

U of A Geosciences: Rock-Solid Research



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From the Department Head

Ahoy awesome geoscientists, students, alumni and friends!

While the water has been a little choppy here at the University of Arizona, our Geosciences Department has come through it swimmingly! This first year as Department Head has been a joy, filled with new opportunities and insight. Each day's experiences have deepened my love and appreciation of our shared Geosciences enterprise. Our faculty maintains its long tradition of cutting edge and transformational science, contributing greatly to our top ranking. Our graduate program is now ranked 4th overall in Earth Sciences by US News and World Report, and we will welcome 24 new graduate students this Fall! Also bringing new students into Geosciences, are our new Gem Sciences and Planetary Geosciences tracks, and BA in Geosciences and Society. Our extraordinary staff continues to work tirelessly to keep our department on an even keel, despite all the challenges.

We owe our previous Department Head, Prof. Barbara Carrapa, a tremendous debt of gratitude for her excellent stewardship and foresight during her 5 years as DH. Not only did she handle the unprecedented challenge of rebuilding our business model during the pandemic upheaval, but we also emerged in excellent financial health and are prepared to meet the upcoming budgetary challenges with much less hardship than most of our sister departments. I can't even imagine how difficult my first year as DH would have been if Barbara hadn't left us in such good shape!

The eminence of our faculty continues to grow as Jay Quade was elected to the National Academy of Sciences, one of the highest honors that can be bestowed on a scientist, and a testament to his exceptional contributions to the field! Not to be outdone, George Gehrels will be receiving

the IUGS highest award, the Emile Argand Medal, in recognition of his outstanding scientific record and his influential discoveries that have transformed our understanding of Earth Sciences.

Although we cannot possibly mention all the grants that our department has brought to the university (we have 58 active grants from NSF alone!), there are two that I would like to spotlight in this newsletter: the Core-To-Clouds REU program from the NSF and an Earth Ventures proposal from NASA. We are all deeply appreciative of the efforts of Andy Cohen and Kau Thirumalai, and for their leadership and hard work on the C2C program. For the past two summers, each cohort's projects have been beyond impressive. Jack Holt's breathtaking Earth Ventures proposal, Snow4Flow, was awarded \$30M to study and track retreating glaciers – woohoo!

I would like to thank Larry Archibald for his excellent service as the Chair of the Geosciences Advisory Board, and for all his effort over the summer convincing our new board members to join the crew. Thanks to Larry, we have five new additions to our Geosciences Advisory Board (see page 16) who bring tremendous relevant professional, industry, and academic experience to help advise the department: Chatelle Lynch, Kit Marrs, Peter Megaw, Phil Pearthree, and Pat Risner!

More than ever, we are grateful to our alumni and friends who provide us essential continuous support. We thank you for the ability to look forward toward making new discoveries and growing excellence and access both in our corner of the university and in the world.

Bear Down and Woohoo!

Joellen Russell
Distinguished Professor &
Department Head



Updates on the Graduate Program

From Director Susan Beck

As director of the Department of Geosciences Graduate Studies, I have the pleasure of working with our Graduate Program Coordinator, Rocina Garcia, to oversee our graduate program. Our graduate program is going strong with 24 new graduate students (7 PHD, 12 MS, and 5 Professional Masters) joining our program in August of 2024. We have outstanding graduate students working in all corners of the Earth on amazing projects pushing the limits of Earth and Planetary science research. Our graduate students are working in the field, in the laboratory, and doing computational modeling from seismic tomography to thermochronology models to climate models. We are working hard to build our graduate program and provide not only a great research environment but also a sense of community and opportunities for professional development. Our graduate students continue to get great jobs when they graduate. We had 6 PhD students (Emilie Bowman, Alex Gorr, Alexander Prescott, John He, Carlie Mentzer, and Emilia Caylor) and 5 MS students (Aubrey Bennett, Joseph Martinez, Liam O'Connor, Sydney Acito, and Maria Marroquin) graduate in spring/summer of 2024. We may have a few more students graduate by August. Congratulations to all the graduating graduate students and their advisors!

I want to highlight just a few of our outstanding graduate students. Graduate student Sankha Subhra Mahanti won 1st place at the campus wide U of A Grad Slam Competition! This competition includes graduate students from all departments on campus for the best 5-minute research talk to the public. Sankha was able to convey his work using machine learning to identify earthquakes in the Andes in a short and entertaining presentation. Holly Thomas was awarded



the ARCS (Achievement Rewards for College Scientists) Foundation scholarship! ARCS Scholarships are given to academically outstanding students in science, engineering, math, technology, and medical research. Arkadeep Roy received the Future Investigators in NASA Earth and Space Science and Technology Grant! These are very competitive grants. Congratulations to our department's outstanding graduate students in research, teaching and service for the 2023-24 academic year who are Nitzen Yanay, Joses Omojola, and Ken Gourley, respectively. They all did a fantastic job. Congratulations to graduate students Anca Barla and Jim Bradford who did an outstanding job as co-chairs of the 2024 GeoDaze! We have amazing graduate students!

Thanks to all the alumni who have donated to our graduate student scholarships. These scholarships make a big difference to the graduate students as I am sure many of you remember. Despite the higher salaries that we pay now than in the past, it is still financially very tight for many students as we know that costs are going up in Tucson. The Department gave out ~\$24,000 in scholarships during the academic year and ~\$40,000 in scholarship funds to 16 graduate students for their summer research activities. We had 11 graduate students receive College of Science Galileo Circle Scholarships that were also donated by alumni. Our endowments are going up, so we expect to pay out more in the coming years. Your contributions make a difference! And thanks to all of you who supported the graduate student run symposium, GeoDaze. It continues to be a highlight of the year. I hope to see many of you at next year's GeoDaze celebration March 27-28, 2025! ♦

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GeoDaze 2024 Recap

On behalf of the University of Arizona Geosciences students and GeoDaze committee, we would like to express our sincerest gratitude for your support for GeoDaze 2024. GeoDaze went off without a hitch this year, and that is in big part thanks to our donors and alumni who give back to the students, and help recognize their efforts. Our students did an excellent job presenting their research results and project updates. For many, it was their final results for Masters and PhD theses alike, and we are proud of what they have accomplished. This year also saw the greatest undergraduate representation in our program, and we are proud to have given them the opportunity.

Your donations go directly to these student scholarship awards and to the set-up processes needed to make GeoDaze happen. In the future, we hope that you will consider donating again, and we hope to grow this event as more and more of our students become alumni. Our website, geodaze.com, will be updated shortly with the winners' information along with photos from the event. All of our participants' abstracts and posters will remain on the website until GeoDaze 2025. GeoDaze 2025 will be in a hybrid format once again. We hope you will return next year and



see our students' work from March 27 through March 28, 2025 in the ENR2 Building courtyard and room S107.

Until next year, and again, from the bottom of our hearts, thank you!

—GeoDaze Co-Chairs, Jim Bradford and Anca Barla

2024 GEODAZE WINNERS

Best Undergraduate Poster: Kay Poonawala

Is the Last Interglacial warm period a good process analog for future Greenland mass balance?

Best Undergraduate Talk: Tanner Johnson

Prefire Assessment of Postfire Debris Flow Hazards near Flagstaff, Arizona: Insights from Debris Flow Runout Modeling and Climate Change Implications

Best Graduate Poster: Luke Basler

Reconstructing the mechanisms of Cenozoic crustal thinning in southeastern Arizona using paleocrustal thickness proxies

Geochemistry/Geomorphology Talk: María Paula Marroquín-Gómez

Geochemistry of the Northern Andean Volcanic Zone, Colombia

Geophysics Talk: Aubrey Bennett

A Model for Strain Accumulation in Zones of Distributed Faulting

Economic Geology Talk: Eytan Bos Orent

Implications of ore-related carbonates in the Paradox Basin

Climate Talk: Mudith Weerabaddana

Tropical western Pacific hydroclimate inferred from paired coral trace elements and $\delta^{18}\text{O}$ records from the Marshall Islands

Tectonics Talk: Priscilla Martinez

Controls on the late Miocene marine vertebrate death assemblage in the Atacama Region of northern Chile

Nicéa Wilder Best Graduate Talk: Sydney Acito

Exploring the exhumation of Laramide porphyry Cu-related intrusions using multiple thermochronometers: new insights from the Ruby Star pluton, southeastern Arizona, USA

Montgomery Associates Best Overall Talk: Isaiah Spring

Trace Element Analyses of Plagioclase from Troctolite 76535 and Implications for Mg-suite Petrogenesis

Save the Date!

GeoDaze 2025!

March 27th-28th



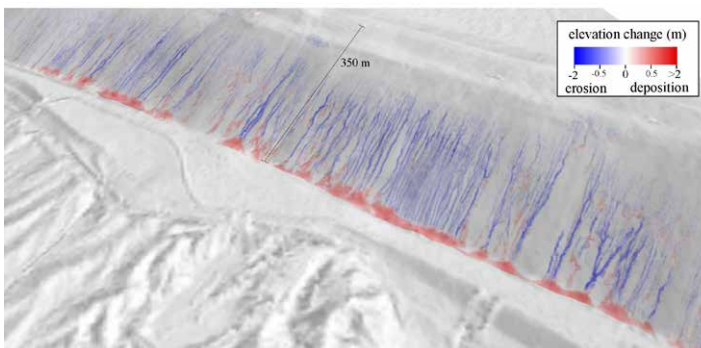
Updates from Associate Department Head Jon Pelletier

As summer break has come to an end and faculty are fine-tuning their Fall course content, I wanted to share some updates on my research and my experience as ADH over the past two years.

Research specialist **Nathan Abramson** and I have developed a numerical model (Rillgen2D) that predicts the likely erosional performance of alternative mine rehabilitation designs (Pelletier et al., 2024a). When mining operations cease, mining companies often seek to minimize future rill/gully erosion on formerly mined hillslopes (Fig. 1) by reshaping the land and emplacing erosion-resistant land covers, including vegetation and rip rap. Mining companies plan to spend tens of billions of dollars worldwide on such rehabilitation over the next few decades. Before Rillgen2D, there was no tool that could accept a 3D model of the proposed design landform, add real-world imperfections/micro-topography to the design, and predict the likely performance of the design as a function of cover materials as a means of choosing among alternative designs. Rillgen2D is based on over 25 years of numerical modeling, rigorously tested against data, dealing with the partitioning of rainfall into runoff and infiltration, the routing of runoff over the landscape and through a layer of rip-rap (if present), and the processes of rill and gully erosion that can result in the transport of mine waste. Rillgen2D has garnered worldwide interest, and is a good example of how basic research conducted at U of A can benefit businesses operating in Arizona.

In terms of my other research projects, I am particularly proud of two recent preprints, both in open review at the journal *Earth Surface Dynamics*.

For the first article, I worked with a group of graduate students and Associate Professor **Luke McGuire** to predict the angles at which two fluvial channels join together to form a larger channel. We found that this angle depends on the initial planarity of the landscape, such that fluvial networks formed on initially relatively planar piedmonts comprised of late-Cenozoic deposits tend to have smaller junction angles, while those formed in relatively less-planar bedrock or older deposits tend to have larger junction angles. This work complemented a paper that I published in 2021 (Pelletier, 2021) that explained how the geometry (depth, width, and along-channel slope) and grain size of fluvial channels vary as one moves downstream from small headwater channels to large continental-scale channels like the Mississippi River. The 2021 paper determined the controls on



how river channels adjust their shape to accommodate the flow of water and sediment, while the more recent paper established the controls on how individual channels merge together. The recent paper began as a class project for Geos 650, a course that I have been offering to students as a research practicum for the past 20 years, with the results of each project published as a journal article with all students as coauthors.



In the second recent article (Prescott et al., 2024b), graduate student **Alexander Prescott** and I worked with colleagues at BHP Copper, Inc. to develop a new method for surface water flow across complex landscapes. The paper began by documenting serious drawbacks with current, widely used approaches to routing surface water flow and then improved those techniques in ways that resulted in greater accuracy while maintaining computational speed and ease-of-use.

As ADH, I have worked to streamline the ways that Geosciences plans and executes its mission in small but impactful ways. That includes detailed planning of course scheduling four years in advance so that students can better plan their schedules. I have also worked with University Distinguished Professor (and overall inspiration) **George Gehrels** to find better and more efficient ways to assess the effectiveness of our educational programs.

Every day, I am reminded of the extra mile that U of A Geosciences students, staff, and faculty go to welcome people into our community to pursue opportunities to understand the natural world and pursue careers that bring both personal fulfillment and the potential to make the world a better place. There are so many standouts among the staff that it is hard to know where to begin the accolades, but I want to highlight the contributions of Business Manager **Pat Waters** in particular. Pat has done a fantastic job guiding Geosciences through a challenging financial time. At the faculty level, Department Head **Joellen Russell** has done exceptional work leading the department while continuing to teach and inspire hundreds of undergraduate students each year, while also somehow finding the time and energy to lead university-level committees responsible for searching for and hiring the future leaders of the U of A. Bravo and woohoo, Joellen!

Finally, I wish to thank all of the Geosciences alumni and friends that support us in our mission.♦

Pelletier, J.D. (2021), Controls on the hydraulic geometry of alluvial channels: bank stability to gravitational failure, the critical-flow hypothesis, and conservation of mass and energy, *Earth Surf. Dynam.*, 9, 379–391, <https://doi.org/10.5194/esurf-9-379-2021>.

Pelletier, J.D., N. Abramson, S. Chataut, S. Ananthanarayan, D. Ludwick, and B.P. Roddy (2024a), New model for predicting the erosional performance of rehabilitated mine sites, *Mining Engineering*, 75(3), 24–28.

Pelletier, J.D., R.G. Hayes, O. Hoch, B. Fenerty, and L.A. McGuire (2024b), Geometric constraints on tributary fluvial network junction angles, *EGUsphere*, <https://doi.org/10.5194/egusphere-2024-1153>.

Prescott, A.B., J.D. Pelletier, S. Chataut, and S. Ananthanarayan (2024), An evaluation of flow-routing algorithms for calculating contributing area on regular grids, *EGUsphere*, <https://doi.org/10.5194/egusphere-2024-1138>.

Department Wows

STUDENTS

Over the course of the last year, our students, both Graduate and Undergraduate, have done some amazing things!

Starting off strong, Associate Professor **Diane Thompson's PhD student, Makayla Deigan**, was awarded a National Science Foundation (NSF) Graduate Research Fellowship. The five-year fellowship provides three years of financial support including an annual stipend of \$37,000.

Undergraduate student **Tanner Johnson** was awarded the Outstanding Senior award in Geosciences by the College of Science. This fall, after a summer internship with William Sale Partnership (WSP), Johnson will be attending University of Texas at Austin to pursue a Master's in Geosciences, continuing his research on wildfires and hydraulic hazards.

Aniket Dhar, currently a third year PhD student working with Assistant Professor **Kaustubh Thirumalai**, was awarded the Carson Scholarship by the University of Arizona. The program is "dedicated to training the next generation of environmental researchers in the art of public communication." (carson.arizona.edu) Additionally, Aniket has received the Galileo Circle Scholarship for the upcoming academic year, a very distinguished honor. Finally, he also received the 2024 AGeS3-Grad (Advancing Geochronology Science, Spaces and Systems) award to support his research proposal on Indian Speleothem growth frequency over the last 400k/yr. He is currently visiting MIT based on his grant to do U-Th analysis on south Indian stalagmites, some of which were collected in this year.

The Department of Geosciences graduated 25 students. Of these students, 14 will be pursuing careers at Saudi Aramco

in petroleum exploration, 4 were accepted into prestigious graduate programs, 1 is pursuing a career in Geotechnology, and 1 obtained a position here at the University to continue supporting the Wildcat Journey. It is thanks to the dedicated faculty and staff of this department that we turn out such fantastic and qualified graduates every semester. Two undergraduate students shined in particular.

Karla Paredes Aguilar is a Planetary Geoscience major dedicated to promoting and inspiring the pursuit of higher education in underrepresented groups. She was the recipient of the Arizona Astrobiology Center's Seed Grant, a highly sought after funding source. With the goal of igniting students' curiosity and equipping them with new skills, Karla shares, "With the seed grant funding, we will design and implement three astrobiology-themed educational modules for high school students that are underrepresented in space science fields through hands-on activities such as microscopy, bioinformatics and fine arts."

"In my first geoscience class, I found inspiration through a community that was as passionate about learning, research, and nature as I was," says undergraduate student **Angela Tatsch**. So far as a student, Tatsch has worked with Dr. Jessica Barnes at the Lunar and Planetary Laboratory as well as Geosciences' very own **Dr. Pranabendu Moitra**, and she joined graduate student **Zoe Wilbur** in presenting research, and is now writing a paper for submission to a journal by the end of the year. Angela shares, "I aspire to attend graduate school to study volcanology or glaciers to diminish the harm society faces against our changing climate".

FACULTY

University of Arizona Geosciences faculty had a great year! Over the course of the last fiscal year, Geosciences has doubled its award revenue. Faculty in Geosciences submitted 61 proposals and received 20 awards with an impressive win rate. Thank you to **Erin Gill**, Senior Research Administrator on the SPS Proposal Support Team, for aiding in the proposal process and contributing to such great results for the year.

One of the highest honors for scientists is being elected to the National Academy of Sciences for distinguished and continuing achievements in original research. That's exactly what Professor **Jay Quade** did! With nearly 400 publications and almost 30,000 citations, Jay has had an extremely influential career. When presented with this honor, a colleague noted, "Over the past three decades, Jay has pioneered new isotopic methods to address major questions in tectonics, global climate change, and evolution. He has set the standard for calibrating geochemical systems in the natural environment; seeking

out that ideal outcrop, even if it means leading, or sometimes dragging, colleagues and students along...I can attest that the elegance of these geochemical data sets has inspired countless students and colleagues, and has helped unravel many secrets of the geologic world".

Jay Quade was also awarded a \$600K NSF grant to "expand the effort to develop lasers for measurement of rare isotopic species (¹⁷O, clumped) as environmental tracers".

Every year, Research, Innovation & Impact at the University of Arizona selects a group of "remarkable [female] faculty and staff who have contributed significantly to our identity as a world-class research enterprise". This past year, 2 women from the Department of Geosciences were recognized: Professor **Susan Beck** and Professor and Dean of the College of Science **Carmala Garziona**.

Professor **Susan Beck** has also been named a senior investigator on the recently announced National Science Foundation (NSF) New Frontiers of Sound Science and Technology Center. She is the co-leader of Problem-driven Project 3, “sensing of the natural environment” which includes trying to measure changes in permafrost through time as well as other applications. Additionally, Susan was presented the AGU (American Geophysical Union) Paul G. Silver Award for Outstanding Scientific Service for 2023. The award is presented annually and recognizes significant contributions to the fields of geodesy, seismology, or tectonophysics from a mid-career or senior scientist. Nominees are assessed on their mentorship of early-career scientists, leadership on community research initiatives, or other collaborative research efforts. (agu.org/honors/silver)

The American Geophysical Union awarded the Willi Dansgaard Award to Joint Faculty Associate Professor **Kevin Anchukaitis**. This award recognizes “significant contributions to the fields of paleoceanography or paleoclimatology from a mid-career scientist within eight to 20 years of receiving their PhD. (agu.org/honors/dansgaard)

Our very own Dean **Carmala Garzione** (Dean Carmie) was also named a fellow of the American Association for the Advancement of Science, a very distinguished recognition!

Each year, the College recognizes a small group of Galileo Circle Award recipients. This year, Professor **Andrew Cohen** was elected as a Galileo Circle Fellow while Associate Professor **Mauricio Ibañez-Mejia** was awarded the Galileo Circle Curie Award. Both award categories highlight the recipients’ contributions to teaching, research, mentoring, outreach, and overall excellence. (science.arizona.edu/galileo-circle)

University Distinguished Professor **George Gehrels** was selected to receive the International Geological Congress Emile Argand Medal as well as give the opening ceremony speech. “This award emphasizes eminent and ground-breaking scientific achievements. It is intended to honor an active senior geoscientist of high international recognition and outstanding scientific record.” (IGC 2024)

Associate Professor **Patricia Persaud** was named a Fellow of the Radcliffe Institute for Advanced Study at Harvard University. The institute fosters interdisciplinary research across a plethora of disciplines. Secondly, Patricia, along with postdoctoral researcher **Alan Juarez-Zuniga**, have received an award from USC/USGS for their proposal titled “Fault Zone Structure from High-Resolution Seismicity Recorded by a Dense Nodal Array in the San Fernando Valley”.

Professor **Jack Holt** received an award recently from Carnegie Mellon University and the National Park Service for his paper titled “Ice-Penetrating Radar Survey at Kennicott Glacier, AK”.

Every year, the Carnegie Museum of Natural History awards the Carnegie Mineralogical Award to recognize “outstanding contributions in mineralogical preservation, conservation, and education”. (carnegiemnh.org) Our very own Professor Emeritus **Robert Downs** was selected as the recipient of this prestigious award.

Finally, Professor Emeritus **Karl Flessa** has received many accolades over the years. This year, he was awarded the Ted and Shirley Taubeneck Superior Teaching Award by the University of Arizona College of Humanities.

STAFF

Congratulations to our outstanding Systems Administrator **Gavin Nelson** who received this year’s Geosciences Staff Excellence Award at the College of Science Staff Advisory Council staff appreciation brunch.



This past Spring, the Geosciences staff had their annual retreat. Led by Assistant Professor **Kaustubh Thirumalai**, staff members went to the Sweetwater Wetlands Park here in Tucson to learn about birding.



Geosciences staff were able to identify an impressive number of birds thanks to Kau’s help. It was a retreat to remember! Not to mention getting steps in to eventually win another Move Arizona title.

Meet our newest staff member, **Melissa Shockley**! Melissa was brought in to cover the business office front desk as an administrative assistant. After working for the state of Delaware for over 30 years, Melissa decided it was time for a career shift. She previously worked as an Administrative Assistant

for a Kindergarten/PreK school so moving on to higher education felt like a full circle! Having been here at Geosciences for nearly a year, Melissa notes, “I feel the business office has a wonderfully positive and welcoming environment, where everyone feels comfortable asking questions and seeking answers. It’s great to be a part of a team where communication is encouraged and getting the support you need is a seamless part of the workday.” Outside of administrative work, Melissa enjoys learning about the ins and outs of the research done in this department. When asked what her hopes are for the future of the department, she shared, “I hope the department stays on top of the latest advancements in geoscience technology and research to ensure we remain leaders in the field... producing the best geoscientists and attracting new students to this top tier program along the way”. We appreciate you Melissa!



Learn more about our most senior staff member, Heather Alvarez, under Department News.♦

News

FACULTY

This has been a big year for research in our department. From accepted proposals and new applications in monitoring climate change to new labs, volunteer work, and highly accomplished new faculty members, we are proud of the work that is being done here.



Professor Emeritus **George H. Davis** hosted a lunch with our new faculty, showing what a great group of talented scientists we've welcomed into our amazing department this year.

There have been many exciting recent developments in Geosciences' economic geology program – the **Lowell Program in Economic Geology (LPEG)** – including new faculty and staff, new facilities, and an increasing range of projects collaborative with U of A's new School of Mining and Mineral Resources (SMMR; mining.arizona.edu). Recent additions to staff include **Marta Codeço** as LPEG Manager, **Jason Kirk** as a leader in our upgraded laboratories (“Minerals Characterization Facility”), and **Jennifer (Jennie) Weiss** as curator and lab coordinator. They join **Hervé Rezeau**, Assistant Professor and Lundin Chair in Economic Geology, **Mark Barton**, Professor and Director Lowell IMR, **Frank Mazdab**, senior research mineralogist, and **Rocio Brambila**, LPEG coordinator. In the coming year, we expect to fill the Lowell Chair in Economic Geology replacing Associate Professor **Eric Seedorff** who retired in 2022 but remains active in our 10-day short courses. Interviews for the Lowell Chair will take place early this fall. Find more LPEG updates under “Labs” and “Education/Training”.

Looking at individual accomplishments and starting off strong is Professor **Jack Holt's** \$30 million Earth Ventures proposal which was selected by NASA. One of six new U of A led missions that have received funding by NASA, the project uses “advanced airborne radar mounted by low-flying aircraft to study arctic glaciers”. The project itself, named Snow4Flow is “designed to address a critical need of climate scientists in their efforts to develop accurate projections of sea level rise from the melting of land glaciers.” (lpl.arizona.edu/news)

Another proposal accepted by NASA for funding was Assistant Professor **Ananya Mallik's** project titled, “How ‘wet’ is the Moon: Insight from hydrogen partitioning during lunar magma ocean crystallization”. The team also consists of U of A Geosciences Assistant Professor **Pranabendu Moitra** (co-investigator), and graduate student **Arkadeep Roy**, along with colleagues

at DLR Berlin, ASU and UA-LPL. The proposal was granted \$548,566 with the goal of estimating the bulk hydrogen content of the silicate Moon or determining the ‘wetness’ of the Moon.

Big news for our volcanology research - the **U of A Volcanology: Fluid Mechanics Lab** is finally up and running! A state-of-the-art rheometer (to characterize viscous and viscoelastic properties of multiphase magma) and other experimental setups (high-speed camera, high-T furnace, gas pycnometer and tap density analyzer) have been successfully installed. U of A Geosciences Assistant Professor **Pranabendu Moitra** shares, “Such an experimental facility is present in very few volcanology labs in the US and is the only one of its kind in the SW USA. The experimental results, along with in-house numerical models, will provide insights into the source-to-surface migration of magma, magma-water interaction, volatile degassing, and volcanic hazard assessment. The first set of results from the U of A volcanology lab will be presented at AGU this year.”

Other research news includes new applications to monitor climate change in Alaska using seismology thanks to the work of Professor **Susan Beck**, Postdoc **Bingxu Luo**, and undergraduate **David Cavalluzzi** (Computer Science) along with collaborators at the University of Alaska Fairbanks.



Professor Emeritus **Karl Flessa** was featured in an NPR story titled “A 3D reconstruction of the woolly mammoth genome might help revive the extinct species”. Karl commented, “The preservation of genetic architectures from the woolly mammoth is really remarkable, but just because you can do it, doesn't mean that it should be done. A genetically modified Asian elephant is not a woolly mammoth. And releasing such an animal into the wild would be arrogant and irresponsible.”

Finally, Professor **Jessica Tierney** received funding for “paleoCAMP” (Paleoclimate training in Climate Archives, Models, and Proxies): a multidisciplinary summer school for graduate students in paleoclimatology.

Promotions

- **Mauricio Ibañez-Mejía**: Promoted to Associate Professor with Tenure
- **Amanda Hughes**: Promoted to Associate Professor of Practice

STUDENTS

One of our most notable accomplishments is increasing the number of undergraduate students by 8% for the upcoming academic year. Our new undergraduate advisor Uphaar Dooling has been a great help in this regard.

This past summer, undergraduate students, along with **SESS (Society of Earth Science Students)**, volunteered at the Salvation Army's summer camp, doing earthquake and tectonics demonstrations with fun props like rocks and fossils. Led by Geosciences Lecturer **Advait Jukar**, undergrads **Jacob**,

Angela, Matt, and Ash, these efforts will hopefully increase local kids' interest in Geosciences!

Over the last year, graduate student **Caden Howlett** has made a dedicated effort to grow U of A Geosciences social media platforms. The interest and results have been nothing short of exciting. During the '23/'24 school year, our Facebook reach was up nearly 75% from the previous year while Instagram reach has increased 21% from the previous year. The numbers are steadily growing and we are so happy to reach more folks in the Geosciences community.

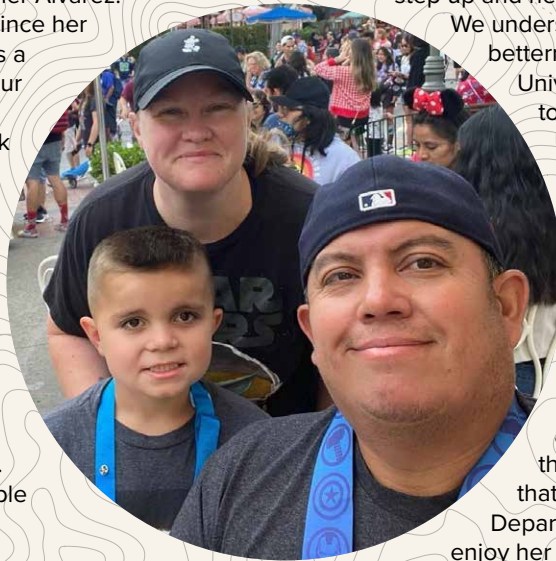
STAFF HIGHLIGHTS

Meet Heather: The Geosciences Business Office processes thousands of transactions each year and fields multiple requests from our personnel, students, central financial services, the College of Science, our alumni, and our donors. It's a vibrant and busy office. At the center of it all, you'll find Senior Accountant Heather Alvarez. Every week, Department Head Joellen Russell sends out a weekly Roundup, and part of this roundup is sharing a Staff MVP. A name that shows up time and time again for being a fantastic team player is Heather Alvarez. Heather has been with the department since her time as a student worker in 2001 and has a wealth of departmental knowledge. As our most senior staff member, Heather has completed an impressive amount of work over the years. In light of the financial restructuring of the university, Heather has had to step in and assist the Department of Computer Sciences with travel & purchasing, as well as aiding in the training of administrative staff. "Heather's willingness to partner up and lend a hand is what keeps the wheels turning, helping move the science along," says Geosciences Department Head Joellen Russell. Heather's experience is incredibly valuable to this department.

As a student employee working for the Dean's Business Office, the USGS, the SEM lab, and finally being hired as a full-time staff accountant, Heather has worked under 4 business managers, 5 department heads, and 2 interim heads. "I will forever be grateful to Gayle Zizzo, my first business manager, for believing in my abilities and hiring me as staff. Over my 23 years in GEOS, I have met many amazing, kind, hardworking, and dedicated people who have made it so easy to stay in Geosciences," Heather said, "and I have made lifelong friendships with former grad students, many who have become faculty in our department and at other universities, our staff, current faculty, and other University employees." Heather has numerous contacts and always has "a guy" to call when a question cannot

be answered. With the reductions in office staff over the past few years, Heather notes that "many things that were once done by financial services have been passed back to the departments. When I first started, we were a team of 6 business staff and now we are a staff of 3. What has made every person who has worked for our business office so special is their willingness to be a team player, especially when we are facing such adversity. As much as it may fatigue us, the business office staff is always willing to step up and help when we are asked, with no hesitation.

We understand that what we are doing is for the betterment of both the department and the University." In the long term, Heather wants to become a business manager here at U of A, specifically in the Geosciences Department, when and if the opportunity presents itself. She hopes the budget crisis will come to an end with a place for all U of A staff to land where "we are appreciated and valued". She finds it important to always try and remain kind, upbeat, and respectful. "As tired as we all are, we are a family, and if we cannot make each other smile and laugh, we will not make it through these tough times." And she does just that! Heather is an incredible asset to the Department of Geosciences. While we all enjoy her sense of humor, it's her hard work and dedication to this department and this University that makes this star shine. Speaking of family, Heather is a dedicated mom and wife. She considers her most important quality to be her love for her family. "My son CJ and my husband of 20 years, Charlie, are the most important things to me," Heather shares, "and at the end of the day, CJ is my number one priority above all other things. He still thinks I'm kind of cool, so I will hang on to that for as long as I can. I have become an advocate for him [he has ADHD], and I fight for his rights and the rights of children like him every day, and I am so proud of that." Heather is an incredible asset to this staff and the office wouldn't be the same without her. Thank you, Heather!♦



FIELD WORK

Work in the Andes with TANGO

Tales from the Graduate Students

The TANGO project aims to investigate the Andean cordillera through a multidisciplinary perspective of seismology, geodynamics, geochemistry, and field-based tectonics research. This year, the TANGO seismology groups have completed their field work, collecting seismic data from two profiles in northern and central Chile and Argentina. The dataset is more spatially dense than any other previous study performed in the cordillera. Through recent technological advancements in seismometer size and portability, TANGO follows the examples of recent publications deploying dense nodal arrays in the Los Angeles basin and the Cascades, in hopes of providing the scientific community with highly detailed imagery of the subduction system and shape of the South American continent.

UA Geosciences Ph.D. students **Jim Bradford** and **Sankha Mahanti**, along with National University of San Juan Ph.D. students Sol Trad and Martin Fernandez worked in the Argentinian Puna plateau and Mendoza areas. The team performed regular trips to the seismometer sites, deploying and maintaining nodal and broadband sensors for the past two years.

TANGO seismologists at U of A are interested primarily in the crust to upper mantle structure and the distribution of seismicity across the cordillera. Both study areas, the Puna plateau in the north, and the area south of the Pampean flat slab, are remarkably different in their development despite belonging to the same system. Through 2023-2024, the U of A seismologists have focused on the Puna plateau area. **Jim Bradford** has produced the most detailed seismic image of the cordillera through receiver functions, imaging the entire complex from trench to foreland up to a 200 km depth. The image, which highlights the lithologic discontinuities and magma storage under the Puna, will



provide TANGO modelers with precise geologic constraints. **Sankha Mahanti** has produced an earthquake catalog using machine learning to pinpoint the distribution of earthquakes and style of faulting. The dataset maps areas of active brittle deformation in the upper crust. He is currently working on constraining crustal thickness through ambient noise autocorrelation. Colleagues in Argentina will be using TANGO to investigate their local basin structure of Salta and San Juan, which will help better inform the public and city planners of seismic hazards.

“The hardest part is getting to the site. Most of the stations we deployed were seemingly close but required several hours of driving along back-country and farmland to reach. Others, fortunately, were directly along the main roads, but we needed to drive up to 6 hours in between sites. I’m confident I’ve left a permanent dent in the seat of the truck. My favorite area was on the

Puna, where there was nothing but salt flats and sand for miles. The sun beats down on you from above and then reflects off the salt back into your face. It makes my extremophile side very happy, but I did get berated for not wearing enough sunscreen when we got back to the city - not nearly as physically strenuous as the geologists had it but still quite the hard work.” (PhD student **Jim Bradford**)

The tectonics group is trying to understand the history of Andean mountain building by integrating field-based structural geology and sedimentology with lab-based isotopic methods. This year, Ph.D. students **Caden Howlett** and **Chance Ronemus**, completed their third season in South America.



They joined Professors **Barbara Carrapa** and **Pete Decelles** and postdoctoral researcher **Veleda Muller** between the latitudes of the Puna plateau and Neuquén basin. A fundamental question addressed by their work is: When and why did the stark southward-decrease in crustal thickness and orogenic mass arise?

Caden Howlett generated the highest age-elevation thermochronology profile on the continent, collected along a climb of Cerro Mercedario (6720m above sea level). His results constrain the timing and

magnitude of erosion that resulted from uplift of the highest part of the Andes (the Aconcagua-Ramada fold-thrust belt). He's also investigating mountain building that preceded the well-studied Miocene–recent pulse. New results from the Atuel river valley, the site of the famous crash landing of the Uruguayan soccer team, and nearby uplifts will constrain the position of the Cretaceous thrust front.

Chance Ronemus is investigating the basin record of the Andes mountains. His analysis of the Manantiales basin, recently

published in *Tectonics*, shows that the fold-thrust belt grew by unsteady jumps and phases of 'out-of-sequence' slip. He's currently working as a Fulbright Scholar living in Mendoza, Argentina. There, he's working with TANGO collaborator Laura Giambiagi and her lab group. His preliminary results integrate stable isotope and zircon trace element data with basin analysis to show that crustal shortening, thickening, and surface uplift processes were nearly coeval and intimately linked.

MORE FIELD WORK HIGHLIGHTS

South Indian Paleoclimate Records, a photo diary



A team of five members, led by Assistant Professor **Kaustubh Thirumalai** and his PhD student **Aniket Dhar**, conducted a field expedition in February 2024 exploring South Indian caves in search of paleoclimate records. This mission involved visiting multiple cave sites, inspecting their structures, and collecting

cave deposits known as speleothems, including stalagmites, stalactites, flowstones, and cave wall concretions. The chemistry of these structures can reveal important information about past monsoon rainfall from tens to thousands of years ago. Over several days, the team navigated and explored numerous cave

regions and collected several formations. The samples collected during this expedition hold the promise of revealing pre-historical monsoon patterns and providing crucial insights into past climatic conditions. They are optimistic that their findings will contribute significantly to the study of monsoon history.

The Tibetan and Colorado Plateaus with Professor Paul Kapp and PhD Students Jordan Wang & John He

Professor **Paul Kapp** and his Ph.D. students, **Jordan Wang** and **John He**, had a productive year. Jordan conducted fieldwork in British Columbia and published a paper in *Geosphere*. John conducted fieldwork on both the Tibetan and Colorado plateaus, published a paper in *Nature Communications*, and just

started a tenure-track Assistant Professor position at UCLA. Paul, Jordan, and John are headed to remote parts of the central Tibetan Plateau this August. The research is funded by a NSF grant entitled "Lithosphere Dripping in Central Tibet: Underappreciated Factor in Orogenic Plateau Development?"



Brazil and Tibet with Researcher Lin Li



« Field work in the East Kunlun Mountains in July, northern Tibet. My colleagues and I are checking Cenozoic strata with >5500 m snow mountains in the background.

» Working on the drilling site of ICDP project TADP (trans-amazon drilling project) in Brazil in early June. The picture shows us holding the first meter-long core.♦



LABS

New instruments, techniques, people, and funding at the Arizona LaserChron Center

By Mauricio Ibañez-Mejía and George Gehrels

There have been a lot of exciting developments at the Arizona LaserChron Center (ALC) during the past year! In addition to new funding from the NSF Instrumentation and Facilities Program to support five additional years of facility operation beginning in 2024, changes in instrumentation, techniques, personnel, and funding have provided new capabilities for the lab.

Background

The Arizona LaserChron Center (ALC) is an NSF-EAR Community facility that supports Earth Science research through the generation of U-Th-Pb geochronologic data and geochemical information by Laser-Ablation ICP Mass Spectrometry. Primary goals are to:

1. Generate U-Th-Pb ages, Lu-Hf isotope ratios, and trace/REE concentrations of

the best precision, accuracy, efficiency, and spatial resolution.

2. Provide opportunities for researchers from around the world (especially NSF-supported scientists) to use our instruments and expertise.
3. Drive the development of new techniques and applications of geo/petro/thermochronology.
4. Build new cyberinfrastructure for data acquisition, analysis, and archiving.
5. Use every aspect of facility operation to increase access to geochronology and enhance expertise and diversity among users of geochronology.

The ALC has operated as a facility since 2005, with progressively increasing impact each year. During 2023, the ALC collaborated with ~422 researchers from ~143 different institutions, supported ~160

different projects (mostly NSF funded), and reported data in ~124 peer-reviewed publications. Researchers include a mix of faculty members, graduate students, and undergraduate students, with ~25% belonging to under-represented minority groups.

New Capabilities in the SEM Lab

With funding from the Instrumentation and Facilities Program at NSF, we have acquired new EDS and EBSD systems for our Scanning Electron Microscope (SEM) and a new Raman Spectroscopic system. These instruments are providing new capabilities for characterizing the composition and structure of minerals. Operation is overseen by research technician **Tristan Nolan** and ALC postdoctoral researchers **Michelle Foley** and **Patricia Kang**.

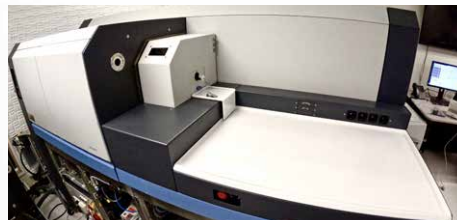
New Capabilities in the LA-ICPMS Labs

Funding from the Major Research Instrumentation (MRI) Program at NSF, GEOS, the College of Science, RII, and Thermo Fisher Scientific, has enabled acquisition of three new mass spectrometers:



Thermo Neoma

Funding from the NSF-MRI program enabled acquiring this next-generation MC-ICPMS system, equipped with a multi-ion counting (MIC) package, 10 movable and two fixed Faraday collectors, three high ohmic (1013) amplifiers, and a collision-reaction cell (CRC) and pre-cell mass filter (MS/MS). The main objectives of this new instrument are to: i) continue improving the accuracy and precision of ALC's established analytical capabilities, and ii) to enable development of new analytical methods in geochronology (e.g., in-situ Rb-Sr). Operation is overseen by ALC postdoctoral researchers **Aleisha Johnson** and **Martin Senger**.



Thermo Neptune

With support from CoS, GEOS, RII, and Thermo Fisher, we upgraded ALC's NU Plasma with a latest-generation Neptune XT MC-ICPMS equipped with a MIC package, ultra-high mass resolution capabilities, two high-ohmic (1013) amplifiers, and 8 movable and one fixed Faraday collectors. The Neptune will primarily be used for U-Pb geochronologic and Lu-Hf isotopic analysis of zircon and allow us to continue improving the accuracy and precision of these well-established ALC methods. Operation is overseen by ALC postdoctoral researcher **Michelle Foley** and research technologist **Yanling Wang**.



Thermo iCAP

This quadrupole ICPMS instrument was recently acquired with funding split between ALC and Thermo Fisher. Its ultra-short dwell time and dual-mode SEM capabilities provide an ideal platform for age and chemical mapping, trace element analyses, and split-stream analyses in combination with the Neptune. Operation is overseen by ALC postdoctoral researcher **Clay Campbell** and research technologist **Yanling Wang**.

Developments in the Lowell Program in Economic Geology – Lab Developments and Current Research

By Mark Barton and Marta Codeço

There have been many exciting recent developments in Geoscience's Economic Geology program – the Lowell Program in Economic Geology (LPEG) – including new faculty and staff, new facilities, and an increasing range of projects collaborative with UA's new School of Mining and Mineral Resources (SMMR; mining.arizona.edu). Over the last two years, SMMR has funded the development of the joint Lowell Institute for Mineral Resources-Geosciences-Mining and Geological Engineering "Mineral Characterization Facility" (MCF). The MCF incorporates related labs and research/teaching collections between Geosciences and Mining Engineering. SMMR support has allowed the hiring of **Jennie Weiss** as our curator/lab manager and **Jason Kirk** as a senior research scientist. The MCF builds on our existing labs and has greatly advanced UA's analytical capabilities in mineral resources.

Among other additions, MCF has a new femtosecond laser – the first of its kind for minerals applications in the US – and three different mass spectrometers (including a Nu Plasma ICP-MS)



(See photo). This has allowed many new projects and applications, including exciting results such as the U-Pb dating of carbonates, garnet, turquoise (among others), and state-of-the-art in situ trace element determinations for critical mineral and metallurgical studies. The MCF is also equipped with a unique optical spectroscopy facility, from visible through near- to long-wave infrared, as well as a new Raman spectroscope capable of 3D material mapping down to 1-micron resolution. Together, these facilities and a number of other labs and collections under MCF give us an unparalleled basis for innovative and collaborative work.

In terms of current research, among the more than a dozen different activities, major projects include several

million-dollar research initiatives. Freeport-McMoRan currently supports seven student projects as part of a long-term partnership on porphyry systems. We have two large Regents grants (ABOR-TRIF) involving all three state universities: \$3.6M on critical minerals from mine tailings responding to a request from the Arizona Mine Inspector, and \$1.4M for an assessment of AZ abandoned mines sponsored by the Arizona Department of Environmental Quality. Recent SMMR seed funding for critical minerals in Arizona has focused on porphyry and VMS systems and has led to a major DOE proposal (over \$2M) for critical minerals in the Southwest. These and other projects engage (and support!) our over two dozen graduate and undergraduate students, a group that includes the largest entering EG graduate class in decades.

For questions and more information, please see lpeg.geo.arizona.edu or contact **Marta Codeço** (mcodeco@arizona.edu) or **Mark Barton** (mdbarton@arizona.edu).

Other Lab Updates

The **Experimental Petrology Group**, led by **Ananya Mallik**, investigates how the interactions between the interior and surface of the Earth and planetary bodies evolve the chemistry and dynamics of these reservoirs. Below are some lab updates from group members:

Emilie Bowman graduated with a PhD in Spring 2024. She used high pressure-temperature experiments coupled with modeling to investigate the fate of dense continental arc roots as they founder into

the underlying mantle. She is currently a postdoc at University of Cambridge, UK.

Anna Rebaza is a PhD candidate whose research contributes to our understanding of mass transfer processes in subduction zones using high pressure-temperature experiments and modeling.

Arkadeep Roy is a PhD candidate working on understanding the thermal and volatile history of the Moon along with the petrogenesis of lunar granites.

Isaiah Spring is a PhD candidate whose current projects revolve around geochemical analyses of intrusive magmatic lunar samples and modeling their formation and chemical evolution.

Bridgett Holman is a senior undergraduate student currently researching the fate of sediment-rich mélanges in subduction zones.

Continued on page 20 »

Instruction & Innovation

Updates from Director Jessica Kapp

Flexible curriculum, active learning, and online options have become paramount to our students in recent years. Adjusting to this while maintaining our standard of excellence in field and laboratory-based geoscience is critical. I am proud to be in a department where faculty are committed to both modernization and excellence, and I look forward to future classroom innovation! With the growing number of undergraduate majors within our department (Fig. 1), it is important that we continue to find ways of promoting innovation and success.



try, especially because our department recognizes the benefits of co-teaching for both students and faculty and is very supportive.

Prior to the University of Arizona, I had taught for 6 years at the University of Houston but had never co-taught. I missed out! As scholar-teachers, we continually seek new ways to help our students learn and grow in curiosity about geoscience.

Co-teaching is one way that faculty can become more effective teachers and learn 'on the job' from the gifted teachers in our faculty. Some of the benefits include experiencing different ways to present material and seeing how different teaching styles can broaden student interest and participation. It was also very cool to hear my co-teachers' stories and personal anecdotes that make our science come alive. On a practical note, co-teaching also offers additional flexibility for travel during the semester or cover during unexpected events. While co-teaching does take a bit more organization and effort in communication, I believe that working together was both beneficial for students and for my growth as a teacher."

While co-teaching is not always feasible, our chair **Dr. Joellen Russell** is supportive of these endeavors, especially when pairing up U of A long-haulers with recently hired faculty.

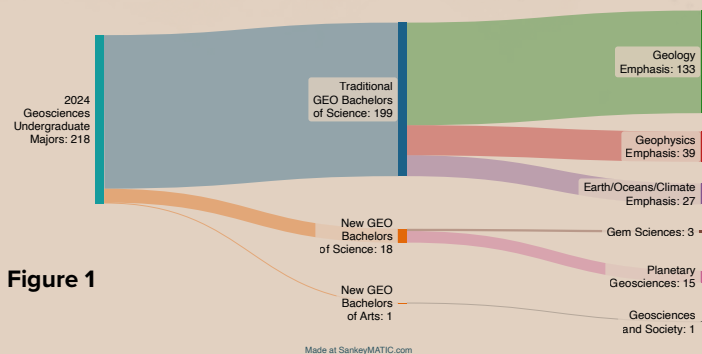


Figure 1

One way to get started is incorporating reflection into classroom culture. Research shows that reflection is key for transfer of learning and metacognition. This can be achieved by adding a few activities throughout the semester to allow students a chance to process what they have learned and want to learn. The Teacher's Guide to Reflection provided by the University Center for Assessment, Teaching & Technology makes it easy and offers lots of examples!

ucatt.arizona.edu/teaching/teaching-resources/resources-guide
(See Guide to Reflection dropdown)

One of my greatest joys at U of A has been co-teaching. Not only did the students benefit from the varied styles and strengths of two instructors, but I picked up ideas and enhanced my knowledge. I had a blast co-teaching Historical Geology (Geos 255) this spring with one of our newest faculty hires, **Dr. Jonny Wu**. Jonny comes to us from University of Houston and has had a lot of teaching experience. I learned new activities and approaches from Jonny that I will incorporate into future offerings. I asked Jonny what he thought about co-teaching, and this is what he said:

"During the Spring 2024 semester I had my first co-teaching experience. In fact, I had two 'first' co-teaching experiences: Associate Professor of Practice Dr. Jess Kapp and I co-taught Historical Geology; and Associate Professor of Practice **Dr. Amanda Hughes** and I co-taught a new seminar, 'The Future of Energy'. After my brief experience as a co-teacher, I can now say that co-teaching is something that every faculty member should



We continue to attract online students to our summer sessions - A huge shout out to Dr. Paul Goodman for offering high-quality online summer courses. Starting next summer (2025), we will be adding Dinosaurs to our summer offerings - who wouldn't want to experience "The Real Jurassic Park" as part of their summer fun!

If you are interested in offering a summer course, reach out to Department Head Joellen Russell.

FIELD CAMP 2024 ROCKED!

Our 2024 Geology Field Camp (Geos 414) returned home on July 13th after five weeks of integrating various disciplines of Earth Sciences across the western North American Cordillera. This year our group consisted of two instructors (Profs. **Barbara Carrapa** and **Peter DeCelles**), two teaching assistants (graduate students **Tshering Lama Sherpa** and **Caden Howlett**), 16 undergraduate students (including 60% female and 20% from other minority groups) from the U of A, Stanford, Middlebury, Dennison, Rochester, Tennessee, Tulsa, UT-Dallas, Bucknell, TCU, Wesleyan, and Lanzhou University, China and our camp cook Eleanor McDonough, a recent U of A geoscience graduate.

Here is a snapshot of some of our students' best experiences:

"Best part of field camp? Everything! One of the most physically and mentally difficult experiences I've ever had. It challenged me in ways I never expected,

and helped me to build confidence as a student, geologist, and person. I was able to accomplish things I never thought I could do previously, and learned many valuable lessons that I will take with me for the rest of my life."

"I want to do field camp for the rest of my life. And that's exactly what I hope to do! These 5 weeks have confirmed my love for field geology, structural geology, and have grown my love for mapping. I will remember and cherish this time forever."

"The U of A field camp was an experience that exceeded all my expectations. As an undergrad student, I truly believe the geological experience is unparalleled across the U.S. It's invigorating, tiring, knowledgeable and most of all, rewarding. The course is an incredible opportunity to grow in many aspects,



not just geology. The camp cemented the idea of me becoming a geologist. I felt more and more like a real geologist every day."

We are fortunate to be able to run this course every summer and support the ever growing need for geologists and geoscientists. If you would like to help support the continued offering of this course, please consider a dedicated donation. Learn more at geo.arizona.edu/fieldcamp.

LOWELL PROGRAM IN ECONOMIC GEOLOGY (LPEG)

Course Updates & Program Developments

Program Developments: LPEG has just created a new Graduate Certificate in Mineral Resources Geology (GCMRG), which complements our regular MS and PhD degrees and the Professional Science Master's in Economic Geology (PSM). The GCMRC is a 12-unit program that officially begins in fall 2024. It is tailored to recent graduates and working professionals interested in building more knowledge and skills in economic geology. It also allows professionals in our 10- and 2-day short courses (lpeg.arizona.edu) to get credit if they register as non-degree students and, if they wish, they can later apply these units toward a graduate degree. The certificate has an in-person component but allows students to take many courses online. Beginning this fall, we will be able to offer some

scholarships for this program thanks to the generosity of Newmont and others. We are also developing an Accelerated Master's Program in Economic Geology (AMPEG). The AMPEG will fast-track students interested in mineral resources, allowing them to get both a bachelor's and master's degree in as few as five years. We hope that will start this year.

Course updates: LPEG's 10-day short courses – Ore Deposits Mapping, Ore Deposit Types ('porphyry' and 'Cu-Au'), and Structural Geology for Exploration and Mine Geologists – continue to go strong with offerings each academic year. In 2023-24, about 100 industry participants joined roughly 35 from the U of A in these three intensive (8-12/hrs per day) classes (Fig. 1). Fees paid by professionals support

student participation and fund all other course costs, including several related TAs. A new 10-day course, "Hyperspectral Applications to Mining", developed by Dr. Dean Riley (Mining Engineering), will be offered for the first time in January 2025. LPEG and LIMR now manage the three 2-day "Inputs to Integrated Planning" series (Geology, Mine Engineering, Metallurgy). **Frank Mazdab** has developed a novel modular 2-semester 400-500-level course in mineralogy, petrology, and geochemistry applied to mineral deposits with a brand-new ore microscopy lab funded by SMMR. That lab will support many other courses, including Geometallurgy and Economic Mineral Deposits, as well as new courses on Ore Microscopy and Mining and Exploration Geology.◆

News from the Advisory Board

The U of A Geosciences Advisory Board comprises colleagues from industry, academia, government agencies, and other areas who possess distinctive experience, skills, connections, and desire to support the Department's mission and vision, and whose efforts support and strengthen the Department. The Board assists the Department in:

- Achieving its goals in education, research, outreach, and development
- Stimulating interdisciplinary College and University initiatives that benefit the Department
- Fostering engagement with alumni, potential donors, and the community
- Encouraging excellence and success in programs of teaching and research, thereby sustaining and strengthening the

position of U of A Geosciences as one of the top geoscience departments in the country

- Provide feedback, advice, information, and resources to the Department Head as requested on issues of strategic importance

We are fortunate that a number of ideally suited new board members have recently agreed to join the existing board. They bring tremendous relevant professional and academic experience to help advise the department. On behalf of the Advisory Board, I am pleased to welcome the following five new members to the Geoscience Advisory Board.



– **Larry Archibald**, Advisory Board Chair

Chatelle Lynch *Chief People Officer, The RealReal*

Chatelle Lynch has served as the Chief People Officer since December 2023. Previously, Chatelle served as Chief People Officer at McAfee, where she ran the People Office, facilities, and corporate and executive communications. During her tenure, she took McAfee from private to public to private again, including the divestiture of a \$4B dollar business to STG, and led a successful \$14B sale to PE. Prior to her CPO role, Chatelle held the head of human resources for Intel Security, a separately owned subsidiary of Intel before being



fully integrated. She has also held leadership positions at Fluor Corporation, specializing in human resources and compensation. Known for her expertise in producing cutting-edge programs that best meet the needs of diverse business models, Chatelle is instrumental in building and leading organizational design and development for today's dynamically changing landscape. Native to Australia, Chatelle holds two bachelor's degrees from Deakin University in Melbourne.

Pat Risner *President, South32 Hermosa Inc.*

Pat Risner is an industry expert in complex mine project planning and development. He has held executive roles across the United States and Australia including Group Health Safety Environmental Officer for BHP, formerly BHP Billiton, where he had direct accountability to the company's sustainability committee of the board of



directors. As a seasoned leader, Pat brings a wealth of knowledge regarding sustainability, long-term economic development through mining, communities, and Tribal relations to the Hermosa project. He holds a degree in Mining Engineering from Missouri University.

Dr. Peter K.M. Megaw

Consulting Exploration Geologist | President of IMDEX/Cascabel and Co-Founder of MAG Silver and Minaurum Gold

Dr. Megaw's Ph.D. work at the University of Arizona was an exploration-focused geological/geochemical study of the Santa Eulalia Ag-Pb-Zn District, Chihuahua and Carbonate Replacement Deposits (CRDs) of Mexico in general. He has published extensively on CRDs and Epithermal Vein deposits and is a frequent speaker at international academic and technical symposia. His primary exploration foci are CRDs and Epithermal Vein Deposits, which he has worked on throughout the Cordillera of North and South America, Ireland and Turkey. Peter was awarded the Society of Mining Engineers 2012 Robert



M. Dreyer Award for excellence in Applied Economic Geology and the PDAC 2017 Thayer Lindsley Award for Outstanding Exploration Success for the significant discoveries made by his team at Juanicipio-Fresnillo, Zacatecas; Platosa, Durango; and Cinco de Mayo-Pozo Seco, Chihuahua. Peter is also an avid mineral collector and since 1985 has been Exhibits Chair for the Tucson Gem and Mineral Show® for which he was awarded the Carnegie Mineralogical Award for 2009. The unusual selenide species "petermegawite" was named for him in early 2022.

Philip A. Pearthree *Director and State Geologist, Arizona Geological Survey, University of Arizona*

Phil Pearthree is currently Director of the Arizona Geological Survey (AZGS). He grew up in the Midwest, graduated from Oberlin College in 1977, and came west to the University of Arizona for graduate school. He gained incredibly valuable geologic expertise and research experience as a graduate student in Geosciences, obtaining his M.S. in 1982 and Ph.D. in 1990. His research focused primarily on geomorphology, Quaternary geology, and active tectonics. He joined the AZGS as a Research Geologist in 1988. There he developed a vigorous program of research, mapping, and investigations in surficial geology, geologic hazards, environmental geology, aggregate resources,



and late Cenozoic landscape development and river evolution, assisted by many excellent U of A graduate students and graduates. He assumed the position of Director in late 2016, very soon after the AZGS was reunited with the U of A. He helped re-establish base state funding for the AZGS in 2017, guided the integration of the AZGS into the U of A, and rebuilt staff capabilities, and fostered renewed growth in research funding working with existing staff and strategic hires while continuing to be involved in geologic mapping and research efforts.

Kit Marris *Co-Founder, CEO, and President, Western Alaska Minerals*

Kit Marris is the Co-Founder, CEO, and President of Western Alaska Minerals, (formerly Western Alaska Copper & Gold). He has more than 25 years' experience in mineral exploration and development, property evaluation, and project financing in Alaska and Mexico. Mr. Marris has worked for major mining companies and consulting firms including Anaconda Minerals Company (Anaconda), Kennecott/Bear Creek Mining, Watts Griffis & McQuat, and Penoles, SA de CV. In 1981, he was the project geologist for the Illinois Creek/Round Top Project for Anaconda and directed the exploration program. He has



extensive experience in financing, permitting, and implementing real estate development projects and joint venture developments with values of \$10-30 million USD. His combined experience in both geologic exploration and development in Alaska, and real estate project financing, permitting and development gives Mr. Marris a unique set of skills to lead this company. He holds Bachelor of Science and Master of Science degrees in Economic Geology from the University of Arizona and served from 2005-2021 on the Advisory Board for the University of Arizona's Department of Geosciences.

Upcoming Events

ACADEMIC YEAR 2024-2025

ExxonMobil Recruitment Event

September 19-21st, 2024
Email rocinagarcia@arizona.edu for more information

Geological Society of America (GSA) Connects 2024

Anaheim, CA
September 22nd-25th, 2024
community.geosociety.org/gsa2024

Department of Geosciences Winter Potluck

December 2024

Department of Geosciences Graduate Winter Open House

December 2024

American Geophysical Union (AGU) Annual Meeting

Washington, D.C.
December 9th-13th, 2024
agu.org/annual-meeting

Department of Geosciences Faculty Retreat

January 2025

Department of Geosciences Advisory Board Meeting

March 26th, 2025

GeoDaze 2025

March 27th-28th, 2025
Poster Session: ENR2 S107 and Courtyard
University of Arizona
geodaze.com

Geosciences Graduate Spring Open House

May 2025

Scholarships & Donations

The Department of Geosciences disbursed \$112,846 in student scholarship support and \$28,980 in non-scholarship student support over the AY23-24 and summer 2024. Below you will find a list of all scholarship and non-scholarship award recipients as well as a highlight of donor support.

Firstly, thank you to Montgomery & Associates for their sponsorship of the Montgomery Associates Best Overall Talk winner and graduate student **Isaiah Spring**. Another thank you to individual donor John Wilder, who sponsors the Nicéa Wilder Best Graduate Talk - winner and graduate student **Sydney Acito**.

UNDERGRADUATE PROGRAM

SCHOLARSHIP AWARDS AY23/24 AND SUMMER '24

Paul E. Damon Scholarship

Pamela Doig

Diane Ferris Scholarship

Alexus Wuertemburg

Chernoff Family Geo Field Experiences

Hannah Elizabeth Howe

Pamela Doig

Angus Robert Steven Grieve

Alexus Wuertemburg

Geosciences Field Camp General Gifts

Pamela Doig

Alexus Wuertemburg

Nell Bernard

David Luffman

Kenneth Lovstrom Memorial Scholarship

Virginia Lynn Noyes

Pamela Doig

Alexus Wuertemburg

David L. Moore Memorial Scholarship

Tanner Johnson

Katleho Ramotso

Wilson R Thompson Scholarship

Katleho Ramotso

Winslow-Ruben-Myron Shared Scholarship

Alexus Wuertemburg

NON-SCHOLARSHIP AWARDS DISTRIBUTED BY GEOSCIENCES

GeoDaze Winners

Tanner Johnson, *Geosciences*

Kay Ateka Poonawala, *Geosciences*

Earth Day Award Winners

Doan Charles Goolsby, *Natural Resources and the Environment*

UPCOMING UNDERGRADUATE SCHOLARSHIPS

We would like undergraduate students to know about scholarships that will be available this coming school year. More information and application instructions can be found on our website at geo.arizona.edu/content/scholarships.

George H. Davis Undergraduate Research Fund

This fund supports and promotes undergraduate research, honoring the legacy of Regents' Professor Emeritus George H. Davis, who has dedicated much of his career to personal mentoring and enriching student experience in and out of the classroom. Students can request support for costs of conducting field work, preparing and analyzing many different types of samples, and computational research expenses.

W. Voorhees Memorial Scholarship

The W. Voorhees Memorial scholarship fund provides a scholarship for a sophomore in geology with a minimum 2.5 GPA, have Sophomore class standing, and have demonstrated financial need.

Zoback Family Scholarship

The Zoback Family Scholarship was established to provide undergraduate students in the Department of Geosciences funding to those who have demonstrated academic achievement and express financial need.

Kenneth A. Lovstrom Memorial Scholarship

The Kenneth A. Lovstrom Memorial Scholarship is intended to provide undergraduate students with a declared major in Geosciences at the University of Arizona and an interest in Geochemistry.

GRADUATE PROGRAM

SCHOLARSHIP AWARDS AY23/24 AND SUMMER '24

Bert S. Butler Scholarship

Tshering Zangmu Lama Sherpa

Peter J. Coney Scholarship

Chance Ronemus

Jim Bradford

Paul E. Damon Scholarship

Anca Barla

Tiger Scholarship

Luke Basler

Keith Katzer Scholarship

Alexander Prescott

David J. Lowell Graduate Scholarship

Emilia Caylor

Eyn Phillips

Jonathan Chappell

Paul S. Martin Scholarship

Corey Crowder

Marie S. Pearthree Scholarship

Priscilla Martinez

Alexandra O'Keefe

Wesley Pierce Graduate Scholarship

Nitzan Yanay

Luke Basler

Maxwell N. Short Scholarship

Luke Basler

Spencer R. Titley Graduate Fellowship

Isaiah Spring

Pratik Santra

Corey Crowder

Sulzer Earth Science Scholarship

Tumaini Kamulali

Tshering Zangmu Lama Sherpa

Anca Barla

Asiya Badarunnisa Sainudeen

Eric Cicero

Luke Basler

John and Nancy Sumner Scholarship

Jim Bradford

Joses Omojola

Mark and Mary Lou Zoback Scholarship

Tumaini Kamulali

NON-SCHOLARSHIP AWARDS DISTRIBUTED BY GEOSCIENCES

GeoDaze Winners

Eytan Bos Orent, *Geosciences*

Aubrey Bennett, *Geosciences*

Mudith Weerabaddanage, *Geosciences*

Maria P. Marroquin Gomez, *Geosciences*

Priscilla Martinez, *Geosciences*

Sydney Acito, *Geosciences*

Luke Basler, *Geosciences*

GeoDaze Chairs

Anca Barla, *Geosciences*

Jim Bradford, *Geosciences*

Earth Day Award Winners

Susan Perez, *Environmental Science*

Alexander Ederer, *Environmental Science*

Michael Spaeth, *Natural Resources and the Environment*



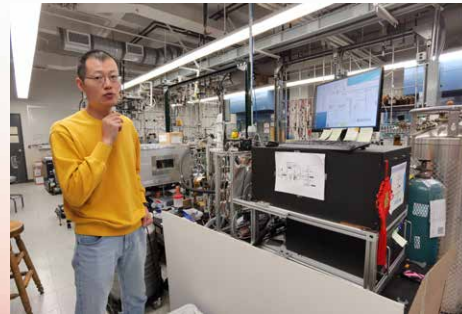
Ocean Sciences
class photos

Other Lab Updates

Continued from page 13.

Carbonate clumped isotope thermometry is a powerful tool for reconstructing Earth's past surface and subsurface temperatures. The **Environmental Isotope Lab**, in collaboration with Aerodyne Research, Inc. and IsoLab at the University of Washington, has successfully designed and developed the world's first laser spectrometer for carbonate clumped isotope ($^{13}\text{C}^{16}\text{O}^{18}\text{O}$) analysis. **Jay Quade**, **David Dettman** and **Zhennan Wang** (Environmental Isotope Laboratory)

recently received a two-year grant from the NSF to expand this pioneering technology by adding a new laser unit for



the measurement of $\delta^{17}\text{O}$ in carbonates. Laser spectroscopic technology is as precise as existing methods using mass spectrometry but directly measures $\delta^{17}\text{O}$ in CO_2 making it faster and more cost-effective without requiring complex pretreatment protocols. The $\delta^{17}\text{O}$ of carbonates gives us information on the evaporation history of a body of water from which a carbonate has formed, adding a humidity/aridity variable to carbonate paleoclimate records. This new methodology will become an invaluable tool in paleoclimate studies. ♦



RESEARCH, INNOVATION & IMPACT

ALFIE NORVILLE GEM & MINERAL MUSEUM

Museum Hours

Tuesday-Saturday 10am-4pm

Admission

UA CatCard: \$5

General: \$15

More Information

@alfiemuseum

gemandmineralmuseum.arizona.edu

Alumni News

The University of Arizona was well represented by its connections to 8 of the 70 international participants at the 2023 Geological Society of America Penrose Conference in Pittsburgh, Pennsylvania, "The Role of Outburst Floods in Earth and Planetary Evolution." This year, **mega-flood research by U of A Geosciences Researchers and Alumni** was featured at the conference which brings together earth-science communities both within and beyond GSA.

Group photograph of the 2023 GSA Penrose Conference field trip attendees. The Columbia River Basalt boulder in the background is one of the largest that were transported by the late Pleistocene Missoula megaflooding that created the Channeled Scabland landscape of eastern Washington state.



Penrose Conference Participants with U of A Geosciences Connections, from left to right: Dr. Tao Liu, recent GEOS postdoc, now at Los Alamos National Laboratory (U of A, Ph.D., Hydrology and Atmospheric Sciences, 2019); Dr. Jim O'Connor, U.S. Geological Survey (U of A Ph.D, Geosciences, 1990); Regents Professor Vic Baker, U of A, currently joint Geosciences faculty member (regular faculty member 1981-1996); Dr. Dorothy Merritts (U of A Ph.D., Geosciences, 1987); Dr. P. Kyle House, U.S. Geological Survey (U of A Ph.D. Geosciences., 1996); Dr. Gerardo Benito (U of A Geosciences postdoctoral visitor, 1990-1992).



Thirteen U of A Department of Geosciences alumni gathered for their annual reunion at the Exploration Roundup conference in Vancouver. The reunion has been a tradition at the conference for over 20 years.

Front Row L to R: Michael McCarrel (MSc 12), Tom McCandless (PhD 94), Eric Jensen (PhD 03), Brooke Clements (MSc 91)

Back Row L to R: Kit Marrs (MSc 79), David Lajack (94-96), Stephen Enders (PhD 00), David Johnson (PhD 00), Matthew Gray (MSc 88), Jennifer Roskowski (MSc 07), John-Mark Staude (PhD 95), David Maher (PhD 08), James Lang (PhD 91)



Also attending the conference but unable to participate in the photo shoot were: Roy Grieg (PhD 21), Rick Van Nieuwenhuysse (MSc 80), Moira Smith (PhD 90), Wolfram Schuh (PhD 93) and Brigitte Martini (BSc 97).

Congratulations to Drs. Jennifer Swenson (PhD 1999) and Stephen Myers (PhD 1998). Both were named "Distinguished Members of the Technical Staff" at the Lawrence Livermore National Laboratory in 2024! The award is given for extraordinary scientific and technical contributions. Jen works on national security issues across the lab and other government agencies. Steve works on seismic verification, seismic tomography and supports the U.S. as a delegate to Comprehensive Nuclear-Test-Ban Treaty Organization Meetings. Jen and Steve both got their PhDs in the Geoscience seismology group working with Susan Beck and George Zandt.

lnl.gov/article/51411/lnl-honors-23-distinguished-members-technical-staff

In Memoriam

Brian Koenig - 1944-2023

Graduated from the University of Arizona in 1978 with a Masters of Science in Geological and Earth Sciences/Geosciences, dedicating more than 40 years of his life to geology and geochemistry.

legacy.com/us/obituaries/legacyremembers/brian-koenig-obituary?id=53704687



Thomas Earl - 1941-2023

Graduated from the University of Arizona in 1972 with a Doctor of Philosophy in Hydrogeology. He was a passionate member of the Galileo Circle that helped send the first rover to Mars.

legacy.com/us/obituaries/centredaily/name/thomas-earl-obituary?id=54932702

Recent Graduate Degree Recipients

MASTER'S DEGREES *Fall/Winter 2023 - Summer 2024*

Name	Title	Advisor	Employer	Position
Omer Iqbal	Numerical-Geomechanical Modelling of Stress and Natural Fractures, Lisbon Valley, Paradox Basin.	Amanda Hughes	Texas A&M	PhD Candidate
Boe Ericksen	Imaging the Subducting Carnegie Ridge and the Ecuadorian Forearc using Teleseismic Receiver Functions	Susan Beck	Ahtna, Inc.	Geologist II
Porfirio Irepan Ascencio	Equilibrium Thermodynamic Modeling of Arclogites: Are We There Yet? An Example From The Andean Northern Volcanic Zone (NVZ)	Mauricio Ibanez-Mejia	Abbott Nutrition	Assistant Chemist I
Brook Runyon	Tectonic evolution of the Paradox Basin with emphasis on shortening style of the interbedded evaporite and clastic Paradox Formation, Northern Paradox Basin, UT.	Amanda Hughes	Harvard University	PhD Candidate
Joseph Martinez	Insights into temporal changes in debris flow susceptibility following fire in the southwest USA from monitoring and repeat estimates of soil hydraulic and physical properties.	Luke McGuire	Montgomery and Associates	Unknown
Liam O'Conner	Assessing the effects of fluvial hydraulic sorting on Detrital Zircon Age Spectra by Coupling CT-Measured grain morphology with U-Pb Geochronology	Mauricio Ibanez-Mejia	Unknown	Unknown
Aubrey Bennett	A model for Strain Accumulation in Zones of Distributed Faulting	Amanda Hughes	Scripps Institution of Oceanography	PhD Candidate
Maria Marroquin	Geochemistry of the Northern Andean Volcanic Zone, Colombia	Mauricio Ibanez-Mejia	ETH Zurich Department of Earth and Planetary Science	PhD Candidate



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Join SESS!



Society of Earth Science Students

Meetings every Friday at 11am

Gould Simpson Rm. 203

Professional Development • Student Socials • Community Outreach

DOCTORAL DEGREES *Fall/Winter 2023 - Summer 2024*

Name	Title	Advisor	Employer	Position
Felipe Rodrigues Ferroni	Paleozoic to Cenozoic History of Basin Subsidence in the Sub-Andean Zone of Bolivia and Argentina (22-21s)	Peter Decelles	Petrobras	Exploration Geologist
Lisa Ziemann	Petrology of modern continental crust formation and recycling in the northern Andean arc	Mauricio Ibanez-Mejia	US Geological Survey	Mendenhall PostDoc
Emily Rodriguez	Multi-scale imaging of the Andean Subduction Zone from the crust of the Northern Andes to the Nazca slab's descent into the lower mantle from seismic tomography	Susan Beck	Los Alamos National Laboratory	Postdoctoral Researcher
Lauren Reeher	Multiscale integration of empirical geological observations with quantitative structural modeling to constrain late cretaceous to eocene paleostress environments on the colorado plateau	Amanda Hughes	Utah Geological Survey	Mapping Geologist
Alice Chapman Kojima-Clarke	Reconstructing Pacific Trade-wind Variability: Assessing and Extending the Novel Coral Mn/Ca Proxy	Diane Thompson	Bureau of Ocean Energy Management	Environmental Scientist
Catherine Hanagan	Earthquake stress and strain through high resolution data analysis: aftershock triggering, afterslip, and a novel borehole strainmeter array	Richard Bennett	EarthScope	Unknown
Alexander Prescott	Novel Numerical Methods and Future Projections in Debris-Flow Hazard Assessments, overland Flow Routing, and Global Suspended Sediment Fluxes	Jon Pelletier	Unknown	Unknown
Alexander Gorr	Constraining the volume and runout of post-wildfire debris flows	Luke McGuire	Mendenhall Postdoctoral Researcher	US Geological Survey
Carlie Mentzer	Investigating terrestrial-marine climate and carbon cycle connections during the late Miocene and Pliocene: Examples from the Andes and the northeastern Tibetan Plateau.	Carmala Garziona	Unknown	Unknown
Emilie Bowman	Investigating the interplay between crustal thickening, magmatism, and lithospheric removal during the evolution of cordilleran arcs	Mihai Ducea	University of Cambridge	Postdoctoral Researcher
John He	Surface response to lithosphere removal: sedimentology, structural geology, geochronology, and geodynamics	Paul Kapp	UCLA Department of Earth, Planetary, and Space Sciences	Assistant Professor
Emilia Caylor	Cretaceous – Cenozoic tectonic evolution of the southwestern and northeastern extents of the North American Cordillera	Barbara Carrapa	University of British Columbia	Postdoc



Colloquium Schedule

Fall 2024 *Schedule is subject to change.*

Each year, The Department of Geosciences hosts a blend of researchers from across the University of Arizona as well as visiting scientists for a series of colloquia covering a wide range of topics.

This year, the colloquium series will be conducted in the Gould-Simpson Building “Fishbowl”, room 228A, on the 2nd floor from 4-5PM on Thursdays. There is a Zoom option as well. Learn more geo.arizona.edu/colloquium or reach out to organizers Kaustubh Thirumalai (kaustubh@arizona.edu), Mauricio Ibañez-Mejía (ibanezm@arizona.edu) or Jonny Wu (jonnywu@arizona.edu).

August 29

Jessica Tierney
(Professor, University of
Arizona Geosciences)
Past Climates Inform Our Future

*NOTE: This talk will be located in Koffler
Rm 204*

September 5

Esteban Gazel (Professor,
Cornell University)

September 12

TBA

September 19

Lowell Chair Candidate

September 26

No talk due to GSA

October 3

Lowell Chair Candidate

October 10

Lowell Chair Candidate

October 17

Lowell Chair Candidate

October 24

Ben Sadler (Postdoc, University of
Arizona Geosciences)

October 31

Eric Schmidtke (PhD Candidate, Simon
Fraser University, Canada)

November 7

Dustin Schroeder (Associate Professor of
Geophysics, Stanford University)

November 14

Megan Mueller (Postdoc, University of
Arizona Geosciences)

November 21

Eleanour Snow (Director, Youth and
Education Program, USGS)

November 28

No talk, Thanksgiving Break

December 5

Robert Stern (Professor of Geosciences,
UT Dallas)