



College of Natural Sciences
& Mathematics

FALL 2023



GEOLOGY & EARTH SCIENCE NEWSLETTER

DEAR ALUMNI AND FRIENDS

It's been a year since our last newsletter, and we have a lot to share! Our students and professors have had a productive year, and this letter summarizes what we've been up to in the Department of Earth Science at CSULB. If you haven't heard yet, we started a new department alumni group on LinkedIn to foster continued connections between our alumni and current students and professors. If you haven't seen it yet, we have >100 members! (To join, search for "CSULB Geology & Earth Science Alumni" on LinkedIn).

We hope that you and yours are safe and well.

If you have news to share in these eNewsletters, please let us know by emailing Dr. Alyssa Abbey (alyssa.abbey@csulb.edu). We also can print the newsletter if you'd like a hard copy. Just email us the name and address where you'd like to receive the newsletter.

Sincerely, Alyssa Abbey, Andrea Balbas, Matt Becker

GEOLOGICAL SCIENCES  **EARTH SCIENCE**

WE'VE HAD A NAME CHANGE! PREVIOUSLY THE DEPARTMENT OF GEOLOGICAL SCIENCES WE ARE NOW THE DEPARTMENT OF EARTH SCIENCE

Greetings from the newly named Department of Earth Science. These last few years have been a period of significant change. This fall, we officially changed our name from Geological Sciences to Earth Science. This name better fits with our mission as well as our strengths in hydrology and environmental chemistry. We also expect it to increase our visibility with freshman students who are exposed to "Earth Science" rather than "Geology" in their K-12 programs.

It isn't just our name that we've changed. Our Geology degree, continues to prepare students for industry jobs and certifications, is still our standard bearer. However, we have received approval to change the Earth Science degree to an Earth

Systems degree starting next Fall. This degree change was done to adapt to the evolving role of many Geoscientists in today's society and will better prepare students for interdisciplinary work that focuses on water resources, pollution and climate change.

In addition to programmatic changes, we have had some key personnel changes. Last fall we welcomed Jillian Pearse, our new geophysicist, who brings with her a deep toolbox and passion for student engagement (see her introduction in last years' newsletter). At the same time, we are sad to see the formal retirement of Dr. Rick Behl. Rick has contributed tremendously to our mission over the years in so many different ways that it is hard to imagine the department

without him. Thankfully he is still engaged, including coordinating this fall's alumni weekend (see page 10), and is only an email away. We wish him the best and most relaxing time in retirement—he has earned it. (We also hope to see him frequently).

All these changes were made with a focus on remaining one of the best Earth Science departments in California. Our commitment to training future Geoscientists is as strong as ever. Please drop by to meet the new faculty and see all the amazing things we have going on in the department.

Lora Stevens (Department Chair, 2021-Present)

WELCOME TO OUR NEW DEPARTMENT LAB TECHNICIAN THOMAS DAVOREN!



We welcomed our Lab Technician Thomas Davoren this summer! Before moving to California from the East Coast, Thomas received his BA in Biology and Earth & Environmental Science at Wesleyan University in Connecticut and completed a MA program continuing his undergraduate lunar petrology research studying unique inclusions in olivine of basalts from the Apollo 12 mission. In his free time, he enjoys doing anything outside like fishing, rollerblading, and walking dogs.

As department tech Thomas has done an amazing job:

- organizing and refurbishing research and lab equipment
- testing and maintaining field gear
- creating well documented teaching kits
- assisting with lab and field work

DR. NATE ONDERDONK'S RESEARCH INVOLVES CURRENT STUDENTS & ALUMNI

Dr. Onderdonk is a Co-PI on a USGS Earthquake Hazards grant, with co-PI and former MS student Ian McGregor. The purpose of the work is to evaluate the activity of faults in the Santa Maria Basin. Much of the field work is taking place on Vandenberg Space Force Base where they are documenting the amount and timing of offset on faults that intersect the coastline and cut marine terraces. Undergraduate Juan Gonzalez is working on this project with them.



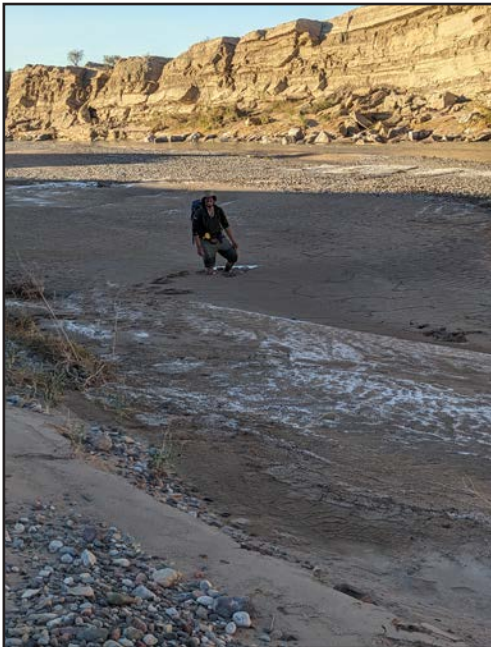
**DR. ONDERDONK AND ALUMNI IAN
MCGREGOR SAMPLING TERRACES FOR
LUMINESCENCE DATING.**

RESEARCH WITH DR. ALYSSA ABBEY IN THE TASTE LAB

Students working in the TASTE Lab (Thermochronology Analyses for Structure and Tectonics) with Dr. Alyssa Abbey have been making progress on a wide range of projects that use thermochronology and geochronology combined with field methods to address questions related to fault growth, surface processes, and regional tectonics. Learn more about this work on Dr. Abbey's website: alyssalabbey.com



GRADUATION AT ANGEL STADIUM: (MIDDLE) DR. ABBEY; (LEFT) CHEYENNE SENESAC, NOW STAFF GEOLOGIST AT STANTEC (BACK) DARREN WESTBY, NOW MS STUDENT AT UNLV; (RIGHT) ROXY SCHULMAN, NOW STAFF GEOLOGIST AT MUREX.



GRADUATE STUDENT VINCENT RUIZ IN THE EASTERN PRECORDILLERA OF SAN JUAN ARGENTINA. VINNY IS SAMPLING MIOCENE TO PLIOCENE SEDIMENTARY ROCKS FOR COSMOGENIC NUCLIDE & PALEOMAGNETIC DATING.



UNDRGRADUATE STUDENT MIYA MAGEE, TRAVELLED TO CENTRAL COLORADO IN JUNE TO HELP MEASURE SEDIMENTARY SECTIONS, COLLECT FLOW DIRECTIONS, CLAST COUNTS AND DETRITAL SAMPLES FOR GEOCHRONOLOGY TO UNDERTSAND HOW EXHUMATION IN THE RIO GRANDE RIFT AFFECTED RIVER EVOLUTION AND BASIN CONNECTIVITY.

NEW TECHNOLOGIES FOR MEASURING AQUIFER BEHAVIOR

Matt Becker and his students have been working with the Water Replenishment District of Southern California (WRD) to develop new methods of characterizing aquifers. They have found new uses for fiber optic technology that CSULB Hydro has been using for geothermal energy development. These fiber optic sensors can measure temperature, strain, and strain rate along an entire length of a well; information which can be used to chart the movement and storage of water in

subsurface. Hannah Fitzpatrick, an undergraduate student in CSULB Earth Science, has been leading the effort with some help from Eduardo Martinez, a new graduate student who is using similar technology for geothermal applications. Hannah is also an intern at WRD and works with Moises Santillan, a CSULB alum who is now an Associate Hydrogeologist at WRD!

HANNAH FITZPATRICK HELPS INSTALL FIBER OPTIC CABLE IN A WELL LOCATED IN TORRANCE.

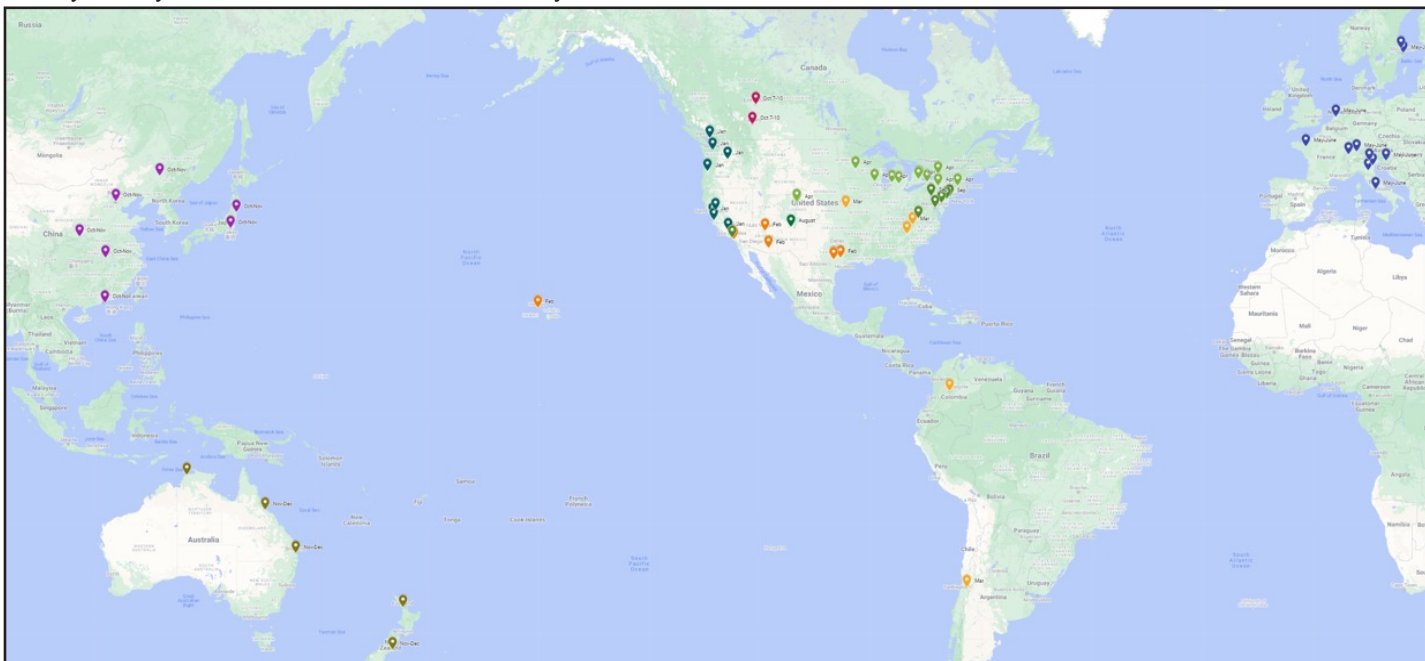


DR. MATT BECKER NAMED AS THE 2024 NATIONAL GROUND WATER ASSOCIATION DARCY DISTINGUISHED LECTURER

Dr. Becker will be traveling about the world in 2024 giving lectures on groundwater, as the NGWA Darcy Lecturer. The Henry Darcy Distinguished Lecture Series in Groundwater Science fosters interest and excellence in groundwater science and technology. It was established in 1986 and named in honor of Henry Darcy of France for his

1856 investigations that established the physical basis upon which groundwater hydrogeology has been studied ever since. Each year, a panel of scientists and engineers invites an outstanding groundwater professional to share his or her work with their peers and students through this lecture series. The Darcy Lecture Series is most often

presented at universities and professional associations throughout the world. Prof. Becker will offer two talks, one on what fiber optic sensing has revealed about groundwater and another on the importance of groundwater to the people and ecosystems of the South Pacific. He will gain a few air miles traveling to over 60 locations in 17 different countries!



CURRENT PLANNED LOCATIONS THAT BECKER WILL BE VISITING DURING HIS 2024 DARCY DISTINGUISHED LECTURE TOUR.

ANDREA BALBAS IS A CO-PI FOR AN NSF GRANT TO RENEWAL FOR THE METRIC

The Mentored Excellence Toward Research and Industry Careers (METRIC) scholarship program aims to improve recruitment, retention, and graduation of low-income and academically talented students from communities unrepresented in the Physical Sciences and Mathematics to prepare them to be the next generation of scientific leaders in their communities.

METRIC students receive need-based scholarships and participate in activities designed to facilitate their scholastic and professional development and to prepare them for careers in Science, Technology, Engineering, and Mathematics (STEM) disciplines.

The grant is funded for \$2,495,087 for 5 years (2024-2029). The bulk of the money goes directly to STEM students for tuition to help them complete their undergraduate degrees.

UPDATES FROM DR. LORA STEVENS



CALANQUE DU SUGITON.

PEACOCKS WANT TO DO GEOLOGY TOO. EVERY DAY, THEY CAME TO WATCH LORA WORK ON CORES.



During spring semester 2023, Lora spent 5 months working with colleagues at the French National Center for Scientific Research in Aix-en-Provence. The focus of her sabbatical was analyzing drill cores collected in 2013 from Lake Maharlou, Iran. The time to focus solely on research on past climate change in Iran was really welcome. Lora gave several talks and refreshed technical skills with colleagues at CEREGE (European Center for Research and Teaching in Geoscience). She cannot wait to

try out triple oxygen isotope measurements on the phytoliths. Some activities, such as a month-long visit the Natural History Museum in Paris were curtailed by the French strikes that closed railways, gas stations, and highways. But that just left Lora with more time to enjoy the natural beauty of southern France. While she was away, Nate Onderdonk took on the role of Chair and did a fantastic job. While the break was fantastic Lora is excited to be back working with students.

SUMMER FIELD IN UTAH AND CALIFORNIA

The first week of summer field was spent in Goblin Valley in Central Utah. Students camped on the edge of the San Rafael Swell, and measured faults, deformation bands and other strain indicators just outside of Goblin Valley to compare stress and deformation relationships between the Swell and the Valley. From there, the group travelled to the northeast corner of UT, to the edge of the Unita Mountains, to record and map the Paleozoic stratigraphy exposed along the Laramide uplift. Before leaving we got a behind-the-scenes tour of the Flaming Gorge Hydroelectric dam! The class then drove across the Basin and Range stopping at the Great Salt Lake on the way and arrived in south Lake Tahoe where they

camped for the next two weeks. In Tahoe the students worked on bedrock geology of the Sierra Nevada Mountain Range, active faults along the eastern side of the range, and investigated the glacial history of the area. They learned to recognize, map, and study active faults in the Genoa fault zone in the southwestern Genoa Valley. These faults are well-expressed as scarps in glacial and fluvial deposits. They also spent 1 week doing bedrock mapping in the Desolation Wilderness along the SW side of Lake Tahoe where they studied Mesozoic metavolcanic rocks and plutons.



SUMMER INTERNSHIPS AND REU'S

Many of our students participated in internships and REU's (research experiences for undergraduates) this summer.

- Undergraduate Hannah Fitzpatrick began an internship with the Water Replenishment District of Southern California (WRD) during Spring semester 2023. This summer she helped with the installation of Fiber optic cables in two monitoring wells in Torrance, Ca that are part of a remediation project to clean the historic saltwater plume beneath the city. The temperature, strain and strain rate data will be used in her research towards her thesis to better characterize the aquifer impacted by this plume.

FUSION OF FIBER OPTIC CABLE AT PM-07 MONITORING WELL IN TORRANCE, CA.



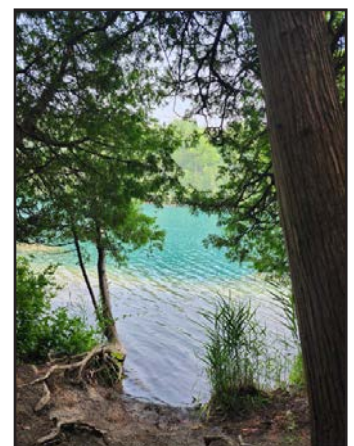
- Undergraduate Candice De Anda spent 10 weeks at the NASA Johnson Space Center in Houston, Texas, through the Lunar and Planetary Institute Summer Internship program. Candice worked to analyze sediments collected from glacial eskers in Iceland as an analog for Mars. The goal of the project is to broaden our understanding of glacial eskers here on Earth so that we can identify these features on Mars. Candice ran bulk X-ray diffraction to quantify the mineral composition on over 72 samples from 4 different eskers. She presented her research to the scientists at the Lunar and Planetary Institute and will be presenting at the Lunar and Planetary Science Conference in March 2024.
- Undergraduate Yousuf Al Sukaiti completed an 8-week summer internship at Occidental Petroleum (OXY), Oman. Yousuf had the opportunity to work in the exploration department where he conducted a petroleum play analysis for shallow and deep reservoirs for three blocks in eastern Oman. During this time, Yousuf learned how the oil and gas industry operates and became familiar with petroleum systems, vertical and horizontal drilling, well logging, well correlation, oil lift systems, reservoir properties mapping, and common risk segment mapping.

OXY, OMAN



- Undergraduate Natalia Gutierrez spent eight weeks at Pennsylvania State University researching carbon cycling between carbonate and wood from Green Lake in Fayetteville, NY. Green Lake is a redox-stratified lake that serves as a proxy for past ocean environments. Natalia visited Green Lake to collect wood samples with carbonate growth on them and she analyzed the growth patterns under a microscope. These samples have been prepared for isotope analysis and results should be in soon and she will present them at AGU this December.

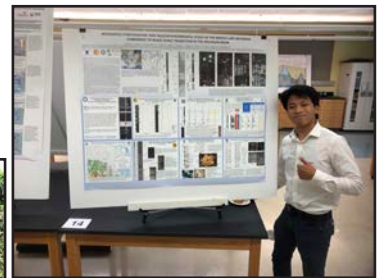
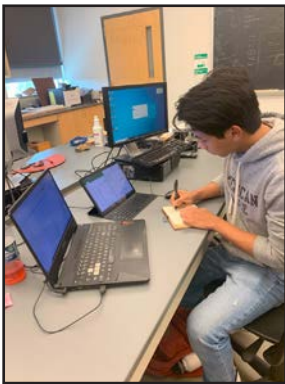
WOOD COVERED IN CARBONATE AND A POSSIBLE CALCITE GROWTH ON THE END



COLLECTION SITE AT GREEN LAKE. LIGHT TAN OUTLINE IS A MICROBIAL THROMBOLITE

SUMMER INTERNSHIPS AND REU'S CONTINUED!

- Undergraduate Lam Truong worked with eight other students from different colleges in the U.S. during a 4-week KECK REU program, hosted by Beloit College. They studied the Carbonate to Black Shale Transition in the Michigan Basin. Lam was in charge of creating a geologic map of Alpena County, MI along with glacial drift, bedrock topography, and cross-section maps. The goal is to better understand the geologic and geographic patterns of Alpena County, MI that correlated with units from the main project. Lam gathered descriptions of the units by looking at cores from the repository, collected and sorted oil/gas well logs, and incorporated them into ArcGIS. The group travelled to meet with other geologic professionals and understand more of the geologic background towards the east of their focus area. Then at the end of the 4-weeks, they presented a poster of the preliminary results at the SDS conference (Subcommissions on Devonian Stratigraphy) at Geneseo, NY. They are continuing to work at their home institutions until April 2024 when they will present at the joint North- and South-Central GSA section meeting in Springfield, MO.



CONGRATULATIONS TO OUR MASTER'S STUDENTS WHO FINISHED THIS YEAR

Justin Arakaki finished his MS with Drs. Nate Onderdonk & Rick Behl: Formational-Scale Differences in Styles of Deformation and Implications for Petroleum Migration and the Structural Evolution of the Pismo Basin. Justin is now a geologist at Berry Petroleum in Bakersfield.

Pat Miller finished his MS with Dr. Onderdonk: Measuring uplift of the San Rafael Mountains of Central California using fluvial terraces along the Sisquoc River. Pat is currently a substitute teacher.

Trang Tran received the honor of the Graduate Dean's List and finished her MS with Dr. Lora Stevens: Integrating Plant Wax Isotopes And Terrestrial Biomarkers For Reconstructing Precipitation And Temperature Variability In Vietnam During Marine Isotope Stage 3. Trang is currently in a PhD program at the University of Arizona.

Carl Jung finished his MS with Dr. Andrea Balbas: New Insights into the Chronology and Geomorphology of the Musician Seamount Province, Pacific Plate. Carl is self-employed as an electrician.

Matt Schweiger finished his MS with Dr. Ben Hagedorn: Dissolved Inorganic Carbon Chemistry Dynamics of a Coral Reef Responding to Submarine Groundwater Discharge. Matt is currently a Project Scientist for Montrose Environmental Group.

STUDENTS AT CONFERENCES!

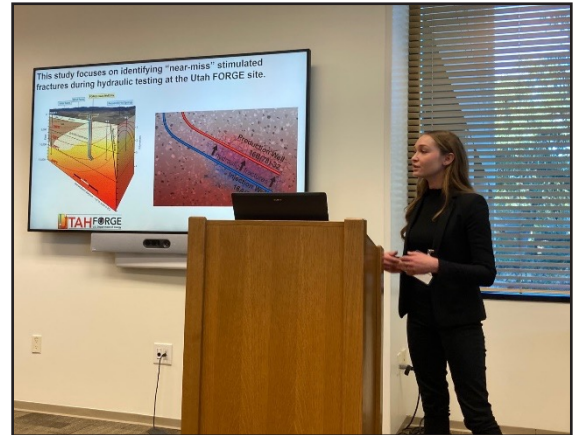
Several of our graduate and undergraduate students attended and presented at national conferences this year!

Desiree Guzman presented at the GSA Cordilleran section meeting in Reno, NV in May:

Desiree presented on work from her internship at Stanford the summer prior: Crystal Records of Evolving Silicic magma: Intermediate Volcanics of the Highland Range, NV

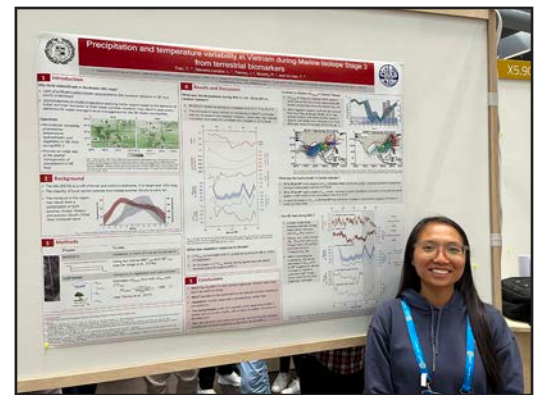
Megan Ward-Baranyay Presents at the 48th Stanford Geothermal Workshop:

The Stanford Geothermal workshop is premier technical gathering for researchers working in the advancement of geothermal energy. Master's student Megan Ward-Baranyay presented her simulations of tests to be conducted by CSULB Hydro at the FORGE geothermal field laboratory located near Milford Utah. FORGE is the Department of Energy's flagship enhanced geothermal systems (EGS) research site. EGS is the process of using hydraulic fracturing to turn hot but impermeable rock into a flowing heat exchanger. Megan's presentation of her multiphysics hydromechanical simulations was very well received and she was heavily recruited for PhD programs about the country. Megan wants to follow a career in the interface between the public and the scientific community, however, so she spent the summer interning with NASA's outreach programs. She has submitted her thesis to her committee, and we look forward to seeing what she does next.



Trang Tran at EGU this spring presenting her Masters thesis research on past climates in Vietnam

Tran, TT, Stevens-Landon, L, Tierney, J, Murphy, P, Vu, TV (2023). Precipitation and temperature variability in Vietnam during Marine Isotope Stage 3 from terrestrial biomarkers. European Geosciences Union Proceedings, April 23-28, Vienna Austria.



OTHER STUDENT NEWS

- Graduate student Hannah Paradis was recently on the E/V Nautilus exploring the seafloor in the Pacific ocean. [View E.V. Nautilus Pictures Here](#)
[Hannah's Nautilus Live Bio Page](#)
- Undergraduate Natalia Gutierrez has been working on independent research with Dr. Lora Stevens on the Fecal Stanol grant, studying fecal matter of different animals
- Undergraduates Julia Dunn and Alexa Cruz conducted independent research on Catalina Island with Dr. Ben Hagedorn.
- Undergraduate students Aaron Kantrowitz, Miya Magee, Sabrina Ansari, and Jennifer Sanchez conducted thermo- and geo-chronology research with Dr. Abbey and collaborators.

NEW DEPARTMENT PUBLICATIONS

- Abbey, A. L.,** Wildman, M., Stevens Goddard, A. L., & Murray, K. E. (2023). Thermal history modeling techniques and interpretation strategies: Applications using QTQt. *Geosphere*, 19(2), 493-530.
- Balbas, A., Jung, C.,** & Konrad, K. (2023). The origin of the Musicians Seamount Province and its inferences for Late Cretaceous Pacific Plate Motion. *Marine Geology*, 107166.
- Becker, M.W.; Cason, F.M.; Hagedorn, B.** (2023). Locating Potential Groundwater Pathways in a Fringing Reef Using Continuous Electrical Resistivity Profiling. *Hydrology*, 10.
- Edgeworth, M., Gibbard, P., Walker, M., Merritts, D., **Finney, S.**, and Maslin, M. (2023). The stratigraphic basis of the Anthropocene Event, *Quaternary Science Advances* 11, 100088.
- Finney, S.**, and Gibbard, P. (2023). The Humanities are invited to the Anthropocene Event but not to the Anthropocene Series/Epoch, *Journal of Quaternary Science*, 1-2.
- Gibbard, P., Walker, M., Bauer, A., Edgeworth, M., Ellis, E., **Finney, S.**, and Maslin, M., (2023), The Anthropocene is best understood as an ongoing, intensifying, diachronous event, *Boreas*.
- Joya-Barrero, V., Huguet, C., & **Pearse, J.** (2023). Natural and Anthropogenic Sources of Cadmium in Cacao Crop Soils of Santander, Colombia. *Soil Systems*, 7(1), 12.
- Pratt, B.R., **Finney, S.C.**, Easton, R.M., and Piller, W.E. (2023). Lithostratigraphy: Formation of the Formation, *Newsletters on Stratigraphy*, v. 56 (3), p. 307-330.
- Sotomayor, A., Balbas, A.,** Konrad, K., Koppers, A. A., Konter, J. G., Wanless, V. D., ... & Raineault, N. (2023). New insights into the age and origin of two small Cretaceous seamount chains proximal to the Northwestern Hawaiian Ridge. *Geosphere*, 19(2), 383-405.

ALUMNI NEWS

Kim Dillon (nee Boyd) and David Dillon welcomed a daughter in April!
- Kim works at the Port of Long Beach and David the State Lands Commission

Alumnus Demetria Eves has a new podcast! Check out [TheDirtOnEarth](#) and listen straight from the link or on Spotify, Apple, or Amazon

Demetria has published episodes on deep sea exploration, and early earth. Upcoming episodes include The Hadean Eon, The Ring of Fire, The Cryosphere, Rare Earth Elements, and the Archean Eon.



ALUMNI NEWS CONTINUED...



80 alumni from the Long Beach State (CSULB) Geology Department, plus their children, spouses, and partners gathered for a weekend at Morro Bay State Park at the end of September to reconnect. It was a grand gathering with great food, drink, and chats around the campfires and on the field trips. We had alumni join us who graduated from the 1970's all the way through the 2020's. Oh, the stories we heard!

We started out Friday afternoon with a great private tour of the Cal Poly San Luis Obispo Wine and Viticulture school and winery. They even gave us a case of student wine to enjoy around the campfire (for educational purposes). There were 6 different geologic field trips - two running concurrently on Saturday morning, Saturday afternoon, and Sunday morning - to give folks a choice on what they and their kids or guests most wanted to do. The trips ranged from the Morro volcanics, to structural geology, the Monterey Formation, geomorphology to the Franciscan Formation, pillow basalts, and elephant seals. The field trips were led by faculty, current and former grad students, as well as a Professor from nearby Cal Poly SLO.

It was fantastic to see old friends and catch up on where they have gone and what they have done and how they are doing! Not only did we have a great social event, but we raised almost \$4,000 to help our current students and the summer field program.

We will try to have a similar event almost every year in the future, so keep an eye out for email.



SUPPORT THE DEPARTMENT!

All of the wonderful opportunities that we can provide for our students come from funding and support by YOU—our partners, followers and alumni!

[Please consider helping the Department of Earth Science with a contribution.](#)

You can choose to support us through various avenues including:

- A one-time donation
- A pledge donation in which you indicate a gift amount and the number of times you wish to make that gift
- A recurring gift. If you would like to create your own endowed fund all you need to do is commit to three years of giving \$2,250/year and you'll be able to name your fund and stipulate how you'd like it to be used!
- **The General Department Fund:** provides funds for teaching materials, day and weekend field trips during the semester, and some department supplies.
- **The Summer Field Fund:** helps us run our 4-week summer field class which involves a full geology immersion experience, complete with camping in tents or at field stations, throughout the western US. These funds help pay for the cost of vehicle gas, student food, camp fees, and park fees.
- **The Student Scholarship Fund:** is a program we recently started in which undergraduate and graduate students can apply for scholarships to help with course and tuition costs, or to use as a stipend while they participate in independent research.

GEOLOGY CLUB T-SHIRTS!

The department student club (also AAPG chapter) has designed t-shirts!

The shirts are \$25 and funds raised will go towards club activities and trips.

To order one for yourself, contact Polito
polito.walters01@student.csulb.edu



POSTCARDS FROM THE FIELD

