SUMMER 2020

THE UNIVERSITY OF ARIZONA
COLLEGE OF SCIENCE
Geosciences

CONTENTS

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COVER PHOTO:
ALICE CHAPMAN, GRADUATE STUDENT

A NOTE FROM THE DEPARTMENT HEAD

Dear Geoscience Alumni and Friends,

In the last few weeks, I have followed and engaged with important conversations we are having as a society around racial issues and listened to the many people expressing their anger about systemic racism following the murder of George Floyd. These events have spurred important conversations around issues of diversity, equity and inclusion in STEM and specifically in Geosciences. Several faculty and students have asked the important question: What is the Department *actually* doing to address lack of diversity in Geosciences?

One common issue many people of color and other minority groups are complaining about are shortcuts or patchy solutions that many well-intentioned white people, like me, are offering to improve or solve a very complex issue—systemic racism—that requires wholesale and long-term commitment and changes. In order to make a plan that is long-standing, we need to first take a serious look at the problem we are trying to solve and answer the following question:

Why aren't more minorities pursuing a career in STEM?

As you know, many articles have addressed this question. The answer to this question is very complex and depends on several factors, including the secondary education of students, the social environment of the student's home, and the student's perception of the social context of certain careers (e.g., Dewsbury et al., 2019). This last point is essential—so why aren't minorities interested in Geosciences?

The answer to this is, at least in part, related to the perceived job prospects for a career in Geosciences. For example, the jobs are in oil, gas, mining, environment, hydrology, government, education, academia, etc. The decision on which degree to pursue largely comes down to which degree provides the higher chance of a well-paid job and to the perception and level of knowledge students have about the field of Geosciences before they get to the university. The Geosciences are undeniably male and white dominated and this by itself can be a deterrent to POC and other minorities.

As a first-generation university graduate, woman, foreigner, and from a relatively low socio-economic background, I feel like I can relate to some of these challenges. Yet, I have no idea about the real issues facing people of color. That being said, there are things we can all do to help. The best thing I, as an individual and academic, can do to help is to lead by example and make changes I can control: educate and self-educate on DEI issues; recruit, advocate for, and support minority students; and recruit, advocate for and support minority hires in our department. At the department level, this is a list of things we are doing and plan to do:

Current Actions:

- In an attempt to remove barriers associated with regular field camp classes, we offer

Accessible Earth, a critical class, which provides field opportunities for students with disabilities and is open to all students.

- We have formed a DEI (Diversity, Equity, and Inclusion) committee in 2019 with a clear mission to help the department on issues of diversity, equity and inclusion.
- Several facilities in our department, e.g. LaserChron, have trained and employed minority students and staff and continue to do so.
- A number of faculty explicitly work to recruit graduate and undergraduate students from under-represented groups.
- We have implemented a "career conversation" seminar open to undergraduate and graduate students to discuss different career opportunities in Geosciences. Several speakers are minority individuals.

Ongoing and Future Actions:

- We plan to offer a seminar on Diversity, Equity, and Inclusion this academic year.
- We are re-evaluating our graduate entry requirements (i.e. GRE). A discussion and vote on this is planned for our first faculty meeting in August.
- The DEI is working on a plan for the department to apply for the AGU Bridge program.
- We are developing faculty search committee criteria and rubrics, with particular focus on commitment to diversity.
- The DEI committee is working on providing suggestions to faculty about DEI training.
- We plan to explore alternative undergraduate level pathways to what we have in place. To this end, I am tasking the undergraduate program committee with designing a plan for a BA degree that will take place largely online. This should open the door to a different pool of students including non-traditional students and will remove potential barriers associated with field and other in-person activities.

I would like to come up with a plan with the graduate students about things students can do to educate and promote Geosciences among underrepresented groups (for example, graduate students have routinely developed outreach programs at local schools). I am sure that such initiatives are already in place and I would like the department to support such initiatives and to help increase awareness across to community. I am committed to listening to your concerns and ideas and I would like to discuss ways we can work together to move forward and improve the situation.

Please join us in this important conversation by sharing your ideas for solution and further actions.

Sincerelv.

Barbara Carrapa
Professor and Department Head

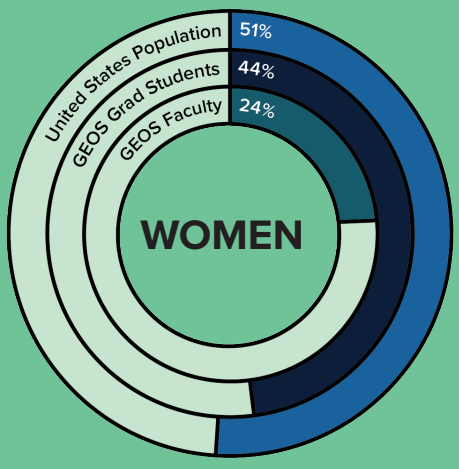
COMMITMENT TO DIVERSITY, JUSTICE, AND ANTI-RACISM

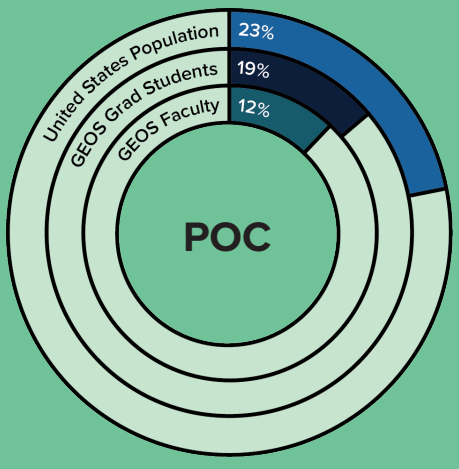
Dear Geoscience Community,

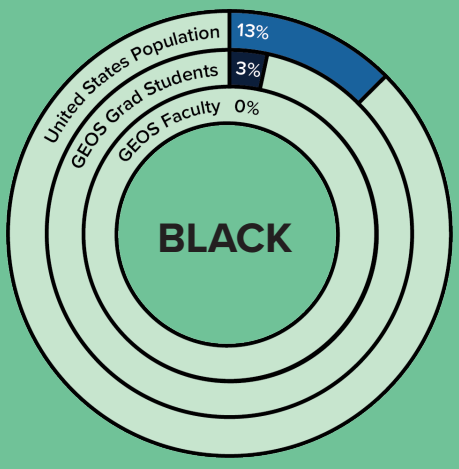
The Geosciences faculty would like to affirm that we are committed to actively promoting equity, inclusion, justice, and anti-racism in this department. Based on our recent reflections and discussions as a community, we are considering the following concrete actions to improve representation and promote a workplace climate that is welcoming for all. We invite and welcome all members of our community to work with us on one or more of these topics and to engage in productive discussions on how we can move forward.

To begin, we would like to take a moment to reflect on longstanding challenges that our department continues to face regarding diversity, inclusion, and racism. First, we acknowledge that, like the Geosciences as a whole, our department lacks diversity. Our current faculty composition (24% women, 12% people of color, 0% Black) is less diverse than our graduate student population (44% women, 19% people of color, 3% Black) and both compositions are substantially different from our country as a whole (51% female, 23% people of color, 13% Black). Recruitment and retention of a diverse student body, researchers, staff, and faculty should be a long-term goal for our department.

Second, we acknowledge that our department has struggled with overt racism in the past. In 2016, one of our Black graduate students experienced several racially-motivated attacks. We challenge ourselves to take a firm anti-racist stance within our immediate departmental community and prepare ourselves to be allies and intervene productively should any member of our community experience racism or discrimination of any kind. We challenge ourselves to take concrete actions in order to increase participation and make our department more diverse. The following is a list of actions and opportunities that we are currently considering; all ideas (here and developed over the summer) will be discussed extensively at our faculty retreat in August, working towards a concrete action plan.







We look forward to your continued input and ideas to meet the needs and values of our community.

Removing structural barriers in admissions, hiring, and degree requirements:

1. GRE requirements for graduate admissions
2. Holistic, equitable, and transparent processes for admissions and hiring
3. Broadening accessibility and inclusion in field and laboratory activities

Professional training in diversity, inclusion, justice, and anti-racism:

1. Professional training sessions, from an entity like the UW Advance program
2. Departmental “community of practice” (e.g., modeled after UCAR/NCAR UNEION) to continue our growth as a community, and to foster an inclusive workplace for all
3. Bystander intervention training

Mentoring for inclusivity:

1. Engagement with and support for student organizations and their active partnerships
2. Inclusive scientific meetings and panels
3. Mentoring for students, postdocs, research scientists, and faculty of color

Developing local outreach efforts:

1. Programs and partnerships between UofA and underserved schools/districts in Pima county
2. Research Experiences for Undergraduates (REU) program
3. Partnerships with the local native tribes (leveraging the Native Peoples Technical Assistance Office)

Removing structural barriers to service and outreach:

1. Departmental discussions on DEI-related issues and opportunities
2. Small group or one-on-one listening sessions to solicit concerns, input, and ideas
3. Explicit structures to promote individual and group contributions to diversity, equity and inclusion in the department and broader community.

We value your input and ideas for other opportunities you would like to add to this list. We look forward to working closely together to develop concrete goals and timeline over the coming months. Together, we can build a safe and inclusive community for everyone to learn and discover.

Sincerely,

The DEI committee, on behalf of the faculty

DEPARTMENT NEWS

Above: Pat Waters receives her Star Award from CoSSAC and the Business Office visits the zoo

STAFF NEWS

- Pat Waters, Senior Accountant, was awarded the Star Award in November 2019 by the College of Science Staff Advisory Council (CoSSAC). The Star Awards are presented to staff members in the College of Science who perform job duties "above and beyond" what is normally expected, improve efficiency in the workplace, and demonstrate, through attitude and actions, a willingness to help others and work as a team. Congratulations Pat!

- A team of staff members, researchers, and graduate students participated in this year's Walk Across Arizona, an 8-week competition sponsored by UA Cooperative Extension and UA Life & Work Connections. Heather Alvarez, senior accountant in the Geosciences business office, led the Joggernauts to a 6th place victory over 54 other teams. Team members Heather Alvarez, Denise Carrillo, Pat Waters, Hannah McCormick, Alex Burant, Alice Chapman, Stefanie Chambers, Xiaoyu Zhang, Lael Vetter, and Lilian Schwartz logged over 2831 miles!

- The Geosciences business and advising offices visited Reid Park Zoo as part of their annual team-building effort during the week of Spring Break.

FACULTY NEWS

- Diane Thomas Received an NSF CAREER Award for her project, "Climate-change vulnerability in the Marshall Islands: learning from the past & inspiring a new future."

  Diane Also received the 2020 Outstanding

Faculty Award presented by the Geosciences Advisory Board.

- Ji Yeon Shin received the 2020 Excellence in Teaching Award presented by the Geosciences Advisory Board.
- George Davis announces his retirement after 50+ years at the University of Arizona.
- Geosciences Adjunct Professor Kay Behrensmeyer was elected to the National Academy of Sciences.
- Karl Flessa is the 2019 Sports Car Club of America, Rocky Mountain Division, champion in the Spec Racer Ford class.
- Peter Reiners was elected to be a 2019 American Geophysical Union Fellow.
- Jess Tierney received the Galileo Circle Curie award from the University of Arizona College of Science.
- Susan Beck, Pete DeCelles, Mihai Ducea, Barbara Carrapa and Eric Kiser received an NSF Collaborative Research Award for their project titled, “TransANdean Great Orogeny (TANGO).”
- Kaustubh Thirumalai writes, “We have a new paper out, entitled ‘Methane, monsoons, and millennial-scale variability,’ which focuses on addressing the links between atmospheric methane—a potent greenhouse gas—and changes in the strength of the Asian monsoon during abrupt climate change events over

Above: Diane Thompson poses with her Outstanding Faculty Award and Karl Flessa's winning race car

Above: CSC and Pueblo Vida's Threshold IPA and Peter Kresan's aerial image shown on a new 200 Peso bill

the past half million years. We show that the previously held assumption of tropical rainfall being a driver of methane variability may not be completely valid and that melting ice in the Northern Hemisphere might be an important driver of changes in methane.

We have two new papers out that look at past and future variability in the Indian Ocean. One is led by my colleagues from Australia and the other is by my colleague Pedro DiNezio and features Jess Tierney as well. Both papers point out that the Indian Ocean is capable of MUCH larger year-to-year swings in climate than we give it credit for, based only on human-made observations over the last century. Paleoclimate data instead suggest much larger climate variability in the past 20,000 years, and back up models which simulate large changes to come in the future.

Finally, with colleagues from India we recently published a paper which suggests that Indian monsoon extremes will get worse with ongoing and future global warming."

- In an effort to bring awareness to the climate change crisis, Jessica Tierney and Joint Faculty Kevin J. Anchukaitis of the Climate Systems Center collaborated with Tucson's Pueblo Vida Brewing Company to release the Threshold IPA.

- Peter Kresan, retired Senior Lecturer, writes, "The Bank of Mexico just released the new 200 Peso bill which features the Pinacate on the back of the note. The Bank of Mexico used a portion of one of my aerial images for the graphics on the back."

STUDENT NEWS

- Emma Reed was selected as a 2019 Carson Scholar.
- Alice Chapman was awarded a Smithsonian Institution Fellowship and the Outstanding Student Presentation Award from the American Geophysical Union.
- Lydia Bailey, Lauren Reeher, and Samantha Portnoy received grants from the AAPG foundation to support their research. There are only 110 awarded throughout the country!
- The 2019 M. Lee Allison Scholarship was awarded to Lydia Bailey by by the Arizona Geological Society.
- The 2019 Courtright Scholarship was presented to Robert Hayes by the Arizona Geological Society.
- Tucson High School student Mia Franks, who interned with Kaustubh Thirumalai over 2019-20, won first place at the SARSEF science fair for her poster titled "Microfossils and Monsoons: What is their Relationship across the Deglaciation?" She also won the Regional Award for Outstanding Achievement for Scientific Excellence in Atmospheric, Oceanic, or Hydrologic Sciences as well as the Arizona Hydrological Society Award. She is now a finalist for the International Science and Engineering Fair.
- Dan Collins received the 2020 Geosciences Outstanding Senior Award.
- Ryan Sigat received the 2020 Geosciences

Above: Outstanding Senior Award winner Dan Collins and Excellence in Undergraduate Research Award winner Ryan Sigat

Excellence in Undergraduate Research Award.

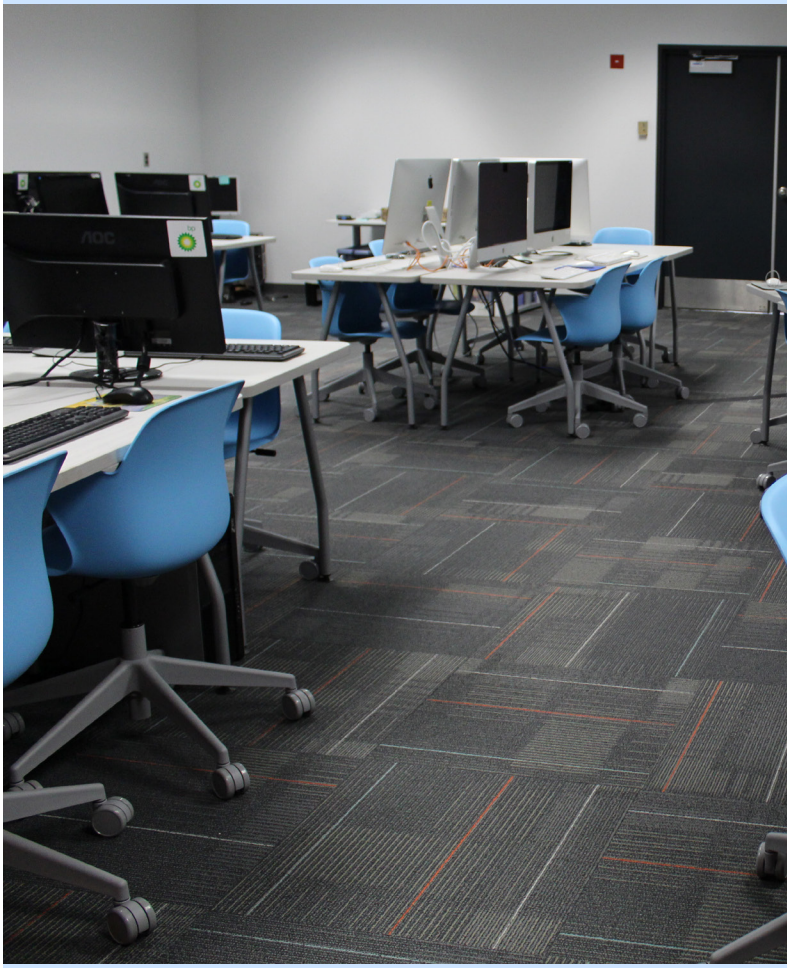
- Rebecca Beadling was a 2020 NOAA Climate & Global Change Postdoctoral Fellowship Awardee.

- Jessie Pearl received the Association for Tree-Ring Research Prize for best Doctoral Thesis 2020.

SERVICE AWARDS

Congratulations to the following faculty, staff, and researchers for these remarkable service achievements! We commend you on your service to the University of Arizona and thank you for your commitment to the Department of Geosciences.

- George Gehrels, 35 Year Award
- Mark Barton, 30 Year Award
- Susan Beck, 30 Year Award
- Mihai Ducea, 20 Year Award
- Heather Alvarez, 15 Year Award
- Kimberley Elliott, 15 Year Award
- Kiriaki Xiluri-Lauria, 15 Year Award
- Xiaoyu Zhang, 15 Year Award
- Nathan Abramson, 10 Year Award
- Barbara Carrapa, 10 Year Award
- Dominique Giesler, 10 Year Award
- Paul Goodman, 10 Year Award
- Mark Pecha, 10 Year Award
- Gayland Simpson, 10 Year Award



GEOSCIENCES DONOR SPOTLIGHT

Stacie Gibbins, PhD '06

In December 2018, the Department of Geosciences was awarded $50,000 in matching funds as part of the Innovative Spaces for Learning and Engagement grant program to renovate the Computational Geosciences Center. A generous matching donation from Stacie Gibbins and ExxonMobil allowed us to begin construction, complete the project, and open the new Computational Geosciences Center to students and faculty in Fall 2019.

We thank Stacie, ExxonMobil, and other supporters of the Computational Geosciences Center for helping us bring our vision to life.

Rolfe Erickson, PhD '70

The Dr. Paul E Damon Memorial Scholarship Endowment was created through a generous gift made by Rolfe Erickson at the end of 2019. This endowment was made in recognition of Rolfe's advisor and mentor, Dr. Paul E. Damon.

The Dr. Paul E Damon Memorial Scholarship will be open to full-time undergraduate or graduate students in the Department of Geosciences who demonstrate interest in or provide evidence of activity in geochemistry. We look forward to announcing the first award in Spring 2021!

Thank you, Rolfe, for your continued support.

Above: The newly renovated Computational Geosciences Center

GEOS AT HOME

Geosciences faculty, researchers, staff, and students have been adapting to the challenges set forth by COVID-19, and as a result, many have been working from home since mid-March. Pictured are some of our colleagues' creative work-from-home setups. Can you spot all the four-legged friends?

Home offices pictured: 1. Kaustubh Thirumalai, 2. Sylvia Quintero and Bingo, 3. Chris Earnest, 4. Pat Waters, 5. Shawna Matteson and Sid, 6. Kurt Sundell, 7. Cassie Hanagan, 8. Kim Elliott and Moxie, 9. Diane Thompson, 10. Denise Carrillo and Eevee, 11. Heather Alvarez and CJ, 12. Joellen Russell and Paul Goodman, 13. Barbara Carrapa and Sam, 14. Malin Ödalen, 15. Lydia Bailey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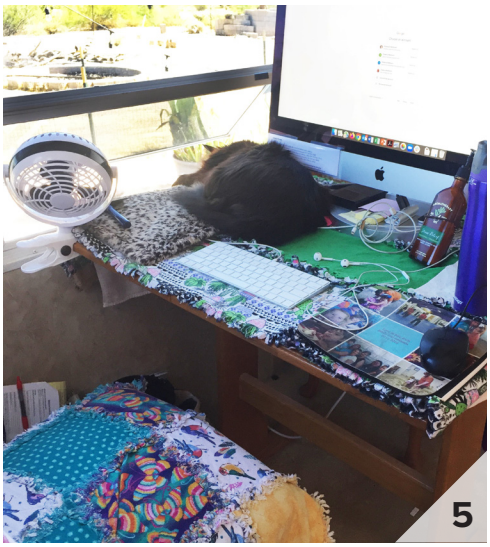
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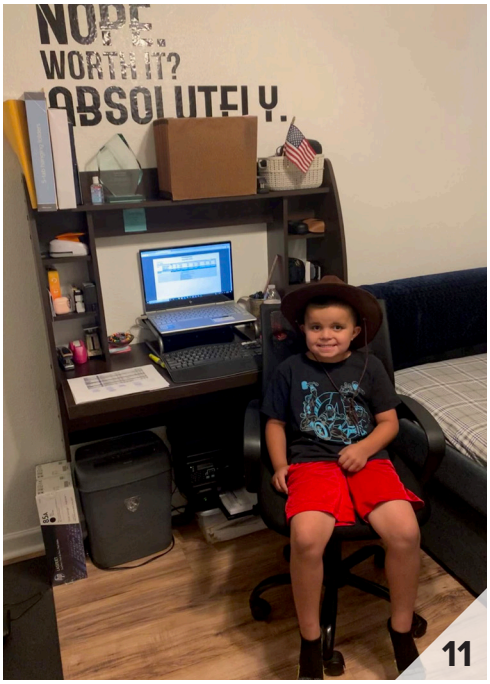

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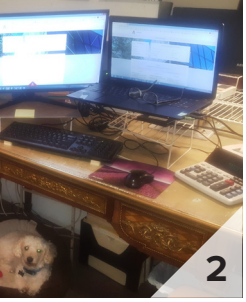
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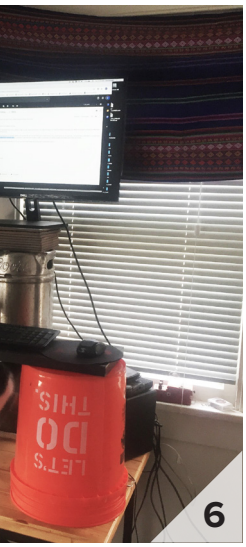
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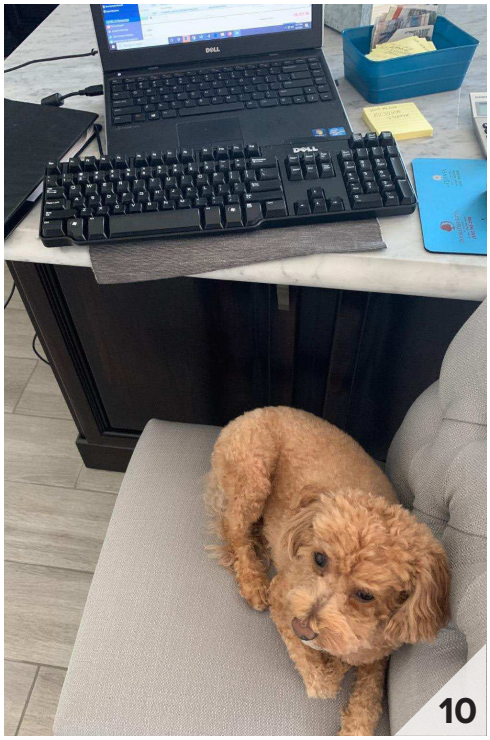
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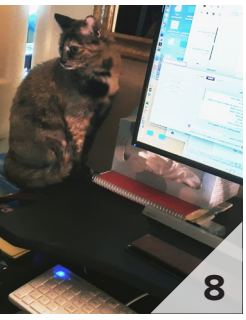
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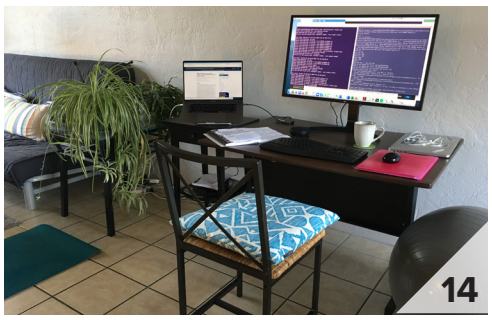
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PILATUS
BAHN
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WHERE IN THE WORLD ARE THE UARIZONA GEOSCIENTISTS?

While many of our Geoscientists have been staying home due to travel restrictions set in place to slow the spread of COVID-19, some of our researchers were lucky enough to finish their field work before restrictions were put into place.

Photo 1 shows Jay Quade, Tshering Lama Sherpa, and Bhai Tamang take a break in the mountains of western Nepal during a recent expedition to study low-relief high-elevation landscape surfaces.

Photo 2 shows Alice Chapman posing for a photo before sinking about half a foot into an algal mat so that she could collect water samples from a

hypersaline lake on Kiritimati island. (Photo credit: Dr. Bess Koffman, Colby College)

Photo 3 shows Diane Thompson wading into the colorful waters of one of Kiritimati's hypersaline lakes to collect a water sample. (Photo credit: Alice Chapman)

Photo 4 is from a more recent trip to the Laramide of Wyoming and Montana with Emilia Caylor, Tshering Lama Sherpa, Lauren Reeher, Gilby Jepson, Barbara Carrapa, and Pete DeCelles. These Geoscientists were in the field unravelling the timing of the Laramide initiation!

MEET OUR ALL-STAR STUDENT SCHOLARSHIP RECIPIENTS

We'd like to thank all of our generous scholarship donors from July 1, 2019 through June 30, 2020. Your generosity allows our students the opportunity to take classes, attend field trips and camps, and complete research projects both in the field and in the lab without the stress of financial burden. Our students are immensely appreciative of our generous scholarship donors.

Next, you'll be introduced to Julian Diepenbrock and Jennifer Kielhofer, two of our recent scholarship recipients. Learn how their academic careers have been positively impacted by supporters of the Department of Geosciences.

Above: Julian Diepenbrock, BS Student

"Getting my project, a study on the different tooth morphotypes of the theropod dinosaur Allosaurus, has been a dream come true. I will be working with Dr. Ji Yeon Shin on this project, pressure testing different tooth types and studying their morphologies in order to determine the extent of heterodonty in these animals.

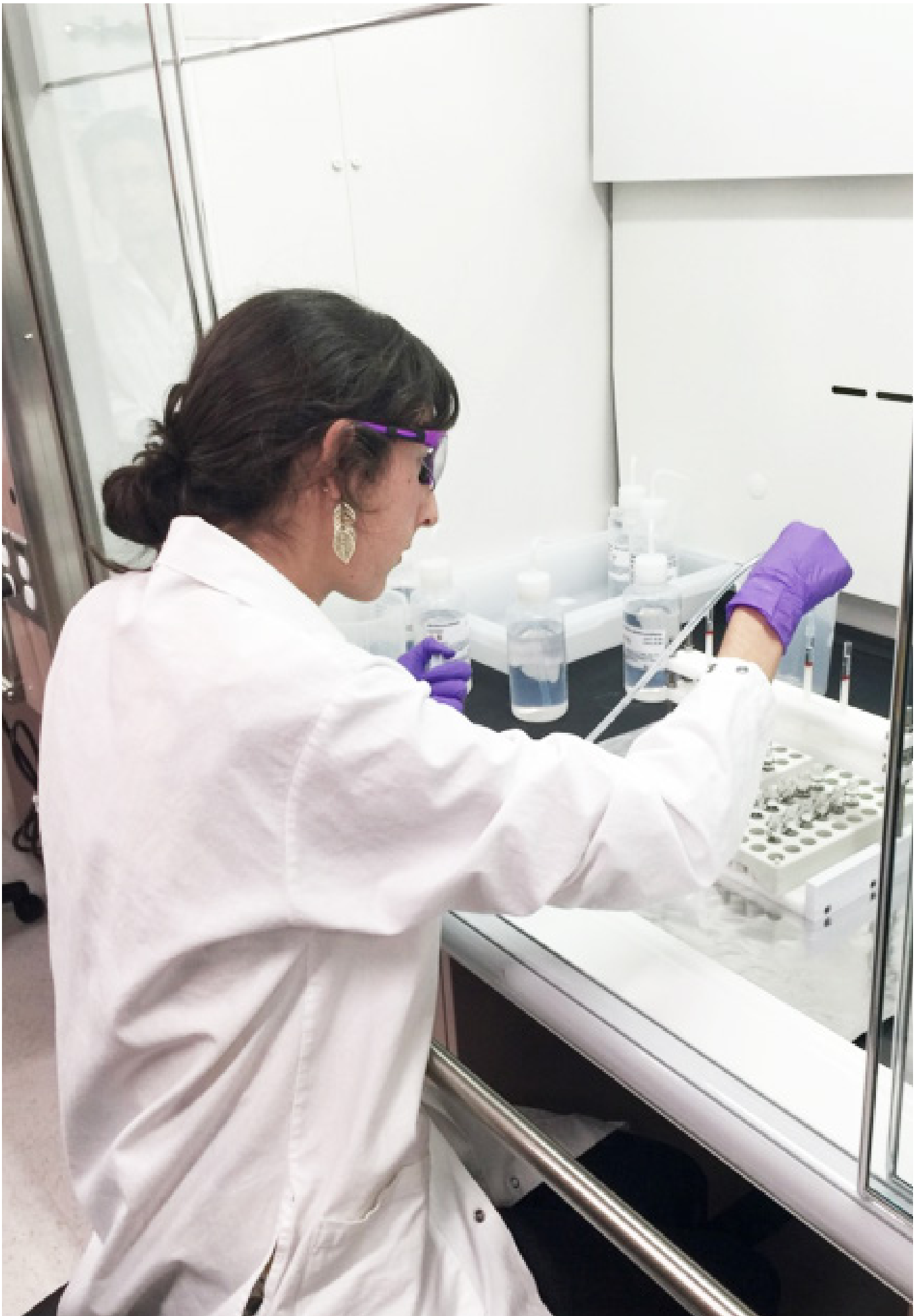
I have been dinosaur obsessed since I was a kid, and once I learned that paleontology was a possible career path I never looked back. One particular dinosaur that I grew up reading about and watching in documentaries was Allosaurus. Not only was it a large meat-eating dinosaur, and therefore "cool" to my young mind, but it was also extremely common and very well known. So well-known that some documentaries described it as the single dinosaur we knew the most about. Because of this I always wanted to study this dinosaur, but slowly grew into the realization that there wasn't much left to do, that Allosaurus didn't hold very many secrets left, barring a spectacular new find.

[Last] summer I was able to work in Wyoming on an internship with the Wyoming Dinosaur Center. The rocks there were from the Morrison Formation, the formation to which Allosaurus belongs, along with a supporting cast of other famous creatures; Diplodocus, Apatosaurus, Stegosaurus, Brachiosaurus and more. I was told that if I was lucky, I might find one or two Allosaurus teeth over the summer. And for the first few weeks I didn't find any. I uncovered a footprint presumably from that dinosaur, among other scattered Camarasaurus bones, but no trace of teeth. Then I found one. And another. And another. Over the course of summer I ended up uncovering 15, as well as a few Camarasaurus teeth and one assumed to be from an Ornitholestes. I became known as the "tooth guy" after a while.

I also began to do prep work on teeth that had come in from the field, working with the smallest airscribe possible. It was while prepping one of the teeth that another intern had brought in that I noticed something interesting: the tooth was thicker and had serrations on the "wrong" sides. I assumed it was something to do with damage done after the tooth had fallen out and didn't think much of it. Then, while working in the field I found a similar one. I then asked the museum's resident paleontologist about the strange teeth. He told me that they were a noted feature, but not much else was known about them after that, as it was deemed not as important as other features in Allosaurus.

The teeth suck with me though. I kept thinking about them for the rest of my time up there, and continued to upon returning. I shared my ideas with Dr. Shin , who suggested to me that there was more than enough there to turn this into a research project. That is why I am so thankful, because this project is about a lot more to me than some weird dinosaur teeth. This is an opportunity to work on a dinosaur I've wanted to study since I was a kid."

Julian Diepenbrock, BS Student, Recipient of the George H. Davis Undergraduate Research Scholarship



"I began graduate school a few years after the 2008 financial recession, and I am soon to graduate during a global pandemic when academic positions are scarce. Thanks to the Maxwell Short scholarship, I have the funding I need to survive during the final months of dissertation writing.

Over the past five years, I have conducted research in the Tanana River Valley (TRV) of central Alaska, aiming to understand the relationship between deglacial climate change and human colonization of the New World (~15,000-10,000 years ago). Eastern Beringia (present day Alaska and Yukon Territory) contains some of the earliest archaeological sites in North America and has long been considered key to understanding the initial entry of humans into the Americas. This high-latitude region also experienced sweeping climatic and environmental change during the deglacial period, which likely impacted the timing, routes, and mechanisms of human migration into the far north. However, data on climatic change in terrestrial settings is limited, making it difficult to test ideas about human-environment interactions.

My dissertation project aims to fill this gap by developing new paleoclimatic datasets that can be directly related to archaeological occupations. More specifically, I use organic compounds from buried soils as proxies for deglacial climatic change. Compound-specific isotopic measurements of plant leaf waxes (n-alkanes), including hydrogen (δD) and carbon (δ13C), provide information on moisture availability, changes in aridity, and changes in vegetation over time. Additionally, the distribution of bacterial branched glycerol dialkyl glycerol tetraethers (brGDGTs) within soils serves as a proxy for mean annual air temperature (MAAT). BrGDGT analysis also represents a newly applied proxy in the Tanana Valley.

Ultimately, my doctoral project contributes to a larger collaborative research program focused on human ecology since the earliest known colonization, known as the Quartz Lake/ Shaw Creek Flats (QL/SCF) Multidisciplinary Project. My biomarker datasets expand existing paleoenvironmental records and help further test the hypothesis that climate change significantly influenced human migration, settlement, and behavior in the far north.

I am tremendously grateful for the generosity and financial assistance of the Maxwell Short Scholarship."

Jennifer Kielhofer, PhD Student, Recipient of the Maxwell Short Scholarship

Left: Jennifer Kielhofer, PhD Student

CONGRATULATIONS GEOSCIENCES GRADUATES!

- Najwa Nazihah Abdul Aziz, BS, Fall 2019
- Filomena Helena Sobral Aparicio, BS, Fall 2019
- Osvaldo Santinho Pilartes Bambi, BS, Fall 2019
- Jennifer Marie Battista, BS, Fall 2019
- Cade Aaron Campbell, BS, Fall 2019
- Clare L DeCelles, BS, Fall 2019
- Tianyu Du, BS, Fall 2019
- Joshua Golden, MS, Fall 2019
- Anna Gravina, MS, Fall 2019
- Jesus Adrian Ibarra, BS, Fall 2019
- Michael Kassela, MS, Fall 2019
- Jon Richard Logan, BS, Fall 2019
- Garrison Loope, PhD, Fall 2019
- Nor Atikah Binti Mohd Jami'an, BS, Fall 2019
- Jonas Joaquim Mulato, BS, Fall 2019
- Charles Kelly Nault, BS, Fall 2019
- Nurun Niswa Binti Samsol Bari, BS, Fall 2019
- Divyaa Venugopal, BS, Fall 2019
- Chad Yost, PhD, Fall 2019
- Ahmad Khazem Alahmari, BS, Spring 2020
- Asma Fouad Alahmed, BS, Spring 2020
- Sarah Saleh Alammar, BS, Spring 2020
- Haitham Hasan Algothemi, BS, Spring 2020
- Ahmed Alhelaili, BS, Spring 2020
- Ameena Haitham Aljehairan, BS, Spring 2020
- Nada Khaled Alshehab, BS, Spring 2020
- Ahmad Mohammed Bajnaid, BS, Spring 2020
- Winston Joseph Bardsley, BS, Spring 2020
- Rebecca Beadling, PhD, Spring 2020
- Daniel Thomas Collins, BS, Spring 2020
- Carlos Cota Moreno, BS, Spring 2020
- Michael Stephen Daniel, BS, Spring 2020

- Daniel Favorito, PhD, Spring 2020
- Matthew Gabriel, BS, Spring 2020
- Claire Getz, MS, Spring 2020
- Kenneth Gourley, MS, Spring 2020
- Katherine Guns, PhD, Spring 2020
- Nur Syazwina Japri, BS, Spring 2020
- Erika Jordan Jaski, BS, Spring 2020
- Tumaini Kamulali, MS, Spring 2020
- Tshering Lama Sherpa, MS, Spring 2020
- Ran Liu, BS, Spring 2020
- Eric Gabriel Romero, BS, Spring 2020
- Melli Rosenblatt, MS, Spring 2020
- Nur Sabrina Binti Rosli, BS, Spring 2020
- Ryan Owen Anak Sigat, BS, Spring 2020
- Maria Celeste Snyder, BS, Spring 2020
- Alexandra Wallenberg, MS, Spring 2020
- Zida Wang, BS, Spring 2020
- Walter Afonso, MS, Summer 2019
- Daniel Alberts, MS, Summer 2019
- Anne Billingsley, PhD, Summer 2019
- Rachel Cajigas, PhD, Summer 2019
- Dominique Giesler, MS, Summer 2019
- Susana Henriquez, PhD, Summer 2019
- Derek Hoffman, MS, Summer 2019
- David Moussa, MS, Summer 2019
- Connor Nolan, PhD, Summer 2019
- Mark Pecha, PhD, Summer 2019
- Carissa Raymond, MS, Summer 2019
- Carson Richardson, PhD, Summer 2019
- Alex Whitehead, PSM, Summer 2019

GEODISCOVERIES FUND: BUILDING TOMORROW'S GEOSCIENCES

The Department of Geosciences has been a leader in the field of Geosciences since its establishment, and is looking forward to forging the way to new and impactful discoveries in light of current and future financial challenges.

The **GeoDiscoveries Fund**, created in early 2020, aims to increase the department's reach by equipping our faculty and researchers with cutting-edge technology. This new fund will also allow us to attract and retain the top scientists in their field, building on our legacy of recruiting leaders in Geosciences and educating our next generation of students by providing them the unique experience of cutting-edge technologies.

Supporters of this fund will help the department to provide faculty and researchers with state-of-the-art instrumentation and equipment for their laboratories and facilities, as well as provide imperative maintenance of these technologies.

With cutting-edge equipment and technology, Geosciences scientists are able to stay at the forefront of science, make impactful discoveries that benefit the worldwide scientific community,

teach and train the next generation of Geoscientists, and provide invaluable research opportunities to students.

This year, we are asking our alumni and friends to consider directing their donations towards the GeoDiscoveries Fund in lieu of regular scholarship donations.

Donations to the GeoDiscoveries Fund will have an immediate impact on our students, researchers, and faculty, and will provide vital support to our department during this critical time.

In an effort to kick-start this fundraising initiative, our Geosciences Advisory Board members have graciously made an initial collective contribution of $3,500 in support of the GeoDiscoveries Fund. The GeoDiscoveries Fund is one of our top fundraising priorities, and we hope that those in a position to do so might consider making a contribution.

To make a donation online, please visit give.uafoundation.org/geosciences and select "Other - Please Specify." In the comment box, type "GeoDiscoveries."

To make a contribution via check, please include "GeoDiscoveries" in the memo and mail checks to:

Development Office
Department of Geosciences
University of Arizona
PO Box 210077
Tucson, AZ 85721

(Gifts are 100% tax deductible. Please note that gifts of $1,000 and more incur a 6% fee from the University of Arizona Foundation.)

ON THE DAY OF MY RETIREMENT: SOME REFLECTIONS ON OUR DEPARTMENT

This is a combination of some departmental history I recounted at a Geosciences Faculty Retreat a couple of years ago and more recent thoughts, expressed via email to faculty, staff, and graduate students on the day I 'retired'—June 2, 2020.

I have reached the conclusion that the primary driver of Geosciences' ever-increasing research reputation has been delivery of impactful science that turns heads nationally and internationally. This has required holding very high standards in seeking and recognizing excellence and collegiality among candidates in faculty searches, which has been the path all along, through to today. In turn, our faculty, supported by staff, continuously have done their best to support our outstanding graduate students, and to teach and mentor undergraduate students. You, our alumni, our graduated students, are the evidence that something good has been happening in Geosciences over the many, many decades. Your contributions, taken collectively, are remarkably diverse, with careers both inside and outside of geology. Your successes cause others to think well of UofA Geosciences; you raise our reputation and fill us with pride.

Lists are sometimes good. Here is mine on factors that have led to UofA Geosciences' excellence:

1. Focusing particularly on some subfields, but not all.
2. Creating and maintaining connections between the subfields.
3. Mighty success in faculty searches achieved through sense of purpose and collegiality.
4. A 6 decades-long tradition of appointing department heads from within & passing the baton.
5. Strategic and courageous actions and choices.
6. Demonstrated willingness to stretch when challenged.
7. Valuing and strenuously addressing both research and teaching.
8. Sustained exceptional quality efforts of staff committed to serving.
9. Building and supporting a very strong graduate program.
10. Conducting affairs in ways punctuated by strong doses of humanity.

By George H. Davis
Regents Professor Emeritus, Geosciences

My association with the department permits me to go back, firsthand, to 1970, and even earlier based on all I learned from close colleagues who arrived in the '50s and '60s and who continued to serve after I arrived. Much of the early history of the Department of Geology was centered on economic geology, and in fact, the Department of Geology resided within the College of Mines up until 1968. It made sense that economic geology was the primary focus at a time when the 5 C's composed the mantra of the State of Arizona: Copper, Cattle, Cotton, Citrus, and Climate. Hero figures in economic geology in the early days at UofA included Frederick Ransome, considered "*The dean of American economic geology*." B.S. Butler immediately followed and like Ransome came to UofA following a distinguished career in economic geology in the USGS. Eddie McKee, Grand Canyon aficionado, was an admired, respected leader and teacher in the department, arriving in the 1940s, staying until 1953, and serving for years as Department Head. The torch was passed to Spence Titley in the 1950s, as he finished his PhD here and then shifted into a faculty/leadership role. Spence emphasized that the faculty in our program back in the 1950s had gained applied experience in industry or government before returning to teach, and thus they brought a practical view to their instruction.

There were other notables that came to the Department in the 1950s, people with whom I was privileged to interact closely as colleagues: All men—the department was simply not ahead of its time in this respect. These included John Anthony (mineralogy); Bryant (Bear) Bannister (dendrochronology); Don Bryant (invertebrate paleontology); Paul Damon (geochemistry/geochronology); John Harshbarger (hydrology); Paul Martin (unclassifiable, bridging ecology, anthropology, geosciences, and paleontology); Evans B. Mayo (structural geology); Ed McCullough (geological hazards); Joe Schreiber (sedimentary petrology); Terah (Ted) Smiley (Quaternary Studies); and John Sumner (geophysics).

The 1960s were pivotal in the life of the Department and, for that matter, the University. Faculty recruitment added strength in traditional areas (e.g., John Guilbert, economic geology; Ev Lindsay, paleontology; Bert Nordlie, petrology; Jack Sturgul, geophysics; Dick Wilson, stratigraphy), emerging areas (e.g., Don Livingston, Precambrian geology; Gerhard Kremp, palynology; Austin Long, geochronology);); and new areas (e.g., Bill Bull, tectonic geomorphology; Vance Haynes, geoarchaeology; Bart Nagy, organic geochemistry). All of these faculty were here when I arrived in 1970. I entered the department along with new assistant professors Dietmar Schumacher (paleontology) and Al Solomon (palynology).

The backdrop for faculty recruitment in geology/geochronology in the 1960s evolved in an interesting way. In about 1960, UofA President Richard Harvill concluded that Arizona needed a stronger footprint in science and recruited both George Gaylord Simpson and Lawrence McKinley Gould. They were appointed to the Department of Geology but moreover served as advisors to the President Harvill in strengthening science broadly across campus. They both arrived in 1962. Penrose Medalist Simpson had done 'little things' like publishing 150 papers in his first 15 years at

the American Museum of Natural History. “Modest” topics: *Tempo and Mode of Evolution* (1944); *The Meaning of Evolution* (1949); *Major Features of Evolution* (1953); *Fossils and the History of Life* (1983).

Simpson and his graduate students, dubbed the Red Fireballs as I recall, would go for long refreshing (i.e., beer) productive seminar lunches each Friday. Gould was a charismatic figure, magnificent in language, focused in his passion for Antarctica (from science to politics to peace in the world), recipient of some 30 honorary degrees, and an astute experienced administrator, a man of action disguised in magnanimous, generous spirit.

Gould, as Past President of Carleton College, and of course in his early days Second in Command of the Byrd Expedition to Antarctica, was especially influential in creating an administrative structure within which what we now call the Geosciences could flourish. He understood that if the Department of Geology remained in the College of Mines its future would be diminished. Its organizational niche would limit recruiting and retaining outstanding faculty in a program of intended breadth, reach, and consequence. Gould persuaded President Harvill and the Arizona Board of Regents to establish a free-standing college, to be named the College of Earth Sciences. Harvill was influenced by Gould to recruit Jim Zumberge (just like Larry, a University of Michigan alumnus) as the scientist/leader to establish the College and become its Dean. Zumberge assembled Geology, Geochronology, Tree Rings Laboratory, Hydrology, and Water Resources as the units of Earth Sciences. This was a prescient construction in its selection of disciplines. In this new design, Geology and Geochronology were merged to become Geosciences, a taxonomy change that was well in advance of geology departments around the country, signifying a mission of applying physics, chemistry, mathematics, biology, atmospheric sciences, and geology to the study of earth. Ed McCullough became the Head of Geosciences.

In Fall 1969, while some of this was still happening in Tucson, my wife Merrily and I were in Atlantic City attending the Annual Meeting of the Geological Society of America. In the final year of my PhD program I was looking for a job. It seemed hopeless until my University of Michigan PhD advisor, Bill Kelly (economic geology) came up to us and told us that a man named Jim Zumberge wanted to talk to us, and that an ad for a faculty position in structural geology at the University of Arizona was about to go out.

Jim Zumberge had been slated to become President of the University of Arizona. This did not happen. Instead a 35-year old UofA chemistry professor, John Schaefer, got the nod in 1971. Zumberge would later become President of the University of Southern California. Under Schaefer’s presidency, along with Ed McCullough as a phenomenally energetic, bold, and resourceful leader, Geosciences began moving to greater heights. President Schaefer, Provost Weaver, Finance VP Gary Munsinger, and Research VP Dick Kassander (with degrees in geology and physics) raised the bar of expectations to heights not foreseen. Things were serious. Imagine, in those days all faculty finalists were interviewed

by the President or Provost, or both. Standards and expectations for tenure and promotion rose overnight. When Peter Coney interviewed, I waited outside the door of President Schaefer's office. Pete was in there for about 5 minutes. When Peter came out, and we walked back to the building, he said to me based on that brief 'interview': "This is a serious institution of higher learning!" Schaefer's rapid-fire transformation set the stage for UofA to be inducted into the AAU (in 1984) as one of the 62 elite research-oriented public and private universities in the nation.

Ed McCullough, who was appointed as the first head of Geosciences in 1970, immediately grasped the significance of and opportunities presented by Schaefer administration. He knew we needed to get our act together. In short order Ed led us through strategic planning to galvanize subfields of priority; and through curriculum planning to significantly strengthen undergraduate core requirements for geology major, with emphasis on mathematics, physics, and chemistry. As some examples of hiring in the 1970s, the strategic planning caused us to build geophysics, starting in the 1970s with Bob Butler, Randy Richardson, and Marc Sbar. Karl Flessa was recruited, bringing paleontology and more. Petrology and economic geology recruitment discovered Jiba Gangully, Tim Loomis, Dennis Norton, Dick Beane, and Chris Eastoe. Finally, two women were appointed to the faculty, Vera Markgraf (palynology) and Susan Kidwell (paleontology, taphonomy). Following the Gould mantra, "*Good is the enemy of excellence*," McCullough led and resources followed, including a huge jump in our teaching-assistantship budget (essential to graduate student recruiting), and more and more positions for faculty recruitment. It was an easy call for Ed McCullough and the faculty to maintain close relations with industry. The means was through maintaining a strong, viable, meaningful, quality master's program.

I was the first faculty member appointed by Ed McCullough, but I learned even more about his leadership when I followed him as Department Head in 1982. Just before I became Department Head, Ed showed me paperwork that no faculty in the department had ever seen. Months earlier Ed realized that a big capital project opportunity served up by President Schaefer and VP Munsinger to the biology departments was not getting traction. Squabbles among biology faculty prevented agreement on how the hypothetical building would be shared by the several biology departments. Ed went directly to VP Cunningham and told him that Geosciences knew exactly how it would put a new building to use. Based on the departmental strategic planning he explained that we could rise to the top in fields such as tectonics, economic geology, geochemistry, and geochronology if we can design state-of-the-art clean labs in a brand-new building. Achieving this in 'old Geology' would be impossible. We soon got the go-ahead, in part because Munsinger and Cunningham were frustrated by 'the biologies' not having their act together.

Before we occupied this building in 1985, I persuaded Henry Koffler to name it the Gould-Simpson Building. I wish I could take credit for how shrewd this naming would prove to be. From the moment that the size and quality of the building became known during the construction phase,

‘vultures’ from other departments and colleges were circling, attempting to take from us some of what was promised. When ROTC made moves to take over all of the lab-classrooms on our ground floor, Gould marched to President Koffler and stopped it, telling him ROTC is not going to occupy “my” building.

McCullough’s objective regarding our ‘new building’ has become a reality: last spring we heard time and again from faculty candidates in petrothermochronology that the Gould-Simpson labs in geochemistry and geochronology are the best, anywhere! As a quick postscript I just found in one of my files a card from Vance Haynes, thanking me for something. He asked me to remember the vote for naming the building. The motion I presented was naming it the Gould Building. Everyone voted in the affirmative, but there was one ballot, cast by Vance, that suggested “Gould-Simpson.” A brilliant idea. We voted again. Unanimous. (It is traditional to

Above: George Davis leads a GSA field trip in Fall 2019

complain about faculty meetings, or any meetings for that matter, but just see what can happen among colleagues thinking about the good of the order!).

The College of Earth Sciences proved to be a useful but transient bridge. When I was Department Head, the Regents concluded that this entity was much too small, and thus not cost effective. As the College dissolved, units could choose their own destiny. Hydrology chose Engineering. Tree Rings and Geosciences chose the new College of Science. Some Geosciences faculty feared this change. Most of us welcomed it, for we knew geosciences would be a player, and I felt that science and math departments on campus would finally see firsthand our stature, and how we conduct our research. Their view would no longer be screened off by bureaucratic barriers. In fact, Ed McCullough became the first Dean of the College of Science.

I won't attempt here to recount the details of history from the 1980s to today, so many colleagues, so many contributions, so many events. However, I do wish to state that we now can show a better record of recruiting women to our faculty ranks. But more importantly, there is presently a determined concerted effort in Geosciences to figure out, and commit to, the ways in which we can substantively improve our efforts and outcomes in recruiting and supporting a more diverse faculty, staff, and study body. You, the alumni, can help.

Finally, I cannot resist adding here an accounting of a set of events that had enormous personal impact on me. When Gould and McCullough invited a blue-chip committee to visit the department in about 1973, the committee, among other things, saw promise in structure-tectonics but felt it could be elevated through a senior appointment. This resulted in a new structure-tectonics position, filled by Peter Coney. I happen to have retained a copy of one of the letters of support written to Paul Damon, who chaired the search, dated February 18, 1975. It begins, "*Peter Coney has asked me to comment to you on his suitability for the position in structural geology and tectonophysics that you described in your flyer. My advice is simple: make him the best offer you can as soon as you can get to a telephone. In my opinion, you cannot do better no matter how long you look because there is no one else quite in his class.*" The letter goes on for a page and a half of superlatives. It ends, "*In closing' let me say that if you suspect, as I do, that long letters are sometimes a cover for uncertainty, then just focus on the first paragraph as my main theme. I added the flute music because I presume that a senior appointment of this kind requires solid documentation in these times, and it has been easy to provide. The guy is just a winner at any scale on any score.*" Signed W. R. Dickinson. The Coney appointment gave birth to tectonics as we know it at UofA.

Moreover, before the end of the 1970s, it became clear that Bill Dickinson could be lured here. And Ed McCullough pulled it off, supported by Coney. Bill visited and gave talks, met colleagues, went into the field. All was in place except for one minor detail: our new Dean of Earth Sciences wasn't behind it. He apparently told Ed, "*Dickinson can't be as good as you say, or he wouldn't*

want to leave Stanford." But Ed worked it out. The appointment paperwork did not contain the Dean's signature, for the Provost signed off when the Dean was away. The Dickinson appointment, 40 years ago, provided a convincing touch that demonstrated to the world that we are 'for real'. And Ed McCullough did not flinch in the face of an apparent brick wall.

In closing, what does a person say on the day of retirement. Here is what I wrote to faculty colleagues, staff, and graduate students on June 2nd. I wish to share this with you as well.

"Particularly at this moment of pandemic, economic crisis, and a nation on fire, I think of what Peter Coney once said/wrote, which I closely paraphrase here: *I have always felt as I pass from the turmoil of urban streets through the gates and onto the campus of an institution of higher learning, anywhere in the world, a sense of relief and comfort, solemnity and freedom. The feeling is not unlike that when one enters a National Park, for that is what Colleges and Universities are – sanctuaries, preserves of civilization. We are asked to seek further advances and new insights into the truth of ourselves and our world. The key is putting the right people in an environment where there is time for thought and reflection and providing encouragement to pursue important issues.*

Among the things for which I am grateful is the conscious decision by Geosciences not just to strive for excellence in research; or the combination of research, graduate education, and undergraduate education; but to strive for excellence in everything, including meaningful outreach connected organically to the fundamentals we carry out and learn in discovery. This breadth of expectation for ourselves individually and collectively lifted us both on campus and beyond. It has prepared us, now, for making more certain that our work connects to a world that needs us more than ever, and moreover needs us to spread our arms more inclusively to join in on the fun and challenge of trying to make a difference.

Strangely, I was in the midst of my PhD program in 1968 and am in the midst of my retirement in 2020. These two calendar years in the USA became inexorably linked this past week. Through the 50 years or so in between I held a dream job. By chance a student in my very first undergraduate structure class (Fall 1970) called yesterday morning, reflected on a few things, and exclaimed how lucky I was to have landed a teaching job at Arizona. No doubt about it!

All who move through the 'retirement' passage make clear that it is colleagues, students, and staff who are top of the list of what will be missed.Though I understand this in the abstract, I took a moment yesterday to recall the names of all the GEOS faculty colleagues with whom I have served since 1970. It is a list full of good memories, experiences, adventures, and collective accomplishment. God willing, I hope to make a few more good memories as I continue to work on appealing projects that have my full attention, and that will keep me in some contact with students, our raison d'être.

Here is what I found in my 'memory bank'. Please, PLEASE, forgive any inadvertent omissions.

Al Solomon
Amanda Hughes
Ananya Mallik
Andy Cohen
Austin Long
Barbara Carrapa
Bart Nagy
Bert Nordlie
Bill Bull
Bill Dickinson
Bob Butler
Bob Downs
Cam Mosher
Chris Eastoe
Chris Harig
Clem Chase
Denis Norton
DeVerle Harris
Diane Thompson
Dick Beane
Dick Wilson
Dietmar Schumacher
Don Bryant
Don Livingston
Doug Brew
Ed McCullough
Eric Kiser
Ev Lindsay
Evans Mayo
George Gaylord Simpson
George Gehrels
George Zandt
Gerhard Kremp
Hugh Odishaw
Jack Holt
Jack Sturgul
Jay Melosh
Jay Quade
Jess Tierney
Jessica Kapp
Ji Yeon Shin
Jianjun Yin
Jiba Gangully
Jim Zumberg
Joaquin Ruiz
Joe Schreiber
Joellen Russell
John Anthony
John Guilbert
John
Harshbarger
John Lance
John McLean
John Sumner
Jon Patchett
Jon Pelletier
Jonathan Overpeck
Judith Parrish
Julia Cole
Karl Flessa
Kau Thirumalai
Larry Anovitz
Larry Gould
Erik Seedorf
Marc Sbar
Marcus Lofverstrom
Mark Barton
Matt Steele
MacInnis
Michelle Wallace
Mihai Ducea
Mike Drake
Owen Davis
Paul Damon
Paul Fitzgerald
Paul Goodman
Paul Kapp
Paul Martin
Pete DeCelles
Pete Reiners
Pete Kresan
Peter Coney
Pilar Lecumberri Sanchez
Randy Richardson
Rick Bennett
Roy Johnson
Spence Titley
Susan Beck
Susan Kidwell
Suzanne Baldwin
Ted Smiley
Terry Wallace
Tim Loomis
Timothy Jull
Vance Haynes
Vance Holliday
Vera Markrauf
Vic Baker

GEORGE DAVIS: GEOSCIENCES ROCK STAR

Dr. George H. Davis, Regents Professor Emeritus of Structural Geology, is one of the pre-eminent 'rock' stars of the University of Arizona College of Science. Having held most of the professional positions in the Geosciences Department over his multiple-decade career at the University, he continues to be fully engaged in research, writing, fieldwork, broad-based university and national service leadership, including teaching undergraduate structural geology.

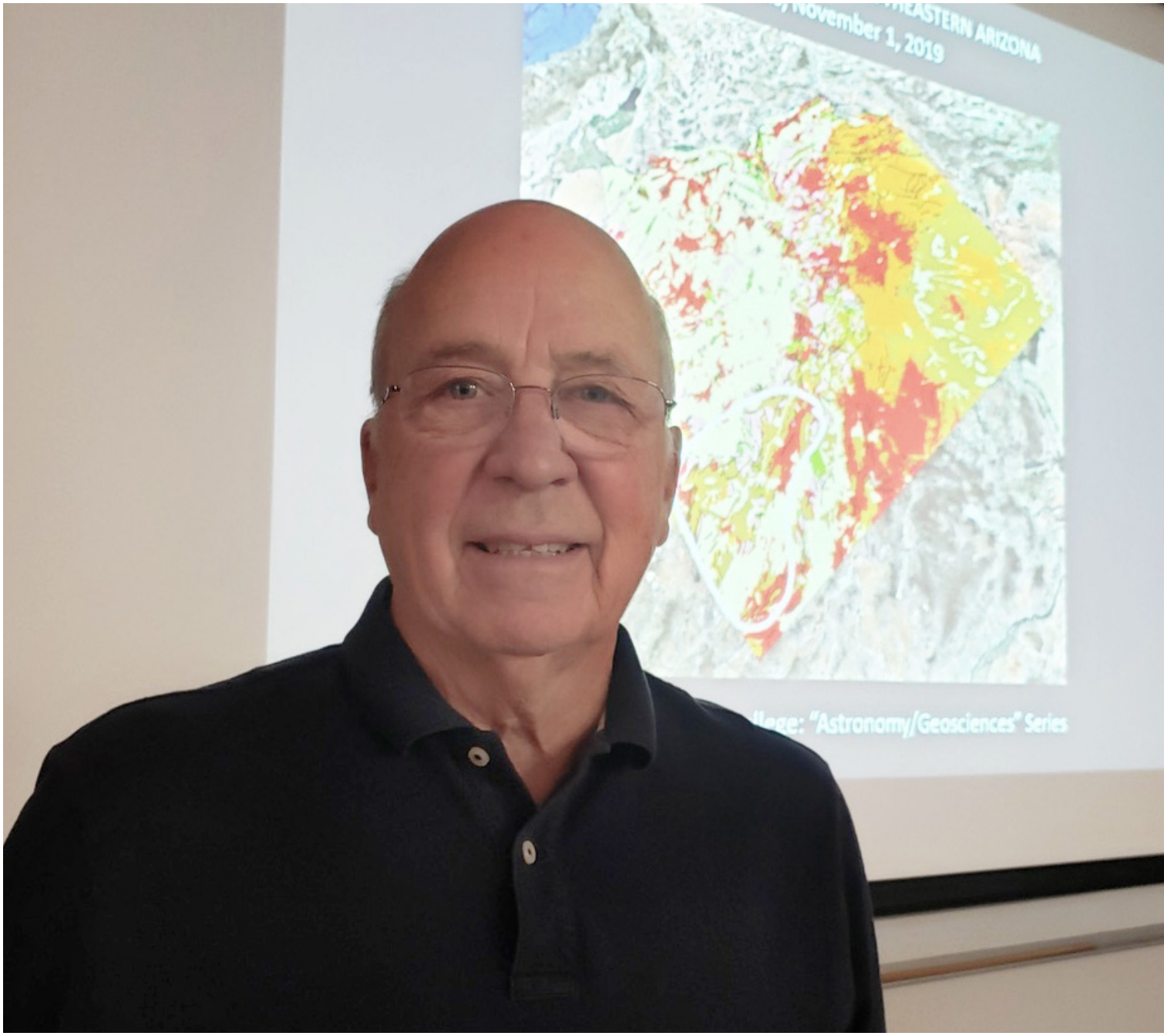
George Davis is heavily involved in ongoing community outreach. He traveled with Galileo Circle donors to Greece in 2017 as the excursion leader and on-site geologist, giving daily talks and demonstrations at the various locations visited, including a location that was a large fault scarp in a heavy rain storm and the Santorini caldera where George tossed a couple of large pumice rocks into the sea to demonstrate their low density and flotation. George has worked for a number of years as a geoarchaeologist at the Mt Lykaion excavation location with Dr. Mary Voyatzis, University of Arizona Archaeology Professor. Both George and Mary were the on-site professors hosting the Galileo Circle participants at the Mt Lykaion site, interpreting both the geology and the archaeology as well as defining the integration of these two fields at this important site. George was rarely without his lap-sized white board on the tour van, drawing illustrations of the geological processes and formations as he described the next site to be visited, all as the van was proceeding down the highway.

Professor Davis has also presented a multi-week course about the Geology of the Colorado Plateau to the University's Humanities Seminar Program. This course was so popular that the classroom was filled to capacity at 90 students and he ended up returning a year later to give the course a second time! (The Humanities Seminar Program is the University's premier adult education venue, which has served the Tucson community and the University for over 30 years.)

Most recently Professor Davis has presented a four-hour lecture in the Fall of 2019 (Part 1) and the Spring of 2020 (Part 2) on the Geology of Southeastern Arizona to the University's Osher Lifelong Learning Institute (OLLI). OLLI is a lifelong learning program open to all adults over the age of 50. These senior students have diverse backgrounds, from medicine to physics to engineering to psychology, and even retired geologists! The classroom was at capacity with over 60 students. Professor Davis received rave reviews from all participating in the class.

OLLI has had incredible support over the past six-years from the Geosciences Department! In addition to Professor Davis, guest professors have included Peter Reiners, Barbara Carrapa, Jessica Tierney, Jay Quade, Jennifer Mcintosh, Joellen Russell, Julia Cole, Victor Baker, George E. Gehrels, Chris Harig, Vance Holliday, Eric Kiser, Luke McGuire, Tim Swindle, and Joaquin Ruiz. These professors have been a big hit with the class. Their rapport, infectious enthusiasm, and engagement with the class members has been second-to-none. The Geosciences Department and the University of Arizona can be very proud of these world-class professors!

By Guy Jette
OLLI Instructor, University of Arizona


EASTERN ARIZONA
November 1, 2019
Image: "Astronomy/Geosciences" Series

LUNCH WITH A BUSHMASTER – 1973

In 1972 I was hired by a large aluminum company to start a bauxite exploration program in the Brazilian Amazon. At that time, I had no experience with bauxite but had previously worked in Brazil during which time I acquired a wife and fluency in Portuguese. Our activities were concentrated midway between Belém, near the mouth of the great river, and Manaus, at the confluence of the Rio Negro and the Amazon. Diesel-powered river boats 10 to 12 meters long and 3- or 4-meters beam were our principal means of transportation and often served as floating base camps.

The main Amazon channel lies along the middle of a stepped graben. The trough is largely filled with Tertiary and Holocene lacustrine and deltaic sediments, with a thin Paleozoic section exposed in tributaries on the northern and southern flanks. A change in base level and subsequent erosion I left flat-lying sediments exposed in plateaus elevated some 80 meters above the present Amazon flood plain. The plateaus are remarkably permeable, and lack incised drainages except on the very edges. Total rainfall during the rainy season, January through May, is typically 1.5-2 meters. The water does not run off but soaks into the ground and eventually emerges in countless springs which gush out of the escarpments bounding the plateaus.

Such conditions are ideal for the formation of bauxite, and plateaus with well dissected perimeters were what we were looking for. We had established a camp on a lake on the south side of the Amazon, connected to it by a channel nameable even at low water. We were there to explore a plateau called Serra Grande do Curuí which looked prospective for bauxite. The plan was to lay out a grid of parallel lines across the plateau and then sink prospect pits at 800-meter intervals (standard practice for the Amazon). It's much like fishing. One uses a net which will catch the big ones but lets the minnows slip through, and we were after whales—economic deposits close enough to navigable water, so that ocean-going ships could be used to transport the bauxite.

We left camp one morning and followed a previously cut baseline to a point where we

By Dick Jones
Geosciences Alumni, MS '57

intended to start a new grid line. I had just set up the instrument on the point of departure when it started to rain. It was supposed to be the dry season, but Amazon weather is rarely predictable. It looked as if the rain might soon pass over, so I threw my GI poncho over the instrument and we all sat around under the edge of the poncho to wait it out. While we waited, my line-cutting crew shared a meager lunch of canned sardines and manioc meal, all dumped in a hard hat.

After a while, the rain did stop, so I uncovered the instrument and turned off the angle to start the new line. Alfredo, my lead line-cutter had a single-barreled 32-gauge shotgun which he carried slung muzzle down to keep rain out of the barrel. Once I set the direction for the line, he took his machete and was about to start cutting. He then let out a wild yell, jumped backward, and in one motion unslung his shotgun and fired nearly straight down. As the smoke cleared, we heard him giving fervent thanks to the Blessed Virgin and assorted saints. Only then did the rest of us realize that he'd just shot a bushmaster (Lachesis muta) lying in the grass beside the trail. In Brazil, the bushmaster is known as surúcucú, its name in the indigenous Tupi language.

The snake had been coiled up no more than 2 meters from our instrument set up. Bushmasters have a reputation for being aggressive, but this one gave no hint of its presence during the twenty minutes or so we sat waiting for the rain to stop. I measured the snake with our survey tape and found it to be 2 meters long and 5 cm thick. The circular patch of flattened grass where it had lain looked as if a heavy fire hose had been coiled there. The bushmaster had no obvious bulge from a recent meal to explain its sluggish behavior, but its apparent lethargy may have been due to the cold drizzle which had fallen intermittently during the morning.

Another explanation might be that it had been repelled by the smell of a lunch of sardines and manioc meal served in a hard hat.

Left: Bushmaster Snake

GEODAZE 2020: VIRTUAL EDITION

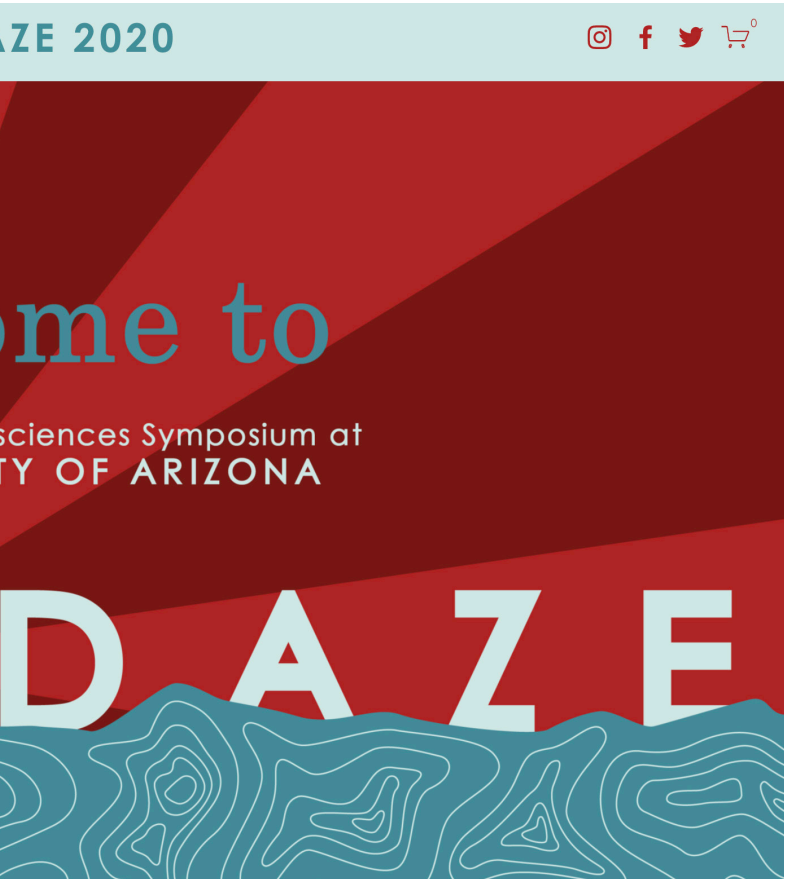
Transitioning the Department of Geoscience's annual student-run conference to a virtual format this year was unprecedented. Despite early hesitation about moving away from the traditional format due to COVID-19 restrictions, the virtual event went off without a hitch. Organizers were pleasantly surprised by the valuable benefits of the innovative experience and the positive feedback from attendees. This year's conference was a learning experience for all involved, but we are happy to reflect on what was accomplished.

Student organizers determined the best method for formatting the virtual conference was to build a custom GeoDaze 2020 website to host conference content and utilize technological software to facilitate presentation delivery and live engagement. The website was created using a website development platform, presenters used Panopto to record their oral presentations, and live conference events were hosted through Zoom Video Webinars, which were accessed through links provided on the website. For those that were unable to attend GeoDaze this year, the website configuration is depicted in the images shown here. At geodaze.com, attendees were able to click on website navigation links titled About, Program, Content, Live Q+A, and Store. Conference information and schedule details could be found on the About page and in the Program. Posters and Talks pages, containing all conference presentations, were available under the Content link, while the Store provided attendees with an easy way to purchase conference merchandise online.

Although this format was much different than that of a traditional in-person conference, organizers recognized several benefits. With Panopto, presenters and viewers were able to use disability access features when recording or viewing presentations. Although a recommended schedule was provided, attendees were able to tune into presentations according to their own schedules and had the flexibility to set their own pace for participation. The versatility of the virtual format welcomed conference attendees from around the globe and brought in over 1,300 website viewers, which far exceeds participation numbers from

By Samantha Portnoy, Graduate Student, Geosciiences, Virtual GeoDaze Committee Member (Website Development)

previous years. We are grateful for such a wonderful turnout this year and hope to find creative ways to implement the positive takeaways from this experience into the planning of GeoDaze 2021. Thank you to all of our supporters, especially our sponsors, for trusting us during the virtual transition. We couldn't have done it without you! We also want to give a big thank you to all of those involved with planning both the original (in-person) and the virtual versions of the conference, and to the participants that adapted to the virtual change with us.



GEODAZE AWARD WINNERS

- Best Overall Talk: Haiyang Kehoe
- Best Graduate Talk: Alice Chapman
- Best Undergraduate Talk: Mila Lubeck
- Best Economic Geology Talk: Lexi Wallenberg
- Best Climate & Paleoclimate Talk: Tuma Kamulali
- Best Geophysics Talk: Audrey Dunham
- Best Tectonics & Structure Talk: Lauren Reeher
- Best Geochemistry Talk: Anca Barla
- Best Graduate Poster: Alex Gorr
- Runner-up Graduate Poster: Julia Manobianco
- Best Undergraduate Poster: Serena Conde
- Runner-Up Undergraduate Poster: Maria Snyder

OCEANOGRAPHY STUDENTS: MAKING A DIFFERENCE

Each semester, students in Introduction to Oceanography (Geos 212) take on a project that in some way "makes the world a better place." During most semesters, projects include activities such as pulling buffelgrass in the Tucson area, participating in beach clean-ups while on holiday, and encouraging recycling. During Spring 2020, we were inspired by an article in the local paper that focused on the need to raise community awareness of Seafood Sustainability. So we contacted the authors, Lorelei Redmond and Kristin Wisneski-Blum of the Inland Ocean Coalition, and arranged for them to help us design a class project that would help inform others about these issues.

Students began by learning about the issues of seafood sustainability (e.g., bycatch, overfishing, habitat degradation) and how these impact the oceans and our society (e.g., loss of primary food source for ~3 billion people, many species endangered, impact on marine ecosystems). We then created wallet-size cards with lists of "good" versus "bad" seafood, and printed enough cards that all 400 students could share 10 cards with others. The final report consisted of short descriptions of the student's ten conversations. Following are slightly edited descriptions of some of our favorite conversations:

1. "My next interaction was with my best friend from back home. We discussed how seafood sustainability is so important due to how essential seafood is to our society. The ocean covers 70% of earth surface which is 99% of the living space on our planet. The ocean is under serious threat due to toxic pollution, and bad fishing practices. These factors affect the health of the seafood we consume, and the amount of seafood available for consumption. We both agreed this is a conversation more people need to have in order to preserve our environment and marine life for the future to come."

2. "This interaction was with my aunt who studied a bit of marine biology. She talked about how the life cycle of seafood is linked to how the world is also impacted. My aunt pointed out the fact that algae is a large factor of how oxygen is produced on Earth, so the environment in which the algae lives is important to how we as a species should be managing seafood sustainability."

By George Gehrels, University Distinguished Professor, Geosciences; Paul Goodman, Senior Lecturer, Geosciences; Joellen Russell, Professor, Geosciences; Rob Hayes, Graduate Student, Geosciences; Tuma Kamulali, Graduate Student, Geosciences; Brandon Levenstein, Graduate Student, Geosciences

3. "My next candidate was my little sister, my little sister is twelve and extremely outdoorsy. She would probably be caught interacting with marine life while snorkeling instead of eating it, but I still thought she'd like to know all of the information the card had to offer. I told her all about seafood sustainability and why it's important, she thought it was super interesting and said she thinks it's cool what I'm doing to help the environment. It felt good to be a role model to her."

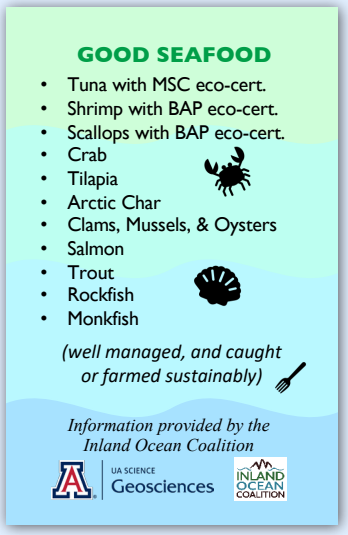
4. "On one occasion I spoke with a man and as I began to tell him about the seafood sustainability problem, he asked me if this was about "the global warming hoax." I could immediately tell that this man wasn't going be too interested in my list that I was about to explain. As I finished, he laughed and shared that he consumes and buys a lot of the seafood from both the good and the bad side."

5. "My friend Sean told me that he thought sustainable seafood was just another word for organic. I quickly taught him what it actually meant and he, clearly, had no idea but he said that he would be much more mindful of the issue on the future."

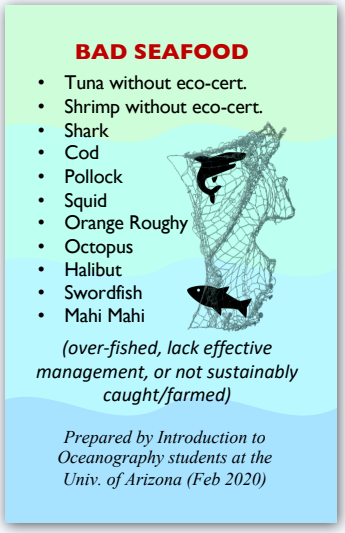
6. "One co-worker read the flashcard and disagreed with it. She was in denial that her favorite food was in the bad seafood list. She said she really enjoys eating Cod and she was not going to stop eating it. She mentioned that the ocean was huge and there was plenty of them. I understood her frustration but she needs to understand that there are people who do not listen, and so the number of consumers adds up."

7. "Another friend I was able to share information with was fascinated by the idea of conserving ocean wildlife by educating others on the topic. She had never heard of many of the ideas I shared and we discussed how it could be highly influential if everyone actually knew about or had seen the information on how to consume and take actions to ensure adequate species and the future of our oceans and animals."

8. "My sister-in-law, who is from Malibu, loves turtles more than any other animal and wanted to discuss the way that nets have impacted both the good and bad seafood lists, along with her beloved turtles. She had heard many stories of turtles getting their heads caught in bags, soda cases, and nets. She understood that the bags and soda cases are usually done by careless people, yet she didn't understand the net problem, as they are thrown by people educated about the ocean."



9. "My ninth interaction was with a high school friend back home, my initial purpose to pick him to give a card was because I want him to take the class next year when he comes to the UofA. I knew his intended major related to science and the ocean so i thought he would find the class to be very interesting. Just like I had predicted, he was very interested in the topic and really liked the cards and their designs. I gave him the class information and I am sure he will enroll in Geos 212 next semester."



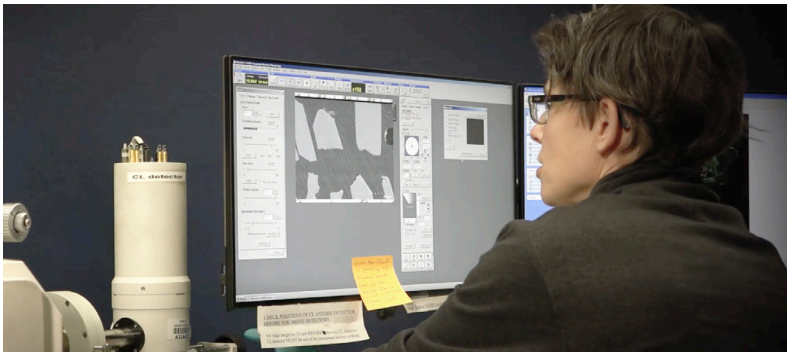
10. "The fourth card went to my grandma. I gave it to her and told her about seafood sustainability, and she handed me a $100 bill in return..."

ARIZONA LASERCHRON CENTER EXPANDS UNDERGRADUATE RESEARCH OPPORTUNITIES

The Arizona LaserChron Center (ALC) is a multi-user facility funded by the National Science Foundation to conduct geochronologic research spanning a wide variety of applications. Its users include undergraduate and graduate students, faculty members, post-docs, and professional researchers from universities, government agencies, and private companies across the country and around the world. The ALC works to make every part of a researcher's visit an educational experience by training them on geochronology theory and methods, analysis of igneous and detrital samples using our two mass spectrometers for U-Th-Pb dating, Hf isotopes, and/or trace and rare earth elements, and data reduction and analysis.

As a national multi-user facility, the ALC is uniquely suited to enhance diversity and foster inclusivity in the Earth sciences by facilitating involvement of undergraduates from underrepresented minority groups and promoting their continued interaction with researchers from varied career paths. In October 2019, the ALC implemented a new program to subsidize and encourage the involvement of underrepresented students in cutting-edge research conducted at the ALC. With a two-fold goal to 1) promote inclusivity and enhance diversity of the Earth sciences by welcoming underrepresented students to our labs and 2) introduce undergraduates to scientific research through the exciting world of geochronology, the new program is off to a great start.

The program offers free travel and lodging for an underrepresented student joining a researcher's visit, as well as covers the cost of analysis of 2-3 samples to allow that student to conduct their own research. Visitors are encouraged to include an undergraduate from an underrepresented minority group on their visit to the ALC at no cost to the student or their home university. Following announcement of this program, we hosted one underrepresented minority student in October, one in November, four in January, one in February, and one in March before the program was put on hold when all visits ceased due to COVID-19 travel restrictions.

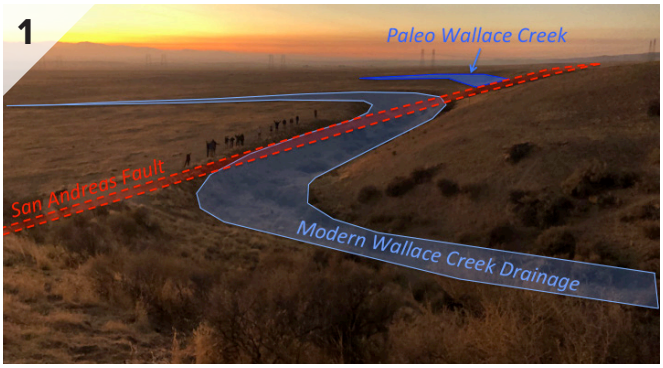


Based on interactions with researchers hoping to visit the lab this summer and fall, we expect that this program will provide opportunities for many new underrepresented students to travel from campuses across the country and conduct their own research projects. For many of us, being exposed to research as undergraduates was hugely important in developing our continued involvement in Earth sciences and we are excited to provide students from underrepresented minority groups a warm and inclusive introduction to geochronology through this new program at the ALC.

By Alissa White, ALC Postdoctoral Research Scientist

ACTIVE TECTONICS FIELD TRIP (GEOS 477/577)

We took 22 students to see active structures all over southern and central California. Below (Picture 1) is an annotated photo of the students lined up along the San Andreas Fault where it offsets Wallace Creek in Carrizo Plain National Monument, one of the most classic field sites constraining the slip rate of the San Andreas Fault. The paleo-drainage for Wallace Creek was abandoned 3800 years ago (based on 14C age dating of charcoal found in the abandoned stream bed); it has been offset 130 meters since then, constraining the slip rate on the central segment of the San Andreas fault as 34 mm/yr.



Picture 2 shows graduate student Cassie Hanagan marking the location of the surface fault scarp that formed during the Mw 6.4 foreshock earthquake of the 2019 Ridgecrest earthquake sequence, near Ridgecrest, CA. The warping of the fence of the China Lake Naval Air Weapons Base demonstrates the strike-slip offset that occurred during this earthquake.

Picture 3 shows the class posing in front of the Dragon's Back pressure ridge in Carrizo Plain National Monument. This kind of feature forms because strike-slip offset on the locally non-planar geometry of the San Andreas Fault forces rocks to be folded and uplifted immediately adjacent to the fault. This particular pressure ridge is a renown geomorphic study site, where characterizations of the uplift and erosion history have helped to provide valuable understanding of the history of slip on the San Andreas Fault and how the landscape and drainage systems respond over time to uplift. This segment of the San Andreas Fault last ruptured during the Mw 7.9 1857 Fort Tejon earthquake.

By Amanda Hughes, Assistant Professor of Practice, Geosciences

Picture 4 is an action shot of a group discussion of the fault geometries in the Alabama Hills near Lone Pine, CA, in the shadow of the highest point in the lower 48 states, Mount Whitney. This location marks the boundary between the Sierra Nevada mountains to the west and the basin and range to the east. At the spot where we're standing, two of the normal faults that bound the Sierra Nevada mountain range front have intersected each other forming a hard fault linkage.

The rocks here represent a small sliver of the basement plutonic rocks trapped between the two fault segments; these are the same plutonic rocks that comprise the high peaks of the Sierras 3.5 km above us to the west, and the basement underlying Owens Valley 3.5 km below us to the east, giving us a good visual representation of the fault geometry in the area. The fault immediately to the east of this location ruptured during the Mw 7.4 Owens Valley earthquake in 1872.

AWG: REFLECTIONS ON OUR SECOND YEAR

Wow, a whole two years! The Association for Women Geoscientists (AWG) Southern Arizona Chapter is an organization run by graduate students in the UA Geoscience Department that was founded two years ago this Spring. These past two years, this organization has really made a lasting impact on the UA Geoscience Department, adding events for professional development, community outreach, and, of course, chats over a beer. The main goals of our chapter are to promote women in STEM fields by creating an inclusive environment and a strong network of women and allies in and around the Tucson community. As a part of the national chapter, we aim to encourage the participation of women in geosciences, exchange educational, technical, and professional information, and enhance the professional growth and advancements of women in the geosciences.

The most exciting part of this year with AWG was the newly minted graduate/undergraduate mentorship program. Lisa Knowles and Alice Chapman, AWG Mentorship program co-chairs, took charge of this formidable task to create an engaging program where graduate mentors are paired with undergraduate mentees to share experiences, career/school advice, and to bring together our grads and undergrads! They spent months planning, strategizing, and fundraising to make this the best possible experience for the participants and received the UA WiSSC (Women in STEM Student Council) Program Grant, giving them $350 to get the program going. All in all, the kick off night was a success (pictured), with 20 graduate mentors and 20 undergraduate mentees meeting for icebreaker games and to find their perfect match. Throughout the year, mentor/mentee pairs met at least once a month to chat about graduate school experiences and decisions, applying for internships, and how to get involved in undergraduate research. My mentee, Erika Jaski, was a senior this past year and we spent our time going over her graduate school application statements in the fall and in the spring, discussing her graduate school prospects, and what school would be the best fit for her!

The mentorship program is just one of the great ways AWG has grown this past year. Our Outreach Chairs, Becki Beadling and Grace Windler, planned a great volunteering event with the Girl Scouts of Southern Arizona, partnering with FreePort McMoRan to teach the girls about rocks, minerals,

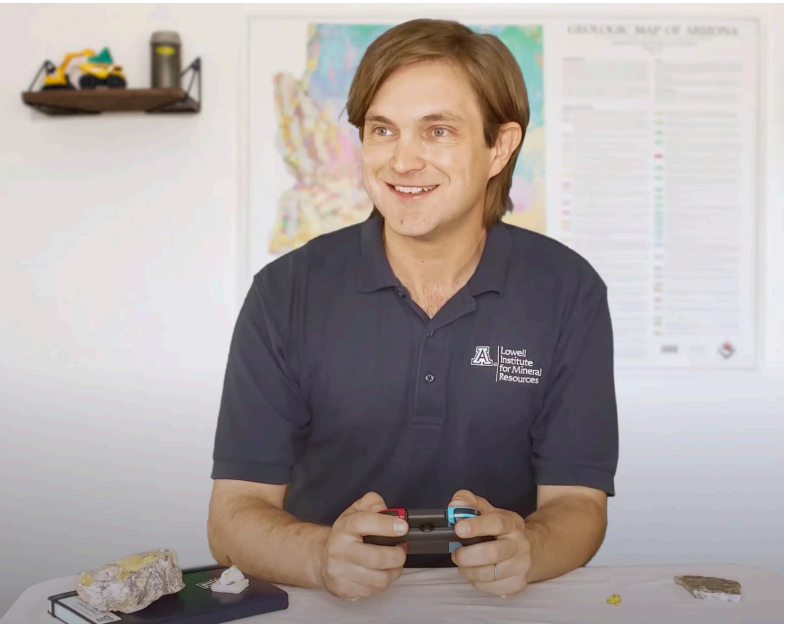
By Audrey Dunham, Graduate Student, Geosciences

and mining, and to get them excited about geology! Our Fundraising Chair, Lexi Wallenburg, put together an amazing post-colloquium Happy Hour Fundraiser (pictured) at Gentle Bens where students, faculty, and researchers gathered and raised $200 to support AWG! Our favorite event to host is the Breakfasts with Female Colloquium Speakers Series because we can learn about the diverse paths that people take in their careers. It is very inspiring to hear successful women talk about their struggles (and success!), especially during graduate school, and how they got to where they are today. To round out our speaker series, we hosted a virtual panel in conjunction GeoDaze focused on career advice and being a woman in STEM with Dr. Diane Thompson, Dr. Amanda Hughes, and Dr. Connie Woodhouse from the University of Arizona and Dr. Terry Plank from Lamont-Doherty Earth Observatory.

The past year has been a whirlwind and we could not have done it without the awesome and dedicated members of our chapter and department! We look forward to growing our Mentorship program, organizing more exciting fundraising events, and continuing with our community outreach to hopefully inspire geoscientists of all ages! If you are interested in joining or donating to our chapter, please contact us at awg.arizona@gmail.com. Keep up with what we are up to by visiting our website: https://www.geo.arizona.edu/awg/ and Twitter: Arizona_AWG.

GEOSCIENCE ALUMNUS BRINGS MINERALS TO ARIZONA SCHOOLS—PHYSICALLY AND VIRTUALLY

It can be difficult to make young people—and also not-so-young ones—understand that many things we use every day, from make-up to game controllers, are made of rocks and minerals. Rocks and minerals which all had to be found, extracted, and then refined into a useful form to make living in our modern world possible. For more than 8 years the University of Arizona Lowell Institute for Mineral Resources (LIMR) Education Outreach program has engaged upwards of 10,000 Arizona students annually, thanks to the tireless efforts of Pam Wilkinson, the original program coordinator, and to generous funding from the Mining Foundation of the Southwest. Education Outreach Coordinator Christopher Earnest carries on Pam's work serving our student clientele with in-classroom visits and hands-on activities (identifying minerals and their uses, exploring for an ore deposit, refining copper and more), field trips to the Mineral Resource Discovery workshop at Flandrau Science Center, and a new video-outreach series called "Minerals Make It!", teaching students how we use minerals in our day-to-day lives, how we obtain them through mining, and what safe, modern mining really is.



Going Virtual

Since classroom visits are not on the agenda right now and Flandrau Science Center is closed due to the pandemic, a new YouTube channel keeps students connected to the topic of minerals. If you have bored children in your life, feel free to send them to our video outreach program. Each short video in the YouTube Series called "Minerals Make It" and tailored for 3rd to 7th graders, focuses on one of the mineral resources in everyday objects. Viewers learn where mineral resources come from, and how they are used. "I never knew copper was in wires." has been a common reaction to the first video in the series. As of mid-June, three videos are online (copper, gold, salt) with a new one being dropped every week. If, after watching, you have any ideas for improving these videos please take some time to fill out this short questionnaire.

Bringing the Minerals to the Students

In non-pandemic times, the Institute's classroom program, free to schools and organizations, offers for different hands-on activities which align with

By Dietlinde B. DuPlessis, Communications Specialist, Lowell Institute for Mineral Resources

Arizona science standards. Presentations available for grades 5 to 12 are: the properties and uses of rocks and minerals, mine design, chemistry and mining, and environmental science and mining.

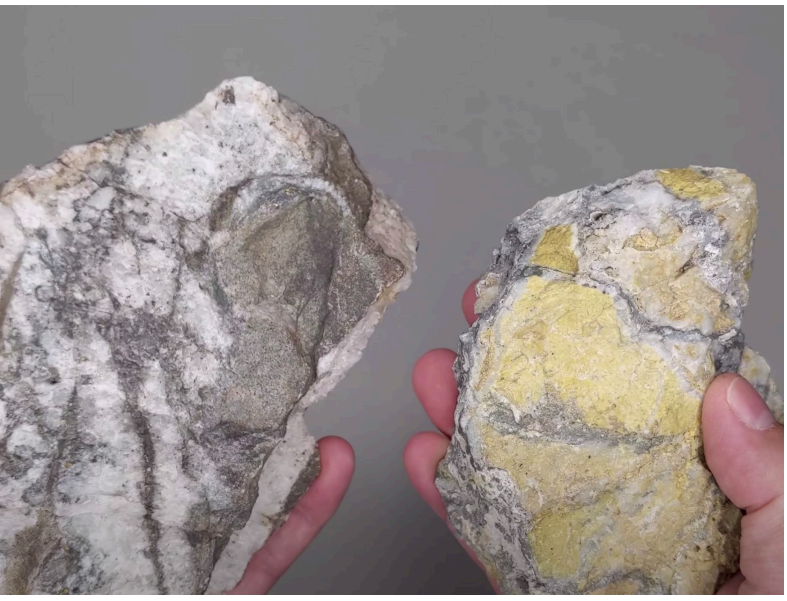
Bringing the Students to UArizona

“I love the interactive, hands-on activities. They spark interest in many areas of rocks and minerals.” said a teacher from Fellowship Christian Academy who attended the Mineral Resource Discovery workshop at the Flandrau Science Center this fall. Within this new program, up to 30 students plus teachers and parents can enjoy a two-hour hands-on experience with the science and engineering of modern mining taught by UArizona students. It includes five stations: ore formation, exploration geology, mine engineering and planning, metallurgy, and environmental reclamation and monitoring. Progressing through each station, students are encouraged to connect the science concepts they have learned in their classroom with applications to various activities in their daily lives.

Going Forward

Covid-19 presents formidable challenges to the 2020-2201 academic year. The Lowell Institute is meeting these challenges by exploring and

Above: Students interact with an exhibit at Flandrau Science Center



Above: Screenshots from IMR's "Minerals and Gaming" video on YouTube.

developing virtual instruction methods and materials to supplement our in-person program. These new methods will allow us to continue to serve the students of Arizona during these difficult times. We look forward to resuming in-person outreach once students and teachers return to their classrooms. To learn more about our classroom program and field trip offerings, visit our outreach website

Christopher L. Earnest is the Education Outreach Coordinator at the Lowell Institute for Mineral Resources at University of Arizona. He has more than a decade experience in primary education.

NEW COURSE FOCUSES ON NONRENEWABLE RESOURCE USE THROUGH TIME

The University of Arizona's departments of Mining and Geological Engineering (MGE), Geosciences, and Anthropology collaborated in an attempt to change modern society's lack of appreciation of dependence on the earth's resources, from petroleum to metals to industrial minerals. In Spring 2020 a new UA-approved general education course, Nonrenewable Resources and Human Civilizations was offered for the first time. Isabel Barton from MGE, David Killick from Anthropology, and Mark Barton from Geosciences had teamed up to bring one of the first mining engineering courses to the general student body. The course is included in the University's general education catalog as a Tier-2 Natural Sciences course, making it an attractive choice for students not majoring in science or engineering to fulfil their course requirements.

This semester's group of 21, mainly freshmen and sophomores, was diverse: Less than one third from the Colleges of Science and Engineering, one third were from the College of Social & Behavioral Science, and the remaining group had various majors, including Fine Arts and Architecture. Many of them had enrolled out of curiosity, without a lot of prior knowledge.

The students experienced a new way to learn about mineral resources, taught by Assistant Professor Isabel Barton. The course takes a longer-term, worldwide view of all the ways that nonrenewable resources have helped civilizations develop over time. That includes technology and industry, but also non-scientific issues such as strategic resources and government resources policy, the role of resources in political and social life, and how to balance the competing needs of preserving the environment with providing materials for society. Science and engineering are fused with history and economics to make sure that some aspect of the material will draw the interest of everyone, no matter what his or her background. The course follows the rise of civilization and starts with the three earliest nonrenewable resources to be used by humans at the end of the Stone Age: copper, silver, and gold. Next, bronze came along, and then iron. Unfortunately, the field trip to a blacksmithing shop had to be canceled due to the coronavirus situation.

The discussion of nonrenewable resource production and trade in the medieval period, including the Black Death, seemed eerily relevant. With the early modern period and the Industrial Revolution, the outlines of the modern world started to come into focus. During the 20th century the emphasis was on strategic resources. Examples from both world wars showed the consequences of shortages in elements, fuels, and everything else the earth provides that we rely on. After that, the course headed straight into the future with a discussion of resource exhaustion, seawater and seafloor mining, and space mining.

The course will be offered again in spring 2021 and will be cross-listed between MGE and Anthropology. Hopefully, the trips to the blacksmith, San Xavier underground mine, and Freeport-McMoRan Miami copper smelter can take place.

By Dietlinde B. DuPlessis,
Communications Specialist, Lowell Institute for Mineral Resources

DAVID LOWELL'S LEGACY IN GEOSCIENCES AND THE LOWELL PROGRAM IN ECONOMIC GEOLOGY

David Lowell's passing is a bittersweet reminder of the 20th anniversary of the first $1M+ endowment in Geosciences, which enabled establishment of the Lowell Program in Economic Geology (LPEG). LPEG and the university-spanning Lowell Institute for Mineral Resources (minerals.arizona.edu) reflect David and Edith Lowell's generosity and vision toward the Department and University.

For many years, David interacted with faculty in Geosciences, including George Davis and John Guilbert, on topics in Cordilleran geology, such as regional structure and porphyry copper deposits. Of his 50+ publications, the landmark 1970 Lowell and Guilbert paper on the distribution of hydrothermal alteration in porphyry copper systems remains one of the most widely cited papers in the field and has influenced generations of academic and exploration geologists. In recognition of these contributions to science and education, he was awarded an honorary doctorate from UArizona in 2000, which followed his election to the National Academy of Engineering in 1999.

David's passion around the power of solid, observational field geology informed his oft-expressed view that this must remain at the core of geological education, and that this approach is particularly important for economic geologists. Although he had made earlier gifts to Geosciences, notably in support of field camp, it wasn't until conversations with Joaquin Ruiz and Mark Barton in the late 90s that he agreed to endow a program focused on applied economic geology, thus ensuring its sustainability in a top academic program at a time when other university programs in economic geology were disappearing nationwide. The idea was to supplement other, more academically oriented faculty positions while providing opportunities for industry professionals and others with an applied bent. His gift ensured maintenance of a second economic geology faculty line and provided for a part-time program coordinator. Generous with his time as well as dollars, David helped with multiple contacts and discussions, although he always insisted in staying out of the decision-making process.

Building on David's vision, the endowment, which allowed the hire of Eric Seedorff from industry in 2002, the newly founded Lowell Program took shape with the development of a novel professional master's degree and a major expansion of continuing education opportunities. The unique, Sloan Foundation-trademarked Professional Science Master in Economic Geology (PSM) degree was created to be fully self-supporting and designed for professionals and

By Mark D. Barton
Co-Director, Lowell Institute for Mineral Resources and Professor of Geosciences

others who wanted to combine solid scientific training with a business component.

With the potential to complete a full master's degree in as little as 9 months, the PSM has attracted and graduated over two dozen students from 6 countries since its inception in 2007. Since 2004, well over 1,000 students (the vast majority from industry, representing 6 continents, over 30 countries, and almost 50 companies) have participated in LPEG's unique intensive 10-12-day field courses. These courses have been self-supporting and also support many regular graduate students through paying for their participation and, in many cases, providing TA and RA stipends to support the broader program, particularly where other funds were not available. In aggregate, over $2M in direct field course income has supported LPEG and contributed to more than 50 other MS and PhD graduate degrees.

As these examples illustrate, David Lowell's generosity to Geosciences and the Lowell Institute has been the catalyst for past success. Yet the most important contributions are still to come, as his gifts built the foundation for UArizona to become a world leader in addressing the challenges of humanity's use of earth materials. His example illustrates how much universities can do with philanthropic support to build the academic programs that educate the next generation of industry and academic scientists. We need more alumni like David Lowell, who left a lasting foundation in education and science alike, and whose philanthropy provided a model for mineral resources programs to thrive in today's competitive landscape.

Left: David Lowell in 2000 upon receipt of his UArizona honorary doctorate with President Peter Likins and Dean Joaquin Ruiz.,
Above: The 16th annual LPEG advanced ore deposits mapping field course.

ALUMNI NEWS

Julio Betancourt, PhD ‘90:

Julio Betancourt, USGS Scientist Emeritus, is being honored with the 2020 Distinguished Career Award from the American Quaternary Association (AMQUA). This is the highest award made by AMQUA and honors a lifetime commitment to Quaternary science. Past University of Arizona faculty that received the AMQUA DCA Award include Paul Martin (1999) and C. Vance Haynes (2002). Julio received both his M.S. (1984) and Ph.D. (1990) from the Department of Geosciences. He served as Adjunct Professor in three different colleges at U. of Arizona from 1990 to 2013; for nearly three decades, he was stationed as a federal scientist at the University’s Desert Laboratory on Tumamoc Hill.

After 35 years of federal service, Julio retired from USGS in 2018. He and his wife Terry currently reside in Reston, VA, where he still has an office at USGS National Headquarters and remains active in research and service to the scientific community. The 2020 AMQUA Biennial Meeting has been postponed due to the pandemic, so both the 2019 and 2020 AMQUA Distinguished Career Awards will be formally presented at the rescheduled meeting to be held in Seattle in June 2021. Julio is very excited to share the stage with Vera Markgraf, Northern Arizona University. Vera be honored with the 2019 AMQUA Distinguished Career Award at the 2021 meeting. Vera was one of Julio’s mentors when he was a graduate student, and she was on the faculty at the University of Arizona, and they are lifelong friends.

Andrew Laskowski and Devon Orme, PhD ‘16 and ‘15:

Andrew Laskowski (PhD 2016) and Devon Orme (PhD 2015), both of whom are Assistant Professors at Montana State University in Bozeman, Montana, welcomed their first child, Morgan Anne, on May 24, 2020. Congratulations Andrew and Devon!

Mae and Michael Gustin, PhD ‘88 and ‘90:

On the left are Michael and Mae Gustin graduated with PhDs in Economic Geology (1990) and Geochemistry/Igneous and Metamorphic Petrology (1988), respectively. Mae is a Professor in the Department of Natural Resources and Environmental Science at the University of Nevada-Reno. Her primary research area is the biogeochemical cycle of mercury in the environment. Michael is a senior geologist with Mine Development Associates. Next to Mae and Michael is their son Andrew then Mariah their daughter who was born while Mae and Michael were in graduate school at U of A. The next person is Mariah’s ex-boyfriend and then Mae’s brother.

William (Bill) Sauck, MS ’69, PhD ’72:

“The latest Alumni News Magazine (Summer, 2019) was outstanding and inspired me to contribute my memories from the 1964-72 period. The Alumni News section featuring friends and classmates John Delaney, Terry Gerlach, Fred Graybeal, and Nancy Cozad brought back a flood of memories. The photo of John Sumner (pg. 26) was especially moving, as he was my mentor and a 2nd father during the 7 years that I was in the Dept. I had lost contact with most U of A contemporaries over the years, but with my retirement earlier this year, I am now able to get back to Tucson and reconnect.

I came to the U of A in 1963 as a Physics grad student, having grown up on a farm in MN and knowing nothing about geology except that frost-heaved rocks appeared in our fields every spring and had to be removed. On weekends I often studied on the roof of the Physics building and was fascinated by the mountains all around the Tucson Basin (as well as the dust devils moving slowly across the valley). One of my 3 roommates that first year was Dick Kelly, who was working on his MS in Geology. Toward the end of that first year he said to me that the Dept. had hired a professor in the ‘new’ area of Geophysics, and that he (John Sumner) was looking for new grad students. I went over and had a great talk with him and signed up for the Fall of 1964. Then I discovered that I would have to take the entire undergrad geology curriculum before I could be seriously considered a candidate for a graduate degree. I took the first-year courses by exam during that summer, and then went through most of the available curriculum in the next 2 years. I have no regrets at having to take any of them – even geomorphology and geochemistry – they have all served me well. My main regret is not taking glacial geology from Lawrence Gould (because it began before 8 am). The summer geology field camp was based at a ranch on the West flank of the Chiricahua Mountains, and was truly the capstone course. Interestingly, when I attended my first Geosciences Alumni reunion in March 2019, one of my team-mates from that course introduced herself to me – Nancy (Cozad) Naeser, BS ’66. I also met another PhD classmate, John Dreier at that reunion. My first roommate, Dick Kelly, after some years in the oil industry, moved back to Tucson (Marana) and started a commercial nursery specializing in trees and shrubs for AZ developers. We had lunch with him and his wife, Shari, in 2011.

In the last news magazine, Fred Graybeal mentioned many of our classmates from that time. There were many more, some of whom had study cubicles upstairs in the Mines building where we spent many late-night hours. Ike Winograd was one, who is now retired from the USGS and is a Fellow of the AAAS. Another was Robert (Bob) West, who did the gravity map of AZ at the same time I was working on the aeromagnetic map of AZ. He and our wives once made the trip from Nogales to Mazatlan via overnight train (old surplus US Pullman sleeper cars). On that trip we were talked into doing a deep-sea fishing trip (with the help of a couple of courtesy margaritas on the dock). Complete novices, but the captain found a school of mahi-mahi that we trolled through a couple of times and brought back 6 beautiful and delicious fish. Bob stayed in Tucson most of the years since, but unfortunately died of

cancer in 2017. I was a roommate with Dick Beane for a couple of years. He was a tough guy (in spite of diabetes) and great geochemist. We did things like drive up to Grand Canyon for a weekend, trotting down the Kaibab trail in the afternoon, spending the night on sleeping bags spread on the sand at Phantom Ranch, and hiking out the Bright Angel trail on Sun am and driving back to Tucson. He sadly succumbed to a head injury from a fall on cement at home in 2004 – condolences to his wife, Barb. Good times were had with others, such as John and Holly Delaney. On a weekend hike in the desert we saw dung beetles in action – ask us what they do. Another memorable resident of the Mines building was LC (Court) Lee, who has spent much of his time in government service; now retired in MD. I encountered another classmate, John Broderick, at an AGS meeting in Tucson in 2011. Dave Rea was a gutsy guy – he dated the daughter of the Geology Dept. chairman at the time, John Harshbarger. Dr. Harshbarger was a bear of a man and rather intimidating, who later founded the Dept of Hydrology & Water Resources. Dave persisted, married Donna Harshbarger, and had a full academic career at the U of Michigan. Also, in the front office at that time was another force to be reckoned with, Rose Samardzich.

We grad students learned quickly that it was best to stay on her good side. Ed McCullough had just finished his PhD and was developing videos for the Intro Geology courses. He shortly became chairman, and I was also very pleased to encounter him at the March 2019 Alumni reunion. Ken Zonge finished his PhD a couple years before me, and already had his own geophysical company. He signed back on as adjunct faculty in the Geology Dept. We had colleagues from the Mining & Geological Engineering Dept., such as Jim Fink. His diploma was in geophysical engineering and he went on to found HydroGeophysics, a company he recently sold to his employees. On our few trips back to Tucson over the years, he and his wife Georgie have hosted us. John R. Sumner (son of Dr. John S. Sumner) also graduated from that Dept. with a BS degree in geophysical engineering and took Intro Geophysics when I was TA for the labs. He got his PhD from Stanford. John R. has retired from Exxon-Mobil in Houston. We've seen him and Linda several times at their summer home in Minneapolis, and also met him by chance in March at the Tucson airport after he had finished volunteer work maintaining trails in the high Chiricahuas. The connection with the MGE Dept. (also in the Mines Bldg.) was beneficial in another way. Beane and I (and others) would sometimes go over on Fri afternoon and check out mining headlamps and battery belts so that we could go out and poke through old underground mines on the weekend to collect mineral samples. In retrospect, we went into some pretty dangerous places.

Those formative years at the U of A, surrounded by interesting geology, supportive faculty, and in close contact with fellow grad students having diverse interests, were so valuable over the following decades. I am very proud that my dissertation was signed by Spencer Titley, John Guilbert, Ken Zonge, Paul Damon, as well as John S. Sumner. While on one of my 3-year stays in Belem, Brazil, as

visiting professor, I was able to assist Dr. Titley get a Fulbright fellowship for his semester sabbatical so that he could tour the various mining districts of Brazil. He spent some time at our home in Belem. It was especially gratifying to visit Spence and his wife at his home in 2018 during GeoDaze. He set a high bar for professors—I don't know of any others who have been advisors to about 150 MS and PhD students. It was sad to hear of his passing earlier this year.

Well, I've rambled but run out of space for much of what I did at the U of A and have done since then. This part is about more of the people who helped shape what is now the Dept of Geosciences in the 1964-71 years. I'm sure that I've left many out, but am glad to have added to the list of those mentioned in the Summer 2019 Alumni Newsletter (see my photo on pg. 21). The story of how the Arizona Aeromagnetic Survey was conceived, funded, and carried out is enough for another chapter. Another 'life' is my Brazil story, and finally the 34 years working at Western Michigan University."

J. K. Cluer, MS '87:

Kelly writes, "The last several years have been busy, and indeed the best. It was a very satisfying transition from North American Greenfield Exploration director at Kinross, where three fully functioning teams were created in Reno, Toronto and Rovaniemi (not exactly North America, but…) to a new role as Business Development Director in Russia. In Russia the purview is finding new advanced opportunities and staking creative greenfield plays in the Far Eastern administrative units. What could be more fun?

Dealing with the coronavirus pandemic has made life interesting, leading teams while on home lock-down, which is less fun. I hear a lot of positive spin about how many folks will learn working from home is good and productive, but the fear that is that field geologists will learn the same lesson – bad idea in the long haul. With all of today's tech there are many distractions keeping us off the rocks, and that is a big contributor to declining discovery rates.

Meanwhile I have been involved in many extra-curricular activities, but a major one is the Central Asiatic Expedition II, a rephotography mission chasing the 1920s Roy Chapman Andrews team across Mongolia. The goal is finding key locations from which the historic photos were taken, repeat the photos, and document change in landscape and urban development. The American Museum of Natural History has provided all of the photos and documentation, thanks again! A brief introduction was recently published in The Explorers Journal."

JJ Muñoz, BS ‘15:

JJ writes, “I left my masters with a sense that I was more interested in exploring the social implications and applications of my academic geology background and that I did not want to pursue a PhD anymore- that maybe some years in the workforce would give me clarity on defining my path.

That summer of 2017 I interned for the Texas Commission on Environmental Quality- the state environmental agency- working in their Superfund site management program. I enjoyed my time there- the experience I gained in environmental geology was valuable- but I did not vibe with other aspects of the job (pace, limited regulation scope- namely with the oil industry, and career projection). ‘Luckily’ for me, Hurricane Harvey rolled through the Texas coast right as the internship was ending- and so did FEMA.

In October 2017 I was hired by FEMA to work as a “local hire” GIS Specialist at the joint field office in Austin for the Hurricane Harvey disaster. It was initially a 3-month contract—so it wasn’t very stable, but I figured I’d go for it.

That first three-month period was trial by fire, working in a high-pressure environment with many other local hires that had no idea how FEMA worked. It was chaos, but I loved it because I felt like I was learning more and more every day and doing impactful work that combined my desire to help people with applying my technical background. Those three months eventually got extended out 6, 9, and then to a year, which is when they set up a long-term recovery office in Austin and they hired me as one of the few CORE employees on a 2-year contract to stay there and carry out that work. I worked in that capacity for another year gaining loads of experience and exposure to all aspects of the agency. I became a Certified Floodplain Manager and well versed on the national flood insurance program. I went out to disaster zones and spoke at disaster recovery centers—it was great. But the two years were coming up, and a lot of us saw the writing on the wall, so I looked for an exit.

Last month, I started a job with the FEMA Region 4 headquarters in Atlanta. I was blessed to have received this promotion. The work will be more challenging, as I will be in the response unit at the regional command center when hurricanes come through, but I’m very excited for this opportunity in a new city working in a different context than the field office.

To sum it up—I feel like I’m doing what I always wanted to do. I work with geologic/hydrologic data and I put it into context to help survivors.

George Davis is one of the people who gave me the opportunity to realize those passions—so I’ll express my endless gratitude for him yet again.”

Brooke Clements, MS ‘91:

Every year, students and alumni from the U of A meet at the Exploration Roundup conference in Vancouver in January. The Roundup is one of the top exploration conferences in the world, and Vancouver is arguably the largest center for mining and exploration in the world. U of A has excellent economic geology, geology and mining engineering programs and its graduates have prominent roles at exploration and mining companies, universities and government agencies throughout the world. For students considering a career in mining/exploration, the Roundup is an excellent place to become familiar with various aspects of the industry. One of our group, Moira Smith was presented with the prestigious Colin Spence award at the conference this year for her role in making the Long Canyon Mine in Nevada a reality.

Front row, left to right: Eugene Schmidt (MS ‘75), Tom McCandless (PhD ‘94), Brooke Clements (MS ‘91) Back 2 rows: Lance Miller (PhD ‘94), Rick Van Nieuwenhuyse (MS ‘80), John Larson (friend of department), Wolfram Schuh (PhD ‘93), Kitt Marrs (MS ‘79), Joey Wilkins (BS ‘85), Peter Megaw (PhD ‘90), David Maher (PhD ‘08), Matt Gray (MS 88), Eric Jensen (PhD ‘03), John Balla (PhD ‘72), Moira Smith (PhD ‘90), Joe Piekenbrock (MS ‘83), Matt Wetzel (MS. ‘16), James Lang (PhD ‘91), John-Mark Staude (PhD ‘95), David Johnson (PhD 00), Michael McCarrel (MS ‘12), Bill McClelland (PhD ‘90)

Marie and Phil Pearthree, MS ‘82, PhD ‘90:

Marie and Phil are grateful to have been able to carve out long, rewarding careers in Arizona. Phil was a Research Geologist for the Arizona Geological Survey for many years, with research focused mainly on geologic hazards, surface processes, and geologic mapping; he (and the AZGS) benefited greatly from being able to work with many Geosciences grad students and graduates. He was thrust into the position of the Director of the Survey in 2016 after the accidental death of his predecessor. This was a very challenging time, as the AZGS had just been reunited with the University, but without state funding. The past 4 years have been interesting, as he encouraged the reinstatement of state funding by the legislature and the re-integration of the AZGS into the UA (with even more opportunities to work with Geosciences faculty and students), while continuing to get out in the field every now and then. The COVID-19 crisis has presented new budgetary and logistical challenges to the AZGS and the University as a whole, but he hopes to remain for a couple more years before riding off into the sunset. (Marie’s note: don’t let him fool you – he’s having way too much fun to retire anytime soon).

Over the course of her career, Marie went from consulting geology/hydrology/engineering to water management, with a short stint in a City Council office. A registered Civil Engineer, she served as Deputy Director of the Tucson Water Department for 10 years where she led the successful transition to a Colorado River water supply. She subsequently became the Deputy General Manager of the Central Arizona Project (CAP), which delivers Colorado River water into Arizona, for 7 years before “retiring” in 2016. Not one to sit still, she has since co-authored the book “Tucson Water Turnaround: Crisis to Success,” which was published in February 2020. It tells the story of the events that led up to the initial introduction of Colorado River water to Tucson in the early 1990s, the epic debacle that ensued, and the steps that were taken to turn the situation around and bring this renewable water supply water back into the community. Marie has also served on the Geosciences Advisory Board for the past 2 years. She is now running for election in November to represent Pima County on the Central Arizona Water Conservation District (CAWCD) Board of Directors, which oversees the CAP system. Spread the word and wish her luck!

Above: Marie and Phil Pearthree visit the Sphinx in Egypt

Above: Joe Hinzman (left) presenting Perry Durning (center) and Bud Hillemeyer with the 2010 PDAC Thayer Lindsley Award for International Discoveries and Mill Complex Los Gatos Mine grand opening

Perry Durning, MS ‘72:

Perry writes, “It has been over 50 years since I finished my graduate course work at U of A and, in 1969, began my full-time career in mineral exploration. I had finished my field work and started the text for my thesis, but it took me an additional three years (should have taken three weeks) to finish the writing. I finally submitted the thesis text with hand-colored maps for review to my thesis advisor, Dr. John Guilbert. I heard nothing for a couple of months. When I stopped by his office to inquire, he sheepishly shared that he had misplaced all my maps. Dr. Guilbert offered a great incentive. If I would bring him a new set of maps, I would not have to take my orals. I colored another set for him to review, my thesis was approved, and he was true to his word. No orals and I got my degree! Thank you Dr. Guilbert.

My passion for mineral exploration was ignited the summer of 1966 while I was in under-graduate studies at San Diego State. I was offered a summer job with Ed Wisser and Bill Cox doing grassroots mineral exploration in Nevada. The objective was to identify virgin epithermal Au-Ag districts. I had no clue what I was getting into, but it sounded interesting. Bill gave me a one-week introductory field course. I was then given the keys to a 4x4 pickup, a few maps and assigned the task of reconnaissance mapping the Kawich and Reveille ranges east of Tonopah and when finished, map the Silver Peak Range west of Tonopah. All in three months! I had a great summer and determined that grassroots mineral exploration was in my future. Towards the end of my senior year at San Diego

State, I sent my application to the U of A for graduate school but had not heard anything from the university. I was scheduled to play in a tennis tournament at U of A and decided between matches to walk over to the geology department. As luck would have it, the door was open to Dr. John Anthony's (department chair) office. I introduced myself, had a long talk, and found out he also was a tennis player. A few weeks later I received a letter of acceptance to U of A and the offer of a teaching assistantship. Before the schoolyear started, all new graduate students met with faculty and were asked to volunteer for teaching assignments. No one volunteered for Professor Mike Wood's minerology and hand specimen petrology labs. Grad student offices at the time were crammed into five-foot-by-eight-foot cubicles. Mike offered four TA volunteers a spacious office with large tables. I have always liked to spread out, so I volunteered along with John Delaney, Fred Graybeal, and Tom Heidrick to teach the labs. The labs were six hours per week and co-taught with another TA, which was fine with me. Little did I know it also required two hours of lecture per week split between my partner and I. John, Fred, and Tom were gifted lecturers. It seemed like preparation for my one-hour lecture each week took more time than all of my other classes combined. All in all, being a TA was a great experience. Since that time, I have given a few geologic talks, but public speaking is still not my gift.

In 1968 I wrote a term paper for one of Dr. Guilbert's ore deposit classes on "The Genesis of the Boleo Copper Deposits, Baja California Mexico". Dr. Guilbert liked the concept and thought he could get a company to fund a trip to Boleo. A few weeks later he asked me to join him along with Dr. John Sumner and Pierce Parker from AMAX Exploration, on a trip to Boleo. Dr. Sumner flew us down in his private plane. The mines were operating, and we were able to arrange a mine tour and prospected the Santa Ana Basin to the north. No new discovery was made. Nonetheless, we had a great trip. As a result, Pierce Parker offered to fund my thesis if I could identify a thesis topic of interest to AMAX.

Looking for an economic geology/ structural thesis, Dr. Ed McCullough recommended the Little Hill Mine area at the northwest end of the Catalina mountains. I wrote my proposal and AMAX agreed to fund my thesis. Little Hill became a major prospect for AMAX and was an academic success (large but too low grade). Working at AMAX with Eric Braun, also a U of A grad, we determined we were looking at the roots rather than the top of a porphyry copper system.

Inspired by a 1975 quote from Peter Joraelmon, 'I know of a possible porphyry copper occurrence that was turned down by two able geologists: one because erosion had clearly stripped the deposit down to its very roots and the other seeing the same evidence, because the ore body was still buried at over 5,000 feet below the surface.' As a result, Jerry Davis, a U of A graduate who did his PhD at Kalamazoo and I decided to co-author a paper on "The Root Zone Characteristics of Porphyry Copper Deposits". The 1978 AGS Digest paper was intended to help the field geologists distinguish hood zone propylitization from the root-zone propylitization at

an early stage in the exploration of porphyry copper systems.

I spent several years in copper exploration but yearned to get into grassroots exploration for epithermal associated gold-silver ore deposits. John Dreier and Dave Hackman had recently completed their PhD's at the U of A and together, in 1976, we formed SAGE Associates. My experience at SAGE taught me perseverance and an understanding of how to prepare and present large grassroots exploration programs to mining corporations. The SAGE objective was not only the funding but also retaining an NSR royalty if an economic discovery were made. It is a business model that I use to this day.

I am very grateful for my education at the U of A, guidance from faculty, student friendships, and industry contacts made during my early career in mineral exploration.Experiences during those formative years laid the foundation for my future career path.

In 1979 I was part of the startup team for Fischer-Watt Gold and, in 1993, founded La Cuesta International, Inc. with my current partner Bud Hillemeyer. Fischer-Watt Gold and La Cuesta International successfully employed the business model first utilized with SAGE Associates. I have had the privilege of working from Argentina to Canada and from the Pacific to the Rockies. I have had more fun, adventure and discoveries than I could ever have imagined back in 1966 when I took on that first summer job. U of A grad Kitt Marrs will remember the trip he made to Baja to help me with a little aerial recon. He flew his prized Stinson high-wing airplane to join me on the east coast of Baja. We completed the recon but, unfortunately, we later discovered gas for his plane was only available at a few designated locations. Kitt knew he would run out of gas before he made it back to an authorized fueling station. So, we decided I would find some gas and he would land near a predetermined road in a remote area near the south end of the Laguna Salada. We knew if we got caught, we would be in trouble. I bought some gas, drove to the rendezvous area, tested the lakebed crust, and waved Kitt in for landing. Unfortunately, the plane tires broke through the crust and the plane was stuck. We had a problem.

Kitt and I drove the road and located a straight section that was long and level enough for him to take off. I towed the Stinson out of the soft sand with my Bronco to the take off point, gassed it up and Kitt took off for the border before the federales found us. Gratefully, another adventure ended well.

In 1990 Fischer-Watt Gold was hired to evaluate the exploration potential of the Pachuca-Real del Monte Mining District, Hidalgo, Mexico. The Mexican Government intended to privatize the district and a potential buyer hired us for one week to evaluate the entire +100,000-hectare district. Geologist Jorge Ordoñez represented the buyer, U of A graduates John Dreier and Jose Luis Lee joined Fischer-Watt employees, Larry Buchanan, Bud Hillemeyer, Walter Schull, and myself as part of the team. We were well prepared for the task. However, upon arrival Jorge told us an SEG field trip was coming at the end of the week and, in addition to completing the evaluation, asked us to give the SEG participants surface and underground tours and prepare two-to-three talks for dinner presentations that evening.

Remarkably, we completed the evaluation, gave the SEG tours and presentations on time and within budget. Jorge's client bought the district.
In 1993 Fischer-Watt changed focus and no longer had a need for geologists. Bud Hillemeyer, who had been with Fischer-Watt since 1983, and I formed La Cuesta International (LCI). LCI proposed to interested parties grassroots exploration programs for gold and silver +/- base metal projects. LCI was fortunate to find an initial funding partner. LCI worked primarily in Mexico from 1993-2010 and, during that time, made five grassroot discoveries. Three of the discoveries are currently in production; San Sebastian (Hecla Mining), San Agustin (Argonaut Gold), and Los Gatos (Dowa/ Sunshine Mining). Camino Rojo (ORLA Mining) is in development and Pitarrilla (Silver Standard) is undergoing an advanced evaluation. As a result of the Mexican discoveries Bud and I were honored to receive the "Thayer Lindsey Award for International Mineral Discoveries" at the 2010 PDAC meeting.

LCI returned to work in the USA in 2010. To this day LCI continues its grassroots mineral exploration programs. In September 2019 LCI was invited to be part of the Los Gatos Mine grand opening celebration. It was a wonderful experience with dignitaries from Mexico, Japan, and the USA, banquets, and surface and underground tours.

For those interested, here is the discovery timeline for Los Gatos:

1. 1994 first seen from aerial recon.
2. 1998 first field exam by LCI, targets identified.
3. 2005 Los Gatos concession located.
4. 2008 Los Gatos claim title granted.
5. 2009 Discovery drill hole 34 m @ 414 g/t Ag, 0.5 g/t Au, 2% Pb, and 4.85% Zn.
6. 2019 First production, 2500 TPD UG mine and mill complex. Twenty-five years from initial recognition to a mine!

In February 2020, Bud's son, Nick Hillemeyer, a 2017 U of A geology graduate, joined LCI as a partner in the newly formed company Bull Mountain Resources. Nick completed his graduate curriculum in Economic Geology at the University of Nevada, Reno and is currently writing his thesis to finish his degree. It is a great feeling to be able to pass the LCI legacy on to the younger generation. Welcome aboard Nick.

A few final thoughts. Successful grassroots exploration requires thinking out of the box, hard work, patience, perseverance, teamwork, and good judgement. Grassroots explorationists need to determine early on if they are at the top, productive, or bottom part of a mineral system, 'draw grand conclusions from trivial amounts of facts, as Mark Twain says, and, as a risk taker, you have to 'know when to hold 'em and know when to fold 'em' (Kenny Rodgers). Success in grassroots exploration requires family and management support with a long-term perspective. I am thankful for my U of A education, many longtime friends and associates in geology, a supportive family and corporate partners who, over the years, allowed my partners and I to pursue the dream of grassroots mineral exploration and make a few discoveries along the way."

Above: Ellen Wohl poses with her Distinguished Alumni Award and Horton Newsom does Mars Science Laboratory operations at home.
Right: Les McFadden poses with his Distinguished Alumni Award

Ellen E. Wohl, PhD ‘88:

Ellen E. Wohl received the Distinguished Alumni Award presented by the Geosciences Advisory Board. The Distinguished Alumni Award is presented to an alumnus of the Department of Geosciences at the University of Arizona in recognition of their outstanding achievements in their field. This individual has made meaningful contributions to Geosciences through public policy, business contributions, or community service, and helps to uphold the reputation of the Department of Geosciences at the University of Arizona.

Ellen, a University Distinguished Professor in the Department of Geosciences at Colorado State University, was presented with the Distinguished Career Award of the GSA Quaternary Geology and Geomorphology Division at the November 2018, GSA Annual Meeting in Indianapolis, Indiana. One month later Ellen received the G.K Gilbert Award in Surface Processes at the AGU Annual Meeting.

Horton & Joan Newsom, PhD ‘82, MS ‘80:

Horton writes, “I received my Ph.D. from U of A in 1982, jointly advised by Giba Ganguly and Michael Drake. The picture shows me doing Mars Science Laboratory operations for the ChemCam instrument at home on April 15, 2020. Mars exploration has continued uninterrupted during this time. My wife, Joan Newsom, also a Geosciences grad is also still busy, and just finished teaching her High School classes by Zoom.”

Leslie McFadden, PhD ‘82:

Leslie McFadden also received the Distinguished Alumni Award presented by the Geosciences Advisory Board.

Les received his PhD from the University of Arizona Department of Geosciences working with Bill Bull. He then spent his career at the University of New Mexico on the faculty of the Department of Earth & Planetary Sciences. He established himself as a leading arid-lands geomorphologist specializing in soils and weathering processes. He published landmark papers on desert soil genesis, soil carbonates, rock weathering, and the role of dust in soil genesis. The Geological Society of America recognized his work with the 2017 Kirk Bryan Award. Les also served two terms as chair of his department.

Sumit Chakraborty, PhD ‘90:

Sumit Chakraborty has been elected Vice President of the Geochemical Society for a two-year term, 2020-2021, after which he will automatically be the President of the society for a two-year term.

SUPPORT GEOSCIENCES

OUR GREATEST NEEDS

GeoDiscoveries Fund

The **GeoDiscoveries Fund** (page 24) aims to increase the department's reach by equipping our faculty and researchers with cutting-edge technology. This new fund will also allow us to attract and retain the top scientists in their field, building on our legacy of recruiting leaders in Geosciences and educating our next generation of students by providing them the unique experience of cutting-edge technologies.

GeoDiscoveries Fund donations will have an immediate impact on our students, faculty, and staff. To support the GeoDiscoveries Fund, please visit give.uafoundation.org/geosciences and select "Other - Please Specify." In the comment box, type "GeoDiscoveries."

Mélange Fellowship

We are seeking support to start a new fellowship to promote **diversity, equity, and inclusion** within the Department of Geosciences. This fellowship is intended to help offset costs for research, laboratory and field related activities and remove barriers associated with such activities for undergraduate and graduate students.

Read more about our commitment to removing structural barriers in admissions, hiring, degree requirements, service requirements, and outreach on page 6.

To learn more about the Mélange Fellowship, or to learn how you can support this initiative, please email Hannah McCormick at hemccormick@arizona.edu.

WAYS TO GIVE

Online

The University of Arizona is now accepting online donations for all funds!

To make a donation online, visit give.uafoundation.org/geosciences. If you don't see the fund you would like to support, select "Other - Please Specify" and use the comment box to include your desired fund.

By Mail

If you would like to send a contribution through the mail, checks can be addressed to:

Development Office
Department of Geosciences
University of Arizona
PO Box 210077

CORE Support

CORE Support (general support) helps us to sustain and build upon our legacy of combining state-of-the-art classroom, field, laboratory, and computational training and engagement for all our students.

Supporters of this fund help the department to make much needed repairs, send faculty and students to educational and outreach presentations, invite world-renowned researchers to speak on campus, and arrange inclusive team-building activities for faculty, researchers, staff, and students.

To support the CORE Fund, please visit give.uafoundation.org/geosciences and choose "Geosciences Department General Fund."

Tucson, AZ 85721
All gifts are 100% tax deductible. Please note that gifts of $1,000 and more incur a 6% fee from the University of Arizona Foundation.

OTHER ITEMS

Didn't see what you were looking for in this summer's newsletter? You might be able to find it online! Check the list below for articles that appear on our website.

- Remembering Spencer Rowe Titley
- A Tribute to Clem Chase
- In Memoriam: Sheila J. Seaman
- Meet our Facilities: The Arizona Computational Geoscience Center
- George H. Davis Scholarship Recipients
- 2020 Galileo Circle Scholars
- In the Footsteps of Roy Chapman Andrews: celebrating the centennial of the Central Asiatic Expeditions (By J.K. Cluer)

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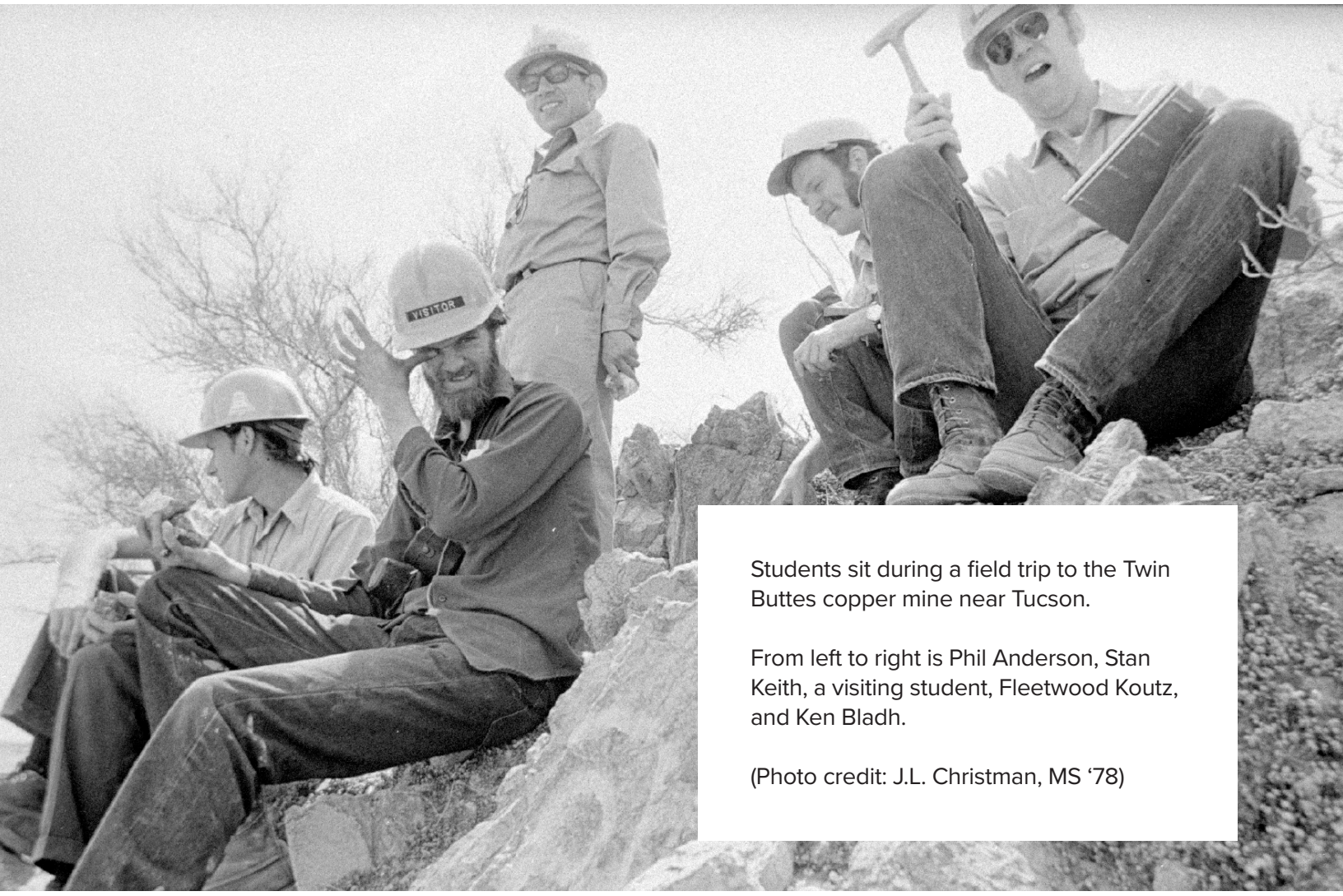

Students sit during a field trip to the Twin Buttes copper mine near Tucson.

From left to right is Phil Anderson, Stan Keith, a visiting student, Fleetwood Koutz, and Ken Bladh.

(Photo credit: J.L. Christman, MS '78)