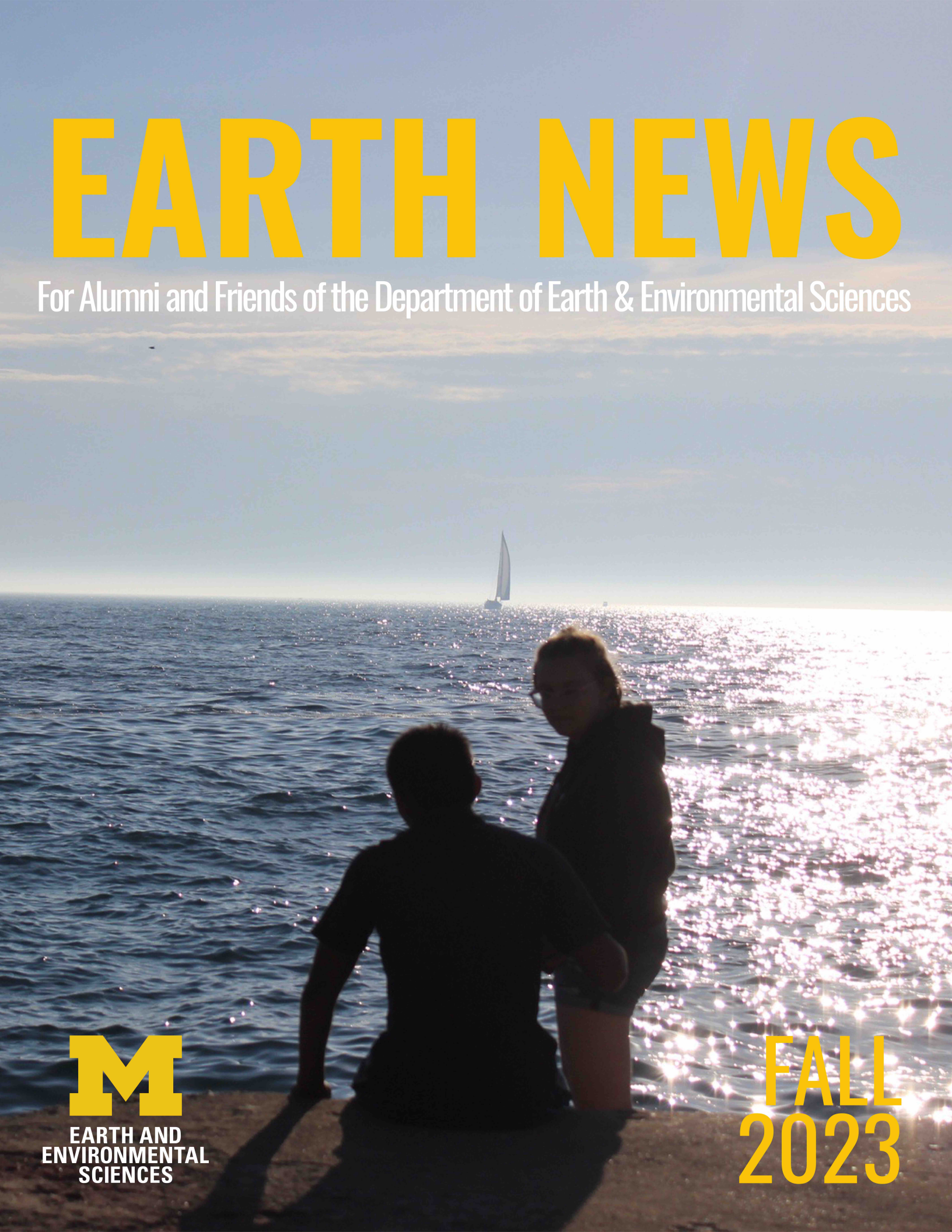
EARTH NEWS

For Alumni and Friends of the Department of Earth & Environmental Sciences



EARTH AND ENVIRONMENTAL SCIENCES

FALL 2023

TABLE OF CONTENTS

CHAIR'S CORNER

JULIA COLE
DEPARTMENT CHAIR

Hello from Ann Arbor!

I'm thrilled to write my first letter to you and share all the exciting things happening in our department over the past year. In July, I picked up as chair where Marin Clark left off. I thank her for five years of leadership during incredibly challenging times, and for her invaluable guidance in this transition. The past four months have been quite a whirlwind - and a lot of fun.

Our program continues to blossom, a testament to the importance of the work we do every day in research, teaching, outreach, and our communities. We serve 189 majors, a record high, and 88 minors in our department. Hundreds more take our classes. We are developing new undergraduate minor programs to serve new fields, for example one that emphasizes geospatial data. On the graduate front, our program has maintained a steady size (68 this year), and the increasing number of applicants testifies to our appeal.

We welcomed two new faculty members to campus this year. Dr. Mónica Carvalho joined us in January 2023 as an Assistant Professor and Assistant Curator with the University of Michigan Museum of Paleontology (UMMP). She investigates the paleoecology of tropical rain forests, with a focus on South American systems. Dr. Jessica Fayne also arrived in January, as an LSA Collegiate Fellow/UM Presidential Postdoctoral Fellow, with a tenure-track appointment starting in September 2024. She develops and applies novel remote sensing methods to characterize surface waters and how they are changing under evolving climate conditions. Both Mónica and Jessica were profiled in last year's newsletter; we're delighted to welcome them in person!

We also welcome Dr. Anders Kiledal as a new research faculty member, and Dr. Anne Kort as a Michigan Society Postdoctoral Fellow and Assistant Professor, a three-year appointment. Anders uses molecular biology ("omics") to characterize harmful algal blooms in Lake Erie. Anne researches the evolution of locomotion in mammals and its association with environmental change, and will teach our GIS class this winter. Finally, we are in the midst of a faculty search for a new tenure-track colleague jointly with the UMMP.

On a sad note, we lost a beloved and inspiring lecturer, Dr. Mark Robbins, to a car accident this summer. You can read more about him in this issue. Mark was known for his infectious good humor, his ready laugh, and for his exceptional dedication to students and their education. We miss him. In his name, we are establishing an innovative teaching prize for graduate students.

Faculty continue to set a high standard of excellence in so many ways. FY23 continued the positive trajectory in external funding established in FY22, with our highest number and dollar value of proposals on record. Most proposals for FY23 are still pending, but we're optimistic that we are on a strong trajectory. This past year, Dr. Naomi Levin and Dr. Matt Friedman were promoted to Professor. Two of our Assistant Professors, Dr. Robert Holder and Dr. Zack Spica, completed successful third-year reviews. And, the year brought several significant honors to our faculty, including Greg Dick (Arthur F. Thurnau Professor, 2023), Jackie Li (AAAS Fellow, 2023; Rodney C. Ewing Collegiate Professor, 2023), Michela Arnaboldi (Teaching Professor, Philip A. Meyers Collegiate Lecturer, 2023), and Adam Simon (2024 Distinguished Lecturer, Society of Economic Geologists).

Looking ahead, we are always asking how we can serve our students better. We are so fortunate to work in a field so rich in hands-on opportunities. Field and lab experiences inspire connections, accelerate new learning, and create stepping-stones to future careers - you'll see abundant evidence of that in the stories ahead! We have set a major goal to increase opportunities for experiential education among our students. Our efforts include new support for undergraduate researchers in Earth labs, and promoting inclusivity in fieldwork, for example with gear programs and local field experiences. And we are moving towards a major (and long-overdue) upgrade of the Camp Davis dining hall, badly needed to keep Camp Davis operational. Stay tuned for more on all of this!

I am excited to be able to contribute to this fantastic department and university - this is an amazing place to be. I am eager to work with all of you to move us forward - I encourage you to connect through the Alumni Advisory Board, or contact me directly, with ideas and suggestions.

Cheers, Julie

FACULTY UPDATES

MICHELA ARNABOLDI

Michela Arnaboldi has been selected as one of the three Collegiate Lecturers at the Ann Arbor Campus for the 2022-23 academic year, making her the Phillip A. Meyers Collegiate Lecturer

GREGORY DICK

Greg Dick was selected as a 2023 Arthur F. Thurnau Professor. Thurnau Professorships recognize and reward a highly select group of tenured faculty for their outstanding contributions to undergraduate education.

MATT FRIEDMAN

Matt Friedman has been promoted to Professor and Curator. Friedman came to Michigan in 2016 and has been serving as Director of the UM Museum of Paleontology since 2018.

ANDERS KILEDAL

Anders Kiledal was hired as an Assistant Research Scientist. Kiledel worked as a postdoc within in Greg Dick's lab prior to his hire as a research scientist.

JIE (JACKIE) LI

Jackie Li has been awarded a collegiate professorship, making her the Rodney C. Ewing Collegiate Professor of Earth and Planetary Sciences. She is also an elected fellow of the American Association for the Advancement of Science (AAAS).

NAOMI LEVIN

Naomi Levin has been promoted to Professor. Levin has been at UM since 2016 and is jointly appointed in the Program in the Environment (PitE). She studies how Earth's organisms and landscapes responded to past climate change.

KERRI PRATT

Kerri Pratt has been promoted to Professor. Pratt is a member of the Chemistry Department and holds a dry appointment in Earth.

NEW FACES AT EARTH

DOMINIC ELDER

Elder works with the building manager to address all facilities issues, including project management, classroom and lab spaces, and any building or asset related needs. Born and raised in Ann Arbor, he earned an associate degree from Washtenaw Community College and a bachelor's in Creative Writing from Texas State University. He comes to us from the School of Music, Theater, and Dance on North Campus. When not working, Elder is an avid disc golfer.

NOAH GOAD

Goad graduated from Michigan State University in 2020 with a bachelor's degree in Journalism. He spent his first two years out of college doing communications work for nonprofit organizations before he joined as Earth's Communications Coordinator in January 2023. Goad handles all things media within the department, including social media, website content updates, graphic design, building signage, department monitors, photo, video, and more.

ANNE KORT

Kort joins us as an Assistant Professor and Postdoctoral Scholar in the prestigious Michigan Society of Fellows. She graduated from Indiana University in 2023 with a doctoral degree in Geological Sciences. She received her master's in Geological Sciences from Indiana University in 2019 and her bachelor's in Earth Sciences from the University of Minnesota in 2016. Kort is a paleontologist investigating the interactions between environmental change and the evolution of locomotor adaptations in mammals.

JUSTIN VANDEVELDE

VanDeVelde received his doctoral degree in geochemistry from Purdue University in 2012 and was most recently the manager of the Stable Isotope Laboratory at the University of California, Merced. He is now the lab manager for Sierra Petersen's Stable & Clumped Isotopes for Paleoclimate & Paleoceanography (SCIPP) lab. When not running mass spectrometers, he enjoys hiking, camping, and the occasional scuba dive.

CAMP DAVIS 2023

At Camp Davis this year, new faculty brought new labs and courses with an environmental focus.

Professors Rose Cory and George Kling added a new emphasis on water to the upper level courses. Water is a critical issue, around the world and right here in Michigan, and students have been expressing more interest in this growth field. Cory and Kling led students in sampling water in the area, including at Grand Teton National Park. They studied the water's chemistry and related that chemistry to the landscape: the geology of the basin, vegetation, recent wildfires, and more.

"Students have a real epiphany when they see all these pieces of their coursework come together," said Nathan Niemi, Camp Davis Director Nathan Niemi

It's one of the reasons Camp Davis is such a vital experience. Coursework can sometimes feel siloed, but fieldwork shows students how connected Earth systems are.

Students loved the new hydrology projects, and Camp Davis faculty hope to continue offering more environmentally oriented classes. With the growing prevalence of climate change in students' daily lives, more and more students are interested in studying environmental systems. There is a new graduation requirement for all LSA undergraduates to take a course in "carbon neutrality and sustainability." Many Michigan Earth courses will likely fulfill this requirement, so there is a great opportunity to broaden the department's reach to students across campus.

This year's Camp Davis was particularly special, because for many it felt like the first normal Camp Davis experience since the COVID-19 pandemic began. With the 2022 session overshadowed by a COVID outbreak, this year was the first year students and instructors were able to interact together normally – eating together in the dining hall every night, having casual conversations in passing, and building new relationships.

"There are really tangible benefits to that," said Niemi. "It's why we teach like this. Students and faculty talking about questions over a bowl of spaghetti – that never happens on campus, and those informal interactions are so important for teamwork and learning."

RETIREMENTS

CLARA CASTRO
Professor Emerita

Dr. Clara Castro retired effective December 31, 2022, after spending 23 years with our great department. Castro received her bachelor's degree in 1988 from the University of Porto, Portugal. She received her master's in 1991 from the University of Paris VI (Université Pierre-et-MarieCurie) and her doctorate in 1995 from the University of Paris VI and Paris School of Mines, France. Castro joined the University of Michigan faculty as Assistant Professor in 1999, was promoted to Associate Professor in 2006, and Professor in 2013.

Castro established the Noble Gas Laboratory, allowing for high precision noble gas isotopic measurements in a diversity of fluids (e.g., rainwater, groundwater, river water, snow, ice, fog, brines, and shale gas) to be made on a routine basis. Her work addressed societal issues pertaining to groundwater resources, climate change, and clean energy. This work was carried out throughout the world, with projects from Antarctica to Greenland - that is, in glacial regions - and elsewhere, including equatorial (Galapagos) and mid-latitude regions in the United States (Michigan, Texas, Hawaii) and elsewhere.

DANIEL FISHER
Professor

Dr. Dan Fisher has been with the university since 1979 when he was hired as Assistant Professor and Assistant Curator in the University of Michigan Museum of Paleontology (UMMP). His areas of expertise include paleobiology, taphonomy, and phylogenetic inference, and his latest research focused on the paleobiology and extinction of mastodons and mammoths, elucidated by studies of growth increments and compositional (isotopic and elemental) time series sampled from their tusks and cheek teeth.

Fisher was promoted to Associate Professor and Associate Curator in 1984 and Professor and Curator in 1992. He was appointed Claude W. Hibbard Collegiate Professor of Paleontology in 2002. He served as Director of the UMMP from 2011 to 2018. Fisher will retire at the end of 2023.

BEN VAN DER PLUIJM
Professor

Dr. Ben van der Pluijm is also making preparations for his retirement; he is set to retire in June of 2024. He is spending the year in Massachusetts where he is working on research. Van der Pluijm's research area is structural geology, dealing with the deformation of Earth's crust on scales ranging from microscope to mountain belt. His second area of interest is societal resilience, examining the connections between human society, Earth resources, and natural processes.

Van der Pluijm was appointed Bruce R. Clark Collegiate Professor of Geology and Professor of the Environment in 2009 and held appointments in Earth & Environmental Sciences and Program in the Environment (PitE). Throughout van der Pluijm's accomplished career, he has authored more than 190 peer-reviewed articles, edited several book volumes, and published the undergraduate textbooks "Earth Structure" and "Processes in Structural Geology and Tectonics".

AAB CHAIR REFLECTION

First, on behalf of the Alumni Advisory Board (AAB), we would like thank Marin Clark for her years as Earth and Environmental Sciences (EES) Department Chair, and wish her, Nathan Niemi and family a fun and productive sabbatical in northern France. Second, we would like to thank Naomi Levin, Carla Huhn and Courtney Hooper for their timely preparation of board materials and meeting logistics which enabled an inclusive and informative board meeting. Hybrid meetings utilizing both in-person and virtual resources are sometimes awkward due to poor audio or problems with recognizing remote call-in members, but through the use of the meeting room 'Owl' feature and online chat tool we achieved a robust discussion of all meeting topics.

The 2023 AAB meeting got off to a roaring start with the new EES Department Chair, Julie Cole, leading with several outstanding kick-off comments which served to set a very positive and cooperative tone which carried through the rest of the meeting. Her introductory comments included the goals of establishing stronger ties with the AAB, especially in support of enhanced student engagements. Julie then went on to give a very thorough review of the state of the department which included observations of increasing undergraduate majors in EES, a trend toward a higher concentration of core Earth and Environmental Sciences majors, and several key graphics that depicted the diversity and sourcing of the graduate student population. Moreover, through the presentations of several of the newer faculty and visiting scholars to the AAB, the board was able to hear of several new lines of research in water shed chemistry and integrated socio-climate-hydrology studies. Collectively, these are strong signs of a healthy geoscience department that is adapting to societal changes and the 'pull' of student interest.

The AAB then heard from Nathan Niemi and several representatives from the LSA Facilities and Operations which outlined the current needs and plans for the refurbishment of the Camp Davis kitchen and dining facility and the addition of a new wet laboratory. The additional details that were provided to the AAB included fundamentals of the design engineering and local construction and permitting challenges that the department is balancing in coming together on the final plans and costs for the facility. Several funding mechanisms for the refurbishment were discussed with the AAB, and the AAB is prepared to help the department through both direct funding activities and support for approaching other internal and external resources. Steve Henry is leading an AAB subcommittee which is assisting the department in looking at several funding opportunities.

The AAB then heard many "flash" presentations on research and student fieldtrips made by the department's passionate student body. This has become one of the favorite agenda items of the AAB, and this year's presentations covered a wide variety of research topics and field areas from across North America to South America and Africa. The AAB also heard the latest on department student experiences by interacting with both undergraduate and graduate students during Thursday night's career discussion where AAB members shared their career experiences and best practices on interviewing and career search techniques. The AAB will be working with Naomi and GeoClub to set arrange follow up career engagements later this fall.

The AAB will be following up with Julie and Naomi on several action items related to AAB department engagements and timing, including the potential for a Spring engagement built around the EES Michigan Geophysical Union (MGU) meeting (April 2024). Stay tuned for further developments!

All the best,

Bill Zempolich,
AAB Chair

UNDERGRADUATE ACADEMIC PROGRAM UPDATE

47
Undergraduates attended field trips

83
Undergraduate majors and minors graduated

Dear Earth community,

The 2022-23 academic year was another year of growth in the number of students choosing to major or minor in the Department of Earth and Environmental Sciences. As our numbers grow, so do the many student activities and accomplishments.

For example, at least eight of our undergraduates presented their research at Geological Society of America, American Geophysical Union, or American Chemical Society meetings during 2022-23, and 13 of our undergraduates presented their research on campus at the annual Michigan Geophysical Union Symposium in April, 2023.

Another highlight of the last year was the field trips our undergraduates were able to take part in. Earth put on three separate field trips during May 2023, to South Africa, Brazil, and Southwest United States (New Mexico and Texas). In total, 47 undergraduates were able to attend these trips - 21 to the southwest part of the United States, five to Brazil and 21 to South Africa. These trips gave them invaluable field and research experiences, along with enriching cultural encounters.

In the last year, a total of 83 students walked away with an undergraduate degree, either as an Earth and Environmental Science major and/or in one of our four minors within the department - Earth Sciences, Geology, Oceanography, and Paleontology - paired with a different major. As we know from our alumni, this year's graduates will also go on to lead and reshape the earth and environmental science community. We look forward to finding out about the many different ways they apply and build on their time at the University of Michigan.

We are also beyond excited to welcome the next cohort of undergraduate students to Earth, and continue to help returning students succeed!

Best,

Rose Cory, PhD
Professor, Associate Chair for Curriculum and Undergraduate Studies

GRADUATE ACADEMIC PROGRAM UPDATE

Dear Earth community,

The 2022-23 academic year was another successful year for graduate students in the Earth and Environmental Sciences Department.

16 graduate students earned their degrees this past year. Nine students received doctoral degrees and seven received master's degrees. We congratulate them on their academic achievements and are eager to see where they go next and what they will achieve in their careers. We welcomed 14 new students to our department this year, bringing our total graduate student body up to 68.

After a hiatus due to the COVID-19 pandemic we were very happy to be able to organize field trips once again. In the spring of 2023, three groups of undergraduate and graduate students and faculty traveled through the southwestern United States (New Mexico and Texas), South Africa, and Brazil. As many of our alumni know, these are invaluable experiences for students. The trip to Brazil was led by two faculty instructors, one being myself, and by graduate students Ethan Shirley and Rodrigo Tinoco Figueroa. I can attest that Ethan and Rodrigo did more than 90 percent of the work. They put together the itinerary, organized most of the logistics, and ran all daily activities in the field. Hats off to them for a job very well done!

Thank you, as always, for your involvement in the Earth community. Our graduate students are extremely grateful for your generous support of their research and experintial learning opportunities, on campus, and around the world.

I invite you to read more about our graduate program and GeoClub on our departmental website and on pages 10 and 11 of this newsletter.

Sincerely,

Jeroen Ritsema, PhD
Professor, Associate Chair for Graduate Studies

68 STUDENTS

In our graduate program for 2023-24

GEOCLUB

GeoClub kayak trip, Summer 2023

YEAR-IN-REVIEW

The COVID-19 pandemic had a devastating impact on the world. Although incomparable to losing a loved one, a major impact of the pandemic was preventing us from being able to get together. It has taken time to get back to some sense of "normalcy" within the Earth community, and last year felt like a huge step forward. Sharing in the value of community within the department, GeoClub played an important role in this by organizing professional and social events for students and all members of Earth.

GeoClub is a registered Voluntary Student Organization with the University of Michigan run by 15 graduate and undergraduate student officers from the Department of Earth and Environmental Sciences. GeoClub is supported by the department and provides the students of Earth with a number of resources, professional development and networking opportunities, as well as opportunities for communication and socialization between all members of the department. Last year, GeoClub's leadership team expanded and saw an increase in student participation as we continued to emerge from the pandemic. This increased participation led to the return of several events that had previously been staples in the department, as well as several new events.

CORNER

GeoClub started off the 2022-23 academic year with the department wide fall picnic. This catered event was open to all Earth members and their families and was held at a pavilion in Gallup Park along the beautiful Huron River. The event was a great way to kick off the year and saw students and faculty socializing in a more casual setting. In October, Earth undergraduate students went on a weekend camping trip to Cuyahoga Valley National Park while Earth graduate students went on their annual weekend retreat to Sleeping Bear Dunes National Lakeshore. The undergrads camped and hiked while discussing sedimentary and fluvial processes. On the graduate retreat students visited the dunes and discussed ways to improve teaching, research procedures, and professional relations in the department. Other fall events last year included an Earth science themed scavenger hunt across campus, a pumpkin decorating competition, and an Earth science related trivia night.

In the winter semester GeoClub traveled to Frankenmuth for Zehnder's Snowfest, went bowling, and saw the much anticipated return of the, formerly annual, department wide Spring Banquet. The Spring Banquet was held at the Cobblestone Farm event center in Ann Arbor for all members of the Earth community. The evening included a catered meal, fun with faculty through games and skits, and dancing.

This year GeoClub is expanding its involvement in the department and in the community. The club is planning on the return of many of its events from last year as well as several new ones. A multi-cultural Thanksgiving and Lunar New Year celebration are currently in the works. There are also plans to increase opportunities for career development and outreach by offering networking events and career panels as well as expanding graduate student mentoring of undergraduates interested in graduate school and research. GeoClub is also looking for opportunities to get involved with community service through community projects and local high schools.

GeoClub is grateful to have the support of the department and our alumni, which allows us to organize so many great events and opportunities for the students, and all members of Earth. Last year was a great year, and we anticipate this year being even better.

Best,

Mack Taylor and Sydney Gable
GeoClub Presidents

EARTH CAMP

HIGH SCHOOLERS STUDY LAKE HYDROLOGY WITH PROFS. NAOMI LEVIN & BEN PASSEY AT EARTH CAMP

Earth Camp 2023 Group Photo

At Earth Camp this summer, students got a new opportunity to do lab work at the University of Michigan Biological Station (UMBS) with Professors Naomi Levin and Ben Passey.

Using funding from a National Science Foundation (NSF) grant, Levin and Passey led a group of 10th grade students on a hydrology research project at the UMBS. Last year, students spent two nights at the station, but this year they stayed three nights to give them extra time to process and plot their data themselves.

The 10 rising 10th graders were from the Wolverine Pathways program, the University of Michigan funded college prep program for high schoolers in Detroit, Southfield, and Ypsilanti. The mission was to get students outside and collecting data. Students started by going out on a pontoon boat on Douglas Lake to measure temperature, pH, dissolved oxygen, and light at various depths.

"Students loved doing it," says Levin. "Some had never been out on a boat before."

Back in the classroom, students plotted their data on a chalkboard to see the trends and discuss the scientific principles behind them. Then in the lab, students looked at the fluorescence of water to determine chlorophyll-a concentrations and get a sense of biological activity in the lake.

"It opened their eyes to how fun research is and showed them that this is a place they belong and something they can do," says Levin. "That's critical – it's how you plant seeds and ideas."

There were two other Earth Camp trips this summer as well, one to the Upper Peninsula and one to Jackson, Wyoming. Four high school seniors did a six-week research experience in Professor Selena Smith's lab. There are several alumni from Earth Camp who are now undergraduate instructors, bringing the camp full circle.

"It's lovely to be building community among the students and getting them excited," says Levin. "And it also gives us a model for how to do this. Personally, I love seeing high school students so jazzed about the environment."

Other contributors to this program include doctoral student Jada Langston, postdoc Anne Fetrow, who helped with Earth Camp at the UMBS this year, and Earth Camp instructors Nicole Rappuhn, Robert Davis, Sydney Libbing, and Andy Jiang.

DEPARTMENT OUTREACH

NEW PILOT PROGRAM TO SHOW UNDERREPRESENTED STUDENTS THAT FIELD WORK ROCKS

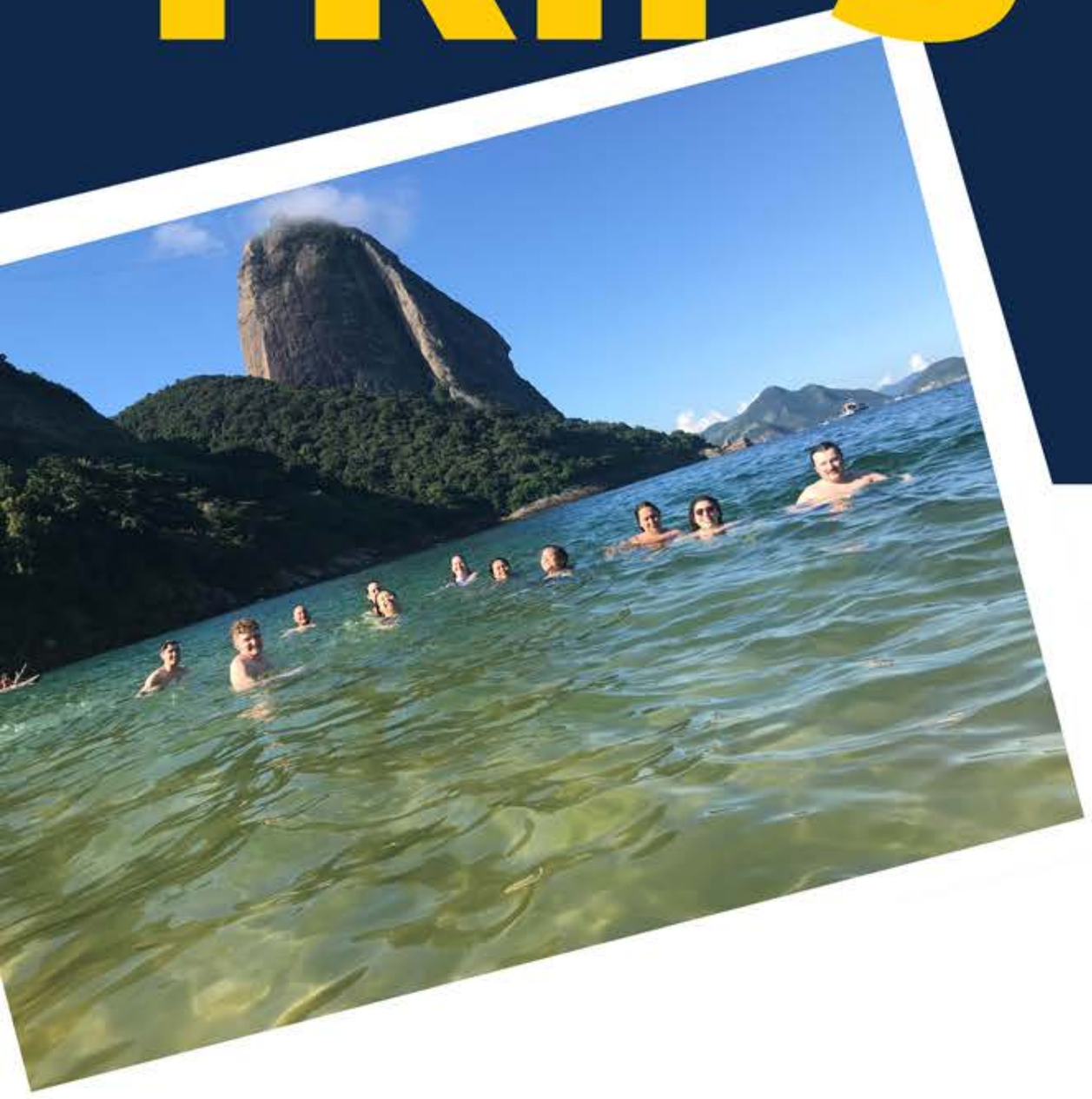
This fall break, the Earth and Environmental Sciences Department will bring seven to 10 undergraduate students on a field trip to see three Great Lakes as a pilot program. The students will all come from the University of Michigan Summer Bridge Scholars Program and are students in the comprehensive studies program who have expressed an interest in earth and environmental sciences.

Outreach specialist Jenna Munson is organizing the trip because she's noticed that some students hesitate to choose Earth and Environmental Sciences as a major because they're nervous about the required Camp Davis field trip. The hiking, camping, and field work can be intimidating, especially for students who have never done them before. The pilot field trip will be part of the department's efforts to recruit students from backgrounds that are underrepresented in this field. Munson hopes that students will realize that fieldwork can be fun, and that they are very capable of it even if they've never gone camping before.

At the students' request, the pilot field trip will begin in the Upper Peninsula. They'll look at the deglaciation history of Mackinac Island and find Petoskey Stones in Lake Michigan. Then they'll travel to a waterfall in the Lower Peninsula to talk about past coral reefs, as well as environmental justice water issues like the Flint water crisis and Detroit floods. Finally, they'll head to Sault Ste. Marie to see Lake Superior and search for Yooperlite, rocks that glow under black light. While there, they'll visit the locks and learn about the invasive species that resulted from the connection to the Atlantic Ocean.

Munson will collect feedback from the students after the pilot field trip and hopes that the program will bring in new students to the department and continue in future years.

FIELD TRIPS '23



This past May, the department led three different field trips to give students valuable cultural and field experiences. Those three destinations were Brazil, South Africa, and southwest United States.

BRAZIL

A NATIONAL TOUR OF BRAZIL'S UNIQUE GEOLOGY AND ECOLOGY

This May, two graduate students and two faculty members took University of Michigan students on a three-week field trip in Brazil. The group included five graduate and five undergraduate students. Two of the graduate students, Rodrigo Figuroa and Ethan Shirley, organized the trip. Figuroa is from Brazil and Shirley lived there for a decade. They led their fellow students around the country to many regions that tourists often don't get to visit.

They started in Rio de Janeiro, then flew up to visit fossil sites in northern Brazil. They went to western Brazil next, where they visited mountains, grasslands, and rainforests. The group spent four days in the Pantanal, the largest tropical wetland in the world and one of the most diverse ecosystems worldwide. They hiked to archeological sites, snorkeled in a rainforest river, went on a night Pantanal safari, and saw a jaguar.

"My major takeaway was that Brazil is diverse – it's not just the Amazon rainforest," says Lucas Gomes, one of the graduate students on the trip. "There are completely different landscapes and ecosystems, many which are unique in the world."

Gomes appreciated how much the students got to practice their observational skills, studying rock records and figuring out the big picture. "I was honing the skills I value as a graduate student, in environments and contexts I'd never encountered before. Throughout the national tour we got to see regional geology and understand how the geologic history interconnects with present day ecology."

Michael Machesky, another graduate student attendee, says the trip gave him a greater interest in wetlands. "Being in the Pantanal, seeing it and some encroaching threats, made me think about the wetlands back in Michigan and the similar threats they're facing."

Both valued the opportunity not just to grow as scientists and hone field work skills, but also to experience another culture.

SOUTH AFRICA

LEARNING ABOUT LANDSCAPES AND INTERNATIONAL COLLABORATION ON AN "EPIC GEOLOGY ROAD TRIP" AROUND SOUTH AFRICA

When Sally Keating, an Earth and Environmental Sciences graduate student, heard about the opportunity to go on a field trip to South Africa, she was thrilled.

"It sounded amazing to get to learn about the geology of South Africa," says Keating. "I love field trips and I love rocks. To have someone who's studied the area for years tell you the story behind the landscape was incredible."

Along with 19 other graduate and undergraduate students, Keating went to South Africa for three weeks in May. They met up with a graduate student from South Africa, who accompanied them on the field trip to give them an inside perspective. The group started in Cape Town, then went on what Keating called an "epic geology road trip" around the whole country, visiting different geological and historical sites. They drove through Karoo Basin, hiked Table Mountain, saw early hominid specimens, and learned about South Africa's rich and complicated history.

"It was an awesome experience scientifically to learn about a completely different continent," says Keating. "We got to see parts of the country that I never would have seen going as a tourist."

In her research, Keating studies tectonic geomorphology and landslide hazards. She works in Nepal, where she has seen how important it is to work with the local people. This field trip emphasized that point for her.

"The trip left me with an impression of how important international collaboration is," she says. "I saw how much you can gain from working with people from different parts of the world with different perspectives."

The students all enjoyed the food, culture, wildlife, and especially the landscape in this beautiful part of the world. It was a reminder that field trips don't just give students invaluable scientific experiences, but also expose them to new cultures and collaborations that are essential in today's global scientific community.

SOUTHWEST UNITED STATES

STUDENTS TRAVEL TO SOUTHWEST UNITED STATES FOR A LESSON IN GEOLOGY

In May, 23 Earth students traveled with Professor Kacey Lohmann and alumnus Peter Knoop to west Texas and New Mexico on an excursion to acquire valuable field experience. They examined the geology of the mid-continent and southwest region of the US, focusing principally on the geological history as expressed in the sedimentary record.

On days five and six of the trip, students traveled to Carlsbad, New Mexico, where they saw the Permian Basin. The Delaware Basin, a trans-tensional basin formed in late Paleozoic times, is rimmed by a world class sponge and algal dominated massive reef complex. Students examined the transition from evaporative, restricted shelf carbonates, to open marine, high energy skeletal sands and reefs at the basin margin, which give way to deep forereef debris flows and basinal sediments. These are exposed along a continuous profile on the eastern side of the Guadalupe Mountains. A trip to Carlsbad would not be complete without a short excursion into the massive cave. Following a cool underground morning, they proceeded to the southern Guadalupes to sample the basin fill comprising thick sequences of deep water siliciclastics which traversed the reef margin during sea level low stands. The final life of this basin, as Pangea assembled, is a restricted evaporate forming sequence called the Salido Fm., comprising gypsum, dolomite and halite facies.

On another day, students visited the Sacramento Mountains, which comprise thick sequences of Mississippian through early Permian carbonates and clastics. Here, the locally famous Muleshoe Mound, Yucca Mound and terrestrial/marine cycles of the Holder Fm were the focus. To appreciate the scope of this glacial-eustatic cyclicity, students spent the morning measuring a classic section in Dry Canyon. This was followed by close examination of a sequence of paleosols and shelf carbonate buildups (reefs).

The trip home included stops in the Coastal Plain to examine Cretaceous and Paleogene sequences of Louisiana and Alabama. Travelers examined the K-P boundary exposed at Moscow Landing and the Silurian ironstones in Alabama. Camp in Oak Mountain State Park, near Birmingham. Driving along the western margin of the Appalachian Mountains allowed them to examine the proximal clastic fluvial and deltaic sediments recording the uplift and erosion of these mountains during the Pennsylvanian.

FACULTY SPOTLIGHT

Jenan Kharbush, Assistant Professor

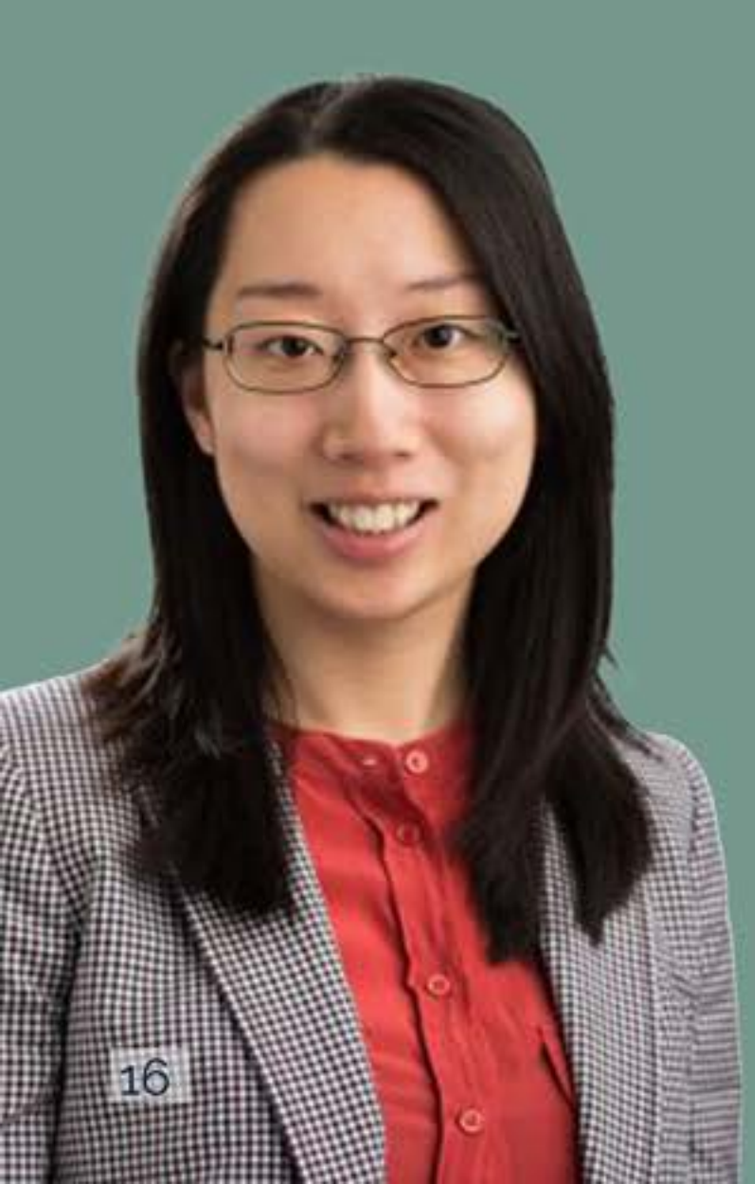
In January, Assistant Professor Jenan Kharbush got her lab up and running in a newly renovated space on the first floor. Kharbush has a background in chemical oceanography and a doctorate from Scripps Institution of Oceanography. She came to the University of Michigan for a postdoc position in 2019 as part of the President's Postdoctoral Fellowship Program, and took a faculty position in 2021. She is now interested in nutrient cycling, specifically the role microbes play in the cycling of carbon and nitrogen in past and modern environments.

One of Kharbush's research areas is the harmful algae bloom (HAB) that happens every year in Lake Erie. Collaborating with a large and welcoming community of HAB researchers, Kharbush studies the role of nitrogen in the Lake Erie bloom.

Her new lab space features many unique tools that she and her students use to study molecular biomarkers specific to certain organisms, so they can track the activities of microbes. A key tool in the lab is the gas chromatography-isotope ratio-mass spectrometer (GC-IRMS), which makes isotope measurements in individual compounds. Kharbush uses the GC-IRMS to study patterns in the isotope values of amino acids in different microbes. Her goal is to understand how microbes with different ways of making a living use nitrogen inside their cells. For example, cyanobacteria like those that cause the Lake Erie bloom likely have different patterns of nitrogen usage compared to heterotrophic bacteria, which is important for understanding their ecological roles.

Kharbush's lab includes her second-in-command, lab manager Thea Bartlett, one graduate student, five undergraduates, and technician Raisha Rahman. Kharbush hopes to add more graduate students to the team and to expand her research through more collaborations. Specifically, she plans to study how the decreasing winter ice coverage on the Great Lakes will affect HABs and nitrogen cycling. Because winds blow the snow off the Great Lakes' ice, allowing light to shine through to the water below, winter is an important but understudied period of primary production and nitrogen cycling. Kharbush believes changing ice coverage may impact the lakes year round. To get started on this research, she is looking for a doctoral student who likes winter and ice fishing!

Yihe Huang, Associate Professor



Associate Professor Yihe Huang is a seismologist who studies what causes earthquakes. Here in Michigan, she looks at injection-induced earthquakes related to the oil and gas industry and considers how to accurately simulate earthquake processes. On her recent sabbatical in Japan, she discovered some surprises.

Huang visited Japan from February to July and collaborated with scientists from the University of Tokyo and its Earthquake Research Institute. She began by playing with the data, which was bountiful. Japan has a borehole seismic station every twenty kilometers. A hundred meters or more underground, the borehole stations have much less noise than a surface seismometer.

While exploring the data, Huang noticed that felt earthquakes in Tokyo were consistently from 60 to 70 kilometers below the surface, unexpectedly deep. Wondering why, Huang employed seismic methods to understand what materials caused these earthquakes.

Three tectonic plates are sandwiched under Tokyo: the North American Plate, the Philippine Plate, and the Pacific Plate. 60 to 70 kilometers down, where the felt earthquakes originated, is where the Pacific Plate begins. Huang analyzed material quality related to mineral composition in patches of the Pacific Plate at that depth, and found a surprisingly low VP/VS ratio, indicating that that part of the plate interface has a very different mineral composition compared to other regions.

Huang plans to continue collaborating with her colleagues in Japan and to explore this data further. She will expand her analysis to the northern part of Japan, which has much larger earthquakes.

Rodney C. Ewing Collegiate Professor Jie (Jackie) Li studies material properties under extreme conditions applicable to planetary interiors and uses her results to understand the origin and development of habitable worlds inside and outside our solar system.

Li received two new grants this summer: one from the National Science Foundation (NSF) geophysics program that's a collaboration with Professor Susannah Dorfman at Michigan State University, and one from NSF's Geoscience Lessons for and from Other Worlds (GLOW) program, which is a collaboration with Professor Marc Hirschmann at the University of Minnesota and Professor Catherine A. Macris at Indiana University-Purdue University Indianapolis. The GLOW grant is co-funded by Petrology/Geochemistry and Astronomy.

For the geophysics project, Li will work on the thermal conductivity of mantle materials. The collaboration will bring together expertise in crystal growth, extreme high pressure and temperature experiments, and heat flow measurements to explore how differences in oxidation in the mantle affect mantle convection. Using diamond anvil cells, they will measure the thermal conductivity of oxidized ferric-iron-rich bridgmanite and post-perovskite. By studying the effect of ferric iron on heat transport, the researchers will better understand how internal heat leaves the Earth and how that cooling drives planetary processes.

For the GLOW project, Li will study mantle oxidation in early Earth, which ultimately allows our atmosphere to contain enough oxygen to support life. One theory suggests that the mantle became oxidized during the magma ocean stage of Earth's history. Li and her colleagues will study redox reactions in molten silicates to understand the role of magma ocean in making Earth habitable and how the process may apply to other planets and exoplanets. One of Li's colleagues will make peridotite glass beads using a laser levitation furnace that lifts the beads with gas. Then Li will use her laser-heated diamond anvil cells to bring the samples to high pressures and temperatures and analyze their ferric to ferrous iron ratio.

Both projects began in August, 2023. Li hopes that the results will contribute to our understanding of life's origin on Earth and how likely we are to find a habitable world outside the solar system.

Jie Li, Rodney C. Ewing Collegiate Professor

ALUMNI SPOTLIGHT

William B. Frank
Assistant Professor, MIT

William B. Frank became interested in geoscience after a physical oceanography elective at the University of Michigan as an undergrad. After switching majors from Physics to Earth and Environmental Sciences, he found seismology through a research project with Professor Larry Ruff.

That path led Frank to an Assistant Professor position at MIT, where he's focusing on earthquakes and solid earth geophysics. Specifically, he's interested in what happens just below the plate interface in subduction zones and how we can link slow slip events to seismic observations and earthquakes.

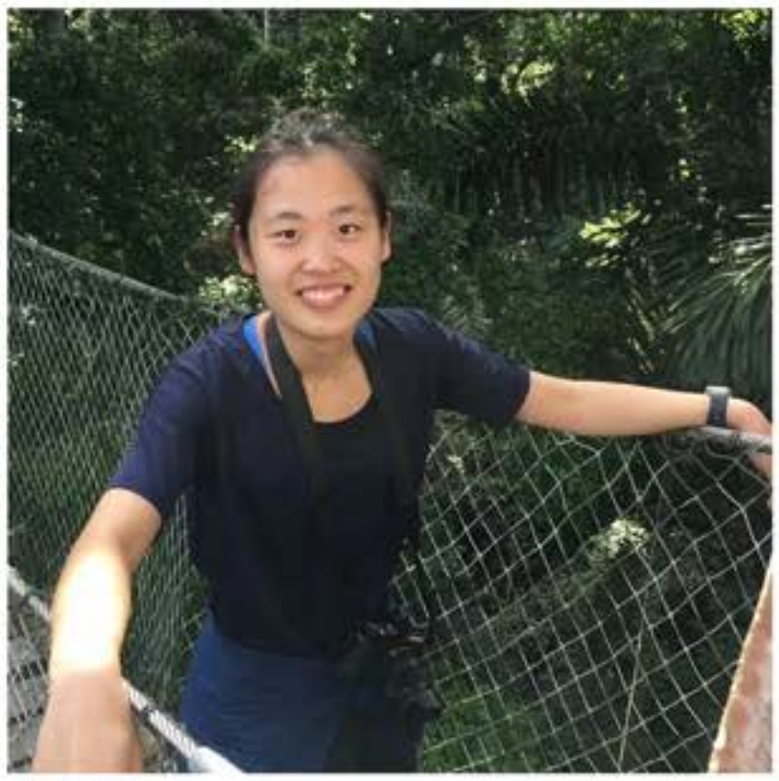
He has fond memories of Friday Smith Lectures and hopes to return to campus this spring to present his research.

Junjie (JJ) Dong
Postdoctoral Fellow, Caltech

JJ Dong was a student at Michigan, which was where his undergraduate work with Professor Jackie Li got him interested in mineral physics and the study of planetary interiors.

That led him to a doctorate at Harvard, which he defended in May 2023. He studied water inside terrestrial planets, then expanded to ice planets like Uranus and Neptune and lava exoplanets as well.

Dong received the 3CPE fellowship at Caltech, a three-year independent position. He'll be applying what he learned in graduate school to exoplanets to determine how water-rich planets may differ in other stellar systems. He hopes to create a unified model for planets both in and outside our solar system, in order to contribute to future understanding of potential life on exoplanets.



Yi Wang
Assistant Professor, Tulane

In January, Yi Wang will begin a faculty position at Tulane University, where she will use geochemical tools to study ocean oxygenation.

Wang graduated from Michigan in 2020 with a graduate degree in biogeochemistry. She credits her doctoral advisor, Ingrid Hendy, with teaching her to write well, a skill she passed on to students she mentored as a postdoc at Woods Hole Oceanographic Institution.

In her doctorate, Wang studied sediments to see how much oxygen the ocean contained during previous warm periods to predict what will happen to ocean oxygenation as the planet warms.

Joining her new university in Louisiana, Wang is excited to have access to one of the largest river deltas in the world as well as the Gulf of Mexico, one of the largest ocean dead zones. She hopes to collaborate with colleagues studying terrestrial sediment discharge and to influence DEI in her new department.

IN MEMORIAM

William C. Kelly, Professor, 1929-2023

Professor William C. Kelly, who went by Bill, passed away peacefully on August 20 at the age of 94.

Kelly received his bachelor's degree from Columbia College and his master's and doctoral degrees in 1953 and 1954 from Columbia University. He came to the University of Michigan in 1956 as an instructor in geology and mineralogy. He was promoted to Assistant Professor in 1958, Associate Professor in 1962, and Professor in 1967. He served as Department Chair from 1978 to 1981 and guided our transition toward grant-supported research. He was appointed C. Scott Turner Professor of Geology in 1983. He went on to serve the university in several ways, including V.P. for Research from 1990 to 1993. He retired in 1994.

Kelly received the ultimate geo-tribute, when colleagues named a newly discovered Mn-Mg-Al silicate mineral "kellyite".

Robert Owen, Professor, 1946-2023

Arthur F. Thurnau Professor Robert M. Owen, often called Bob, passed away peacefully on June 10 at the age of 77. Owen received his bachelor's degree from Drexel University in 1969, and his master's and doctoral degrees from the University of Wisconsin in 1974 and 1975. He joined the University of Michigan faculty as an Assistant Professor in 1975, and was promoted to Associate Professor in 1979, and Professor in 1986.

According to his obituary, Owen treasured time spent at his home in Sea Isle City, New Jersey, being with his beloved dogs, time spent with family, completing The New York Times crossword puzzle, all things Irish, and discussing life and politics over drinks.

Owen is remembered as a wonderful colleague and a great teacher and mentor. He was passionate about undergraduate education, and established a scholarship fund to benefit PitE students taking field courses at Camp Davis. Donations in Owen's memory may be sent to: SEAS Program in the Environment, The University of Michigan ATTN: Matt Kasten, 440 Church St., Suite 2046, Ann Arbor, MI 48109. Checks should be made out to: The Robert M. Owen Fund. On the memo line please write "Donation." You can also donate by searching "Robert Owen" at giving.umich.edu

Mark Robbins, Lecturer, 1987-2023

Mark Robbins passed away in an automobile accident near Camp Davis in Jackson, Wyoming on July 21. Robbins taught as a GSI while earning his doctorate in geology as part of our department. He learned he both enjoyed teaching immensely and had a talent for helping students master difficult concepts. After graduation, he joined the Earth faculty as a Lecturer. Robbins had a true love of teaching and sharing the joy he found in nature and science with others. He was loved by students, many of whom describe him as the best teacher they've ever had. He was passionate, knowledgeable, enthusiastic, patient, empathetic, and caring. A former student described him as having "a twinkle in his eye" as he was quick to laugh and quicker to smile.

A true lover of the outdoors, Robbins was an avid skier, hiker, bicyclist, and camper. A voracious reader, he loved puzzles, craft beers, game nights, wood carving, fresh powder snow, building furniture, and adventures with friends. He was generous with his time and talents and always made time to help others. He made fantastic homemade bread, the best oatmeal raisin cookies, and could be counted on for a variety of pies baked from scratch for annual Thanksgiving get-togethers. His greatest loves in life were his family, his dog Harper, and his close friends, of which there were many throughout the world.

Robbins' family suggests gifts in his name to support Earth and Environmental Sciences students attending Camp Davis. Donations in Robbins' memory may be sent to: Department of Earth and Environmental Sciences, University of Michigan, 1100 North University Ave., 2534 NUB, Ann Arbor, MI 48109. Checks should be made out to: University of Michigan. On the memo line, please write "Mark Robbins." You can also donate by searching "Camp Davis" at giving.umich.edu and noting that your gift is a tribute in Mark's memory.

To honor Robbins and live a great life: stay curious, smile big, appreciate nature, and always keep learning and exploring.

THANK YOU TO ALL OF OUR INCREDIBLE DONORS

We are grateful for your commitment, generosity, and support. We can't wait to put these gifts to work for our amazing students. Thanks for making Michigan Earth a truly amazing community and Go Blue!

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