



**2021**

## DEPARTMENT NEWS

Greetings! We continue to thrive despite the unique challenges posed by pandemic protocols and we are excited to share news of our 2021 accomplishments. We look forward to hearing from you as well.

## IN THE LEAD WITH STUDENT SUCCESS

We are very proud of our long history of graduating high quality students and as a result of our continued success we remain a leader in the CSU system. We have employment information for 62 out of 73 graduate students and 123 out of 145 geology undergraduates who graduated from 2013-2020. Based on these data, 95% of our MS graduates and 84% of our undergraduates completing their degree are employed in the geosciences or continued into graduate studies in the geosciences. Of the 62 degreed graduate students with employment information, 56% are underrepresented minorities (including women), and of the 123 degreed undergraduates with employment information, 61% are underrepresented minorities (including women). These numbers indicate that we generate qualified, successful graduates, and make significant contributions to placement of minorities in the professional workforce.

We remain among the leaders in graduating students, graduating between 8% and 10% of all CSU geology students graduating between 2015 and 2020. The number of CSUB geology graduates currently ranks third among all undergraduate geology programs and our MS graduate program ranks first for the number of graduates among all CSU Geology programs, including those that have many more geology faculty. These results, coupled with our excellent student employment rates clearly reflects our commitment to retaining and graduating highly qualified students.

## THE TEAM

We now have 7 tenure-track faculty, with our most recent hire, **Dr. Anna Cruz**, officially joining us in January 2021.

As our curriculum continues to evolve with newly hired faculty and the strong demand for Earth science courses we remain very grateful for the help from part-time instructors helping to cover courses: **Jason Cotton, Bob Crewdson, Thom Davis, Larry Drennan, Alyssa Kaess, Steve Kiouses, Pam Knight, John McCormick, Nick Moreno, Brian Pitts, Jesus Robles, Gregg Wilkerson, and John Yu.**

We maintain our strong relationship with **the United States Geological Survey (USGS)**, providing a CSUB Department of Geological Sciences base of operations for **two hydrologists, Olga Rodriquez and Maryanne Bobbitt**. Although they haven't been able remain on campus since the virus protocols were invoked in March of 2020, we look forward to the time when they can return full-time to their campus office.

## SEMINAR SERIES

Our seminar series once again provided interesting and educational talks covering a broad array of topics. As a result of pandemic protocols, all of the presentations were virtual. Speakers included **Brian Pitts** who spoke about his adventurous trip to Namibia, **Matt Herman** who gave a talk about his impressive tectonics and earthquake research, and Robert Yohe (CSUB archaeologist) who presented some of his fascinating work in Egypt using portable XRF technology to determine mud provenance at a Middle Egyptian site.



*CSUB Archaeologist, Robert Yohe gave a Geology Seminar Series talk entitled "Mud, sweat and tears: Linking ancient human behavior to mud sourcing using portable XRF technology at Tell El-Hibeh, Middle Egypt".*

Fall semester seminar speakers included Dr. Julie Griffin who gave an excellent talk entitled "Orbital Forcing of Precipitation Recorded in an upper Paleozoic Cyclothem of the Midcontinent, USA," and Dr. Peter Wigand who presented his intriguing climate model research reconstructing past landscape erosion and the underlying rainfall parameters that affected erosion.

Please let **Liaosha Song**, our seminar series organizer, know if you or someone you know

might be interested in giving a presentation. Our seminar series offers something for everyone, so please plan to join us. Check out our Facebook page and get on our email list for notification of upcoming talks and events:

<https://www.facebook.com/groups/CSUB-Geology-Club>

## GRANTS

Department of Geological Sciences faculty have a long and impressive record of securing appreciable external funding from a wide array of external sources. Each of these grants were written by faculty (not written by external, contracted agencies). In addition to supporting student and faculty research, these grants continue to provide appreciable indirect funds and faculty release time.

Funding highlights include the fifth year of the 5-year Phase II \$4,996,937 award for CSUB's NSF *Center for Research Excellence in Science and Technology* (CREST). Geology Professor Rob Negrini (now Emeritus) was the lead PI for both the Phase I and Phase II awards, along with five Geological Sciences faculty (including Drs. Krugh, Gillespie and Guo), and four Biology, Math and Engineering faculty as co-PIs and team members. Another highlight was the fourth year of an extended, \$297,459 NSF grant awarded to Rathburn (lead PI) and Baron (now Emeritus). Research expeditions have been postponed and lab research progress has been slowed due to pandemic limitations. This grant, in collaboration with Scripps Institution of Oceanography and the University of San Diego, supports educational and research project opportunities for students, and also provides CSUB students and local high school teachers with hands-on research experiences on a research vessel at sea, in the classroom, and in the lab. In its final year, the \$150,000 Keck Foundation Grant obtained by Drs. Basak (no longer at CSUB) and Rathburn funded improvements to the geochemistry facilities in the Department, including a new mass spectrometer (see story later in this newsletter), and helped students engage in marine research.

Liaosha Song received a \$55,000 grant from the American Chemical Society to study sandstone petroleum reservoirs in 3-D using state-of-the-art X-Ray technologies. Dr. Song also received an Interdisciplinary Energy Research Program

grant of \$31,000 from CSUB's California Energy Research Center to work on petroleum reservoir fluid dynamics and modeling. Chris Krugh received Provost's Proposal Development Program (PDP) funding of \$5000 for *Development of Geodetic Research and Teaching Capabilities at CSUB*. Katie O'Sullivan also received \$5000 PDP funding and release time for 2022 and Research Council of the University funding for Mojave Desert research, along with external funding from the California Desert Studies Consortium, 2020-2021. External and internal proposals are submitted by faculty on a regular basis, and some are still pending.

## SCHOLARSHIP

Research productivity is a priority for the Department of Geological Sciences and faculty maintain an excellent record of scholarship. From 2016-2020 tenure-track faculty published 41 peer-reviewed journal articles, many with student co-authors. In 2020/2021 Department of Geological Sciences (DGS) tenure-track faculty continued the high level of scholarship, publishing eight peer-reviewed journal articles plus at least one published by emeritus faculty, with several more in review. The high caliber and high impact factor commanded by the international journals these publications appeared in is clear evidence of the quality of DGS faculty research. This year faculty published in journals that included *Geochemistry*, *Geophysics*, *Geosystems*; *International Journal of Coal Geology*; and *Sciences Advances* (see story about this publication later in this newsletter). A number of these publications were co-authored by students. As a result of pandemic protocols, research opportunities for faculty and students were reduced, but several CSUB geology students won research-related awards and regional and national scholarships and internships.



After a significant delay due to pandemic restrictions, a new iCAP RQ ICP-Mass Spectrometer was installed in the recently renovated W. M. Keck Geochemistry Lab, completing the lab's transformation into a state-of-the-art facility.

## NEW GEOCHEMISTRY LAB

Renovations of the Department's W. M. Keck Geochemistry lab were capped off with the 2021 installation of a new Thermo Scientific iCAP RQ ICP-Mass Spectrometer. Transformation of the lab was made possible by funding awarded to **Basak** and **Rathburn** from the W.M. Keck Foundation along with funds from the Department and the Dean's Office. Upgrades, remodeling, and new devices provide the lab with greater analytical capabilities and more student research opportunities. Geology Assistant Professor, **Anna Paula Soares Cruz** is in charge of this laboratory, including its new ICP-MS and state-of-the-art instrumentation.

## MATT HERMAN PUBLISHES IN SCIENCE ADVANCES

In his first year at CSUB, **Matt Herman** published new research on a recent sequence of Alaskan earthquakes in *Science Advances* (Impact Factor = 14.14), a top-tier, international science journal. Many research scientists work their entire careers without publishing in such a highly prestigious journal. Matt joined CSUB Geology in the fall of 2020, and worked with Dr. Kevin Furlong from Penn State University to study an October 17, 2020 earthquake (Magnitude 7.6) in the Alaska-Aleutian subduction zone.

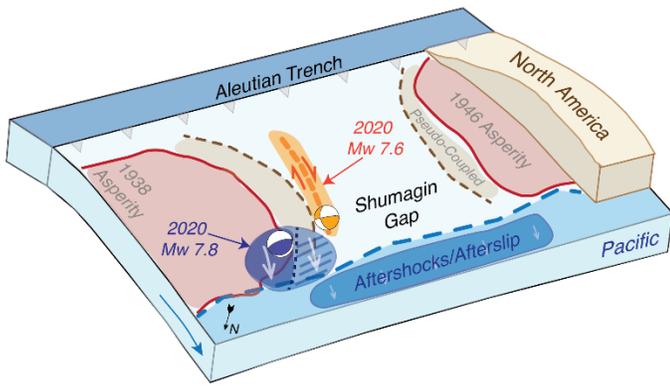


Diagram of the location and character of the Shumagin Gap, off Alaska.

Some sections of subduction zones, such as the Shumagin Gap in the Aleutians, were thought to be incapable of having large earthquakes. In this area near the Shumagin Islands tectonic plates slide past each other without sticking and therefore do not have megathrust earthquakes. **Matt** notes, "The potential for unusual earthquakes in these regions makes sense from our computational models. But it is still pretty counterintuitive that making the expected kind of earthquakes less likely actually makes other types of big earthquakes more likely." This research also suggests that the earlier earthquake that occurred in July in another section of the subduction zone to the northeast triggered the October earthquake in the Shumagin Gap.

*Science Advances* is an open-access journal, so the article is free to read and download at: <https://www.science.org/doi/10.1126/sciadv.a bf7590>

This story was excerpted from an article by Kelly Ardis which can be found at: <https://news.csub.edu/csub-geologist-has-research-published-in-major-journal>

## PROGRAM REVIEW

This academic year we spent a significant amount of time compiling data and writing our required Self-Study and Program Review document (300 pages, including data). This document reviews the Department's performance in all aspects since the previous review (2013). The primary goal of the department is to continue to build on the extraordinary achievements in the number of majors and graduates, the high level of grant

activity and scholarship, and the exemplary outreach program. Our recent self-study has confirmed that we have a strong program relative to other geology programs in the CSU system and elsewhere.

In December 2020, the Department administered a survey to current students and alumni of both the Bachelor's and Master's degree programs. We were very pleased with the results of the survey, noting that our priorities of skill building, experiential learning, research opportunities and maintaining a welcoming, student-focused culture are appreciated by students.

Responses by students and alumni for the open-ended portion of the survey listed the following as strengths of the Department:

- Small, family-like department, friendly, knowledgeable, & approachable faculty and staff
- Proximity/connections to industry and networking opportunities
- Proximity to field sites/field trips
- Research opportunities, technical skill building

The majority of alumni respondents use the knowledge that they gained in the program in their occupation. Approximately 90% of alumni would recommend the program to others.

## NEW ENERGY INNOVATION CENTER

Governor Newsom's proposed 2022-2023 budget includes \$83 million for CSUB's Energy Innovation Center, a hub of energy research and development. The Governor called CSUB a "remarkable CSU". The keystone of the Center is the planned 3-level building on campus that will feature state-of-the-art laboratories, teaching spaces, faculty offices, and an auditorium. This building will house a number of labs and offices, and include the Fab Lab, the Division of Extended Education and Global Outreach, and CSUB's California Energy Research Center (CERC) laboratories and offices.



*Artist's conception of what the new Energy Innovation Center Building will look like when completed. Located between Science III and the Student Health Services Building on campus, this new building will house California Energy Research Center offices and labs.*

The new building and focus on energy research will promote new collaborations, attract funding, facilitate faculty and student research, and engage the community. The Energy Innovation Center together with the California Well Sample Repository and CERC solidify CSUB's pivotal role in the future of energy solutions in the Valley and beyond. More on the story can be found at:

<https://news.csub.edu/governor-proposes-83-million-for-energy-innovation-center>

## **OUR 2021 COVID-19 ADJUSTMENTS**

After CSUB switched to virtual instruction mode in mid-March, 2020 the majority of our courses and labs have been delivered virtually through the fall of 2021 and spring of 2022. We offered only a limited number of field trips. Most 2021 summer field camps were back to face-to-face mode with pandemic safety protocols in place. Although there are a lot of disadvantages to virtual courses, the primary goal is to keep geology students and faculty safe. Despite the challenges, we continued our strong record of graduating students on time. Some CSUB Departments offered some courses and labs in face-to-face mode, but had to also deliver the courses and labs virtually for those that chose not to be there in person. So every course had to have a virtual option and classrooms had to have fewer students in them due to distancing protocols through the fall of 2021. University staff were required to be on campus in August 2021 and a limited number of students populated campus dorms for the fall 2021 semester. It was hoped that faculty would spend more time on campus with office hours and face-to-face meetings. However, the impact of the Delta and Omicron variants reduced

expectations considerably. The virtual learning opportunities that modern technology provides are very much appreciated, but we are all looking forward to getting back to face-to-face instruction when it is safe to do so.

## **WE HAVE A NEW LOOK! VISIT US ONCE THE CAMPUS IS OPENED UP FOR VISITORS AGAIN**

You won't recognize the third floor of Science II. Despite the paucity of student and faculty traffic in the building, we have been diligent about revising existing educational displays and improving teaching spaces. In addition to updating displays on the first floor of Science II, we are enhancing our lobby and hallway areas on the third floor, creating a welcoming, informative atmosphere. A large, framed map of the Geology of California was mounted on the wall across from the elevator. A 4-panel display kiosk housing student-designed posters that advertise geology faculty research and scholarship/internship opportunities is located on one side of map and a donated, living plant (thanks, Katie) adorns the other side, with comfortable chairs and convenient electrical outlet underneath the map.



*A new, framed map of California geology, a 4-paneled kiosk advertising student research opportunities and scholarship/internships, a living plant (thanks, Katie!), and comfortable chairs with table now greet visitors as they step off the elevator to the third floor of Science II.*



*First floor Science II Shark Tooth Hill display created by geology student Hector Zavala and Karen Blount, retired geology dual-credit teacher and geology lecturer. This educational display is located across from the elevator and showcases Shark Tooth Hill fossils provided by Karen Blount.*

Adjacent to the elevator a lighted display cabinet containing mineral specimens will soon be augmented with student-designed background posters and a key to the identification of the minerals. The popular display of rock spheres remains by the window and an updated, student-designed collage poster of geology faculty and student images will soon be mounted above the large amethyst geode across from the stairway door to the third floor. All together these established displays and new and updated additions serve to make the third-floor lobby area an inviting and aesthetically pleasing introduction to the third floor.

Hallways were also improved with the addition of a large, framed map of geologic faults in California, and updates to faculty, lecturer and scholarship posters. Assistant Professor, **Anna Cruz** was added to the framed images of first-generation faculty adorning the halls, and we also plan to add to hallway walls framed images of the geology faculty elected to the CSUB Hall

of Fame. We will be ready to welcome students and visitors of all ages when it becomes safe for campus repopulation. Once the campus is open to visitors again, please come by and join us for coffee/tea and conversation anytime that is convenient.

## MAKING WAVES



*The Department's popular stream table, shown here during the Emergency Preparedness Event (pre-COVID) on campus, now has a wave maker to generate tidal waves of educational fun.*

This year we have also improved our hands-on educational tools. Our stream table has colorful plastic sand and generates a continuous, recycling stream of water that demonstrates stream morphology and erosion. Through an internal IRA grant (to **Adam Guo**) augmented with Department of Geological Sciences funds, we acquired a wave-making device to add to our stream table capabilities. With this device attached to our stream table, in addition to fluvial processes we will be able to create beaches and estuaries, and demonstrate processes such as longshore drift, tidal fluctuations, seasonal beach profile changes, and the erosional effects of sea level rise.

## MAGICAL

The Magic Planet located in the newly renovated Globe Room (foyer formerly known as the "Head Room") in Science I is still awaiting a grand unveiling. With funding from Chevron, NSME and the Department of Geological Sciences, this interactive, 3-D globe was installed and made operational. Thanks to the custom construction of a plastic dome from a company in the San

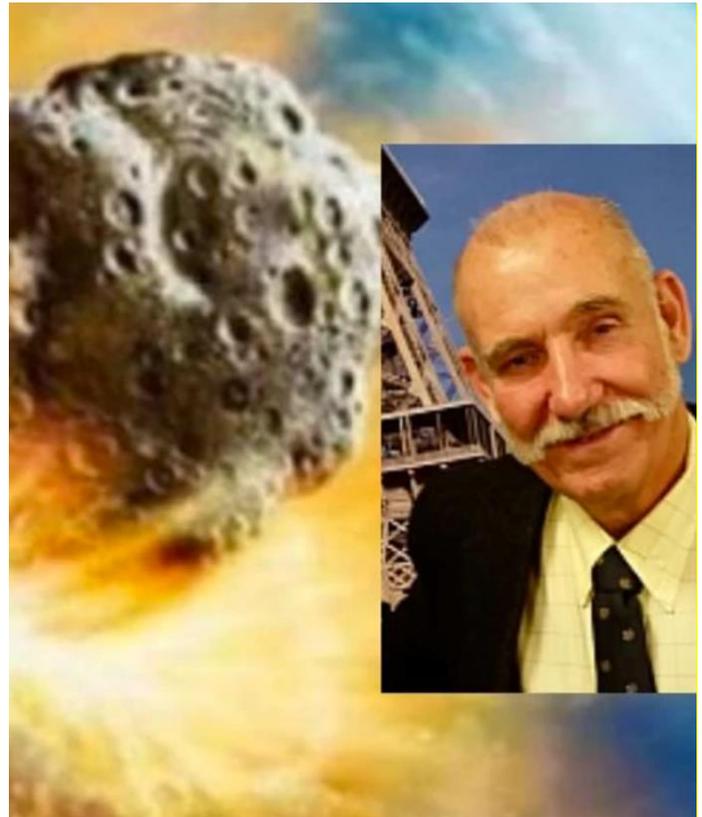
Francisco area and the much appreciated skills of Bill Whitaker, the globe is encased in an attractive dome with a ventilated oak base that can be separated to liberate the globe if necessary. Through an internal IRA grant (to **Rathburn**), a kiosk to operate the globe was also purchased and installed. Unfortunately, due to COVID-19 protocols we have not yet been able to have a grand opening or use the globe for courses or educational outreach. We expect to use the Magic Planet on a limited basis until we can fully populate the campus.

## MONITOR POWER POINTS

We continue to update our series of PowerPoint slides for the computer monitors in the new displays, and would like to feature alumni. **We would greatly appreciate photos of each of our alumni and Emeriti**, with text that includes your current job title or activities and a brief statement about your experience at CSUB. We will use these to create PowerPoint slides for each person, or you can send in a PowerPoint slide that you created with photos and text-- there is no prescribed format for these slides. If you wish to see an alumni PowerPoint slide that we created to get an idea for a template, just contact Tony at [arathburn@csub.edu](mailto:arathburn@csub.edu).

## COMMUNITY ENGAGEMENT

Expanding our robust community engagement and educational outreach activities remains an important Department goal. Although pandemic protocols have restricted a number of our community engagement activities, we are committed to staying closely connected with our community, its geoscience organizations and our alumni. Enhancing the number of geology scholarships and donors, involving more alumni in campus activities, updating our educational displays, expanding faculty involvement in community engagement, and increasing the number of community engagement activities we organize are among our plans to build upon our strengths.



*Gregg Wilkerson gave a presentation about geology in the movies in the "Meet The Expert" series hosted by the Buena Vista Museum of Natural History and Science. Gregg is also in charge of collecting boulders for the Walk Through Geologic Time Project. He is searching for large rocks, though not quite the size of the one shown in this photo—Katie O'Sullivan and Bob Crewdson are the CSUB faculty that collect meteorites.*

## TAKE A WALK THROUGH GEOLOGIC TIME ON CAMPUS

We have begun creating a geologic walk through time and a boulder rock garden in the Environmental Studies Area on campus (a fenced area in the SE section of campus). CSUB alumnus and lecturer **Jason Cotton** helped design the layout of the rocks and pathways. This area will have ADA-compliant pathways along a sequence of rocks that represent the geological history of California. The boulder rock garden (also with ADA-compliant pathways) will have different types of rocks that can be incorporated in lab exercises for a number of courses and used in a variety of ways, including making structural geology measurements. This area will be used for field trips for all levels of geology courses, and will increase meaningful, hands-on lab exercises. This area may be used for educational outreach as well.

**We could use your help** We are currently in the process of collecting and storing appropriate,

boulder-sized rocks for this project. We are also hoping for a rock table and chairs. **Gregg Wilkerson** is heading up the rock selection and collection, and **Elizabeth Powers** is in charge of the gravel pathways. If you have cool boulders (or a rock table) to donate and/or wish to help with this project, please contact Gregg, Elizabeth or Tony Rathburn.



*Gregg Wilkerson, with the help of Maranatha Landscape & Supplies, on one of many trips collecting boulders for the Geologic Walk Through Time and the educational boulder rock garden on campus.*

## GEOLOGISTS IN THE "MEET THE EXPERT" SERIES

The Buena Vista Museum of Natural History and Science located in downtown Bakersfield initiated a popular "Meet The Expert" series of presentations by local scientists. These free, virtual presentations via Zoom are designed to introduce the general public to a wide variety of topics, and provide scientists with a means to connect with community members, including home-schooled children. Each presentation features a question and answer session and is recorded for future viewing. The videos can be found at:

<https://www.buenavistamuseum.org/videos>

(Scroll down to the Meet the Expert section). CSUB geologists have given several Meet the Expert presentations so far, with more scheduled. **Gregg Wilkerson** ("Geology in Hollywood") and **Tony Rathburn** ("Microfossils: Tiny storytellers of Earth's History") gave a couple of the early presentations in the series. CSUB archaeologist, Dr. Robert Yohe gave an enlightening presentation on mummies and CSUB biologist, Dr. Anna Doty gave a popular presentation entitled "The wonder of bats: Understanding the misunderstood".

CSUB geologist **Matt Herman** gave an excellent talk about earthquakes, comparing regional earthquakes with others around the world. He provided fascinating information about



how earthquakes occur and why some are more violent (it was their own fault...). Kelly Ardis, communications specialist, School of Natural Sciences, Mathematics and Engineering (NSME), previewed Matt's talk and her article can be found at:

<https://news.csub.edu/csub-geologist-to-talk-earthquakes-for-museum-event>

CSUB Geologist **Tony Rathburn** gave a second talk entitled "*Voyages to the bottom of the sea: Exploring the deep ocean*". The talk focused on the deep sea and the strange creatures that exist in those dark, remote habitats. "I think it is important for CSUB folks, and scientists in particular, to convey to the community the relevance and importance of what we do, the exciting applications of our research, and the rewarding career paths that an education at CSUB can lead to," Rathburn said. Kelly Ardis also previewed Tony's talk and her article can be found at:

<https://news.csub.edu/csub-marine-scientist-to-give-museum-talk-on-oceans-depths>

Check out the NSME and BV Museum of Natural History and Science websites for announcements of future Meet the Expert talks.

**CSUB Geologists in the media** CSUB geologists are frequently asked to provide insight about science topics that are relevant to the Valley. For example, **Katie O'Sullivan** and **Tony Rathburn** were separately interviewed about different topics by KGET TV, and Katie was also interviewed in a Mitchell Caverns State Recreation Area Podcast.



Katie O'Sullivan was a guest on "17 News at Sunrise" to discuss the significance of the landing of NASA's robotic explorer Perseverance on Mars. Katie's KGET interview can be found at : <https://www.kget.com/sunrise-interviews/nasas-perseverance-rover-to-land-on-mars-local-planetary-geologist-explains-the-significance-of-this-mission/>



## The Maddy Report

This Sunday at 10 AM

Fracking:  
Energy Bridge or a Dead End?  
on ABC30

Fracking in the Valley:  
Pros and Cons

KMJ 580 am / 105.9 fm

on ABC 30 featuring Catherine Reheis-Boyd, President of the Western States Petroleum Association and John Cox of the Bakersfield Californian on KMJ also featuring Dr. Liaosha Song, Assistant Professor of Geology at CSU Bakersfield and Dr. Anthony Rathburn, Interim Director of the California Energy Research Center

CSUB geologists Liaosha Song and Tony Rathburn were interviewed about petroleum-related topics by various media, including The Maddy Report radio show.

## KATIE O'SULLIVAN'S LUNAR METEORITE RESEARCH WAS SPOTLIGHTED BY CSUB

Katie O'Sullivan, earned her bachelor's degree in geology from CSUB and received her PhD from the University of Notre Dame where she conducted research on moon rocks. She returned to her roots at CSUB and, as an Assistant Professor in Geology, she and her students study moon rocks and ancient volcanoes.

Moon rocks can end up on Earth as meteorites (or as cargo on Apollo missions). Regardless of how they arrive, moon rocks are very rare on Earth. As a result, virtually every Earth-bound moon rock has unique geochemical information that is new to science. These rocks are much older than anything here on Earth and they can provide clues about what Earth might have been like billions of years ago.

## PRESIDENT JOE BIDEN AND CSUB'S KATIE O'SULLIVAN SHARE AN AFFINITY FOR MOON ROCKS.

President Biden's oval office decor includes a moon rock collected in 1972 during Apollo 17's lunar visit. The rock is on loan from NASA.

Katie O'Sullivan also obtained moon rocks on loan from NASA to show moon rock mineralogy to her students. After returning the rocks to NASA, Katie bought her own moon rock, which had arrived on Earth as a meteorite. Katie and her graduate students use this rock for geochemical and mineralogical research. President Biden will have to return his moon rock loaner when he leaves office, but Katie will be able to hold on to her moon rock, after studying it inside and out.



You have to hand it to Katie O'Sullivan--she was able to obtain a moon rock sample of her own for exciting research.

For more about Katie's research spotlight, see the story by Kelly Ardis that can be found at: <https://news.csub.edu/research-spotlight-dr-katie-osullivan>

## SEVERAL MEMBERS OF THE GEOLOGY TEAM WERE RECOGNIZED WITH 2020 & 2021 SERVICE AWARDS

In a combined virtual ceremony for 2020 and 2021 **Adam Guo, Sue Holt, Katie O'Sullivan,** and **Alyssa Kaess** were presented with 5-year service awards. **Charles James** was honored with a 10-year service award, and **Elizabeth Powers** received a remarkable **20-year service** award.

The CSUB 2020 & 2021 Service Awards Recognition Virtual Ceremony on April 28<sup>th</sup> was recorded and can be viewed at: <https://www.youtube.com/watch?v=hm9HtCyf-Cw>

## CSUB GEOLOGIST AND FOUNDING DEAN JACK COASH IS ELECTED INTO THE CSUB HALL OF FAME.

Link for CSUB Hall of Fame induction ceremony video: <https://hrc.csub.edu/fhof/2021-ceremony/>

The CSUB Faculty Hall of Fame's Distinguished Faculty Award was established to honor the University's greatest professors. In 2021, Founding Dean and Geologist **Jack Coash** was inducted into the CSUB Hall of Fame, joining geologists **Bob Horton** and **Rob Negrini** who were inducted into the Hall of Fame in 2020. Jack now has a photo and plaque mounted permanently in the library, and a biographical sketch housed on the Faculty Hall of Fame website. Here are excerpts from his biographical sketch:

### **John (Jack) Coash:**

Jack was a geology professor and a Founding Dean of Science at CSUB who passed away March 21, 2019. He was one of the original founders of CSUB, arriving when the future site of the school was just a big open field. He served as Dean of Sciences, and later as Dean of the School of Arts and Sciences until his retirement in 1987 after 19 years at CSUB. In addition to

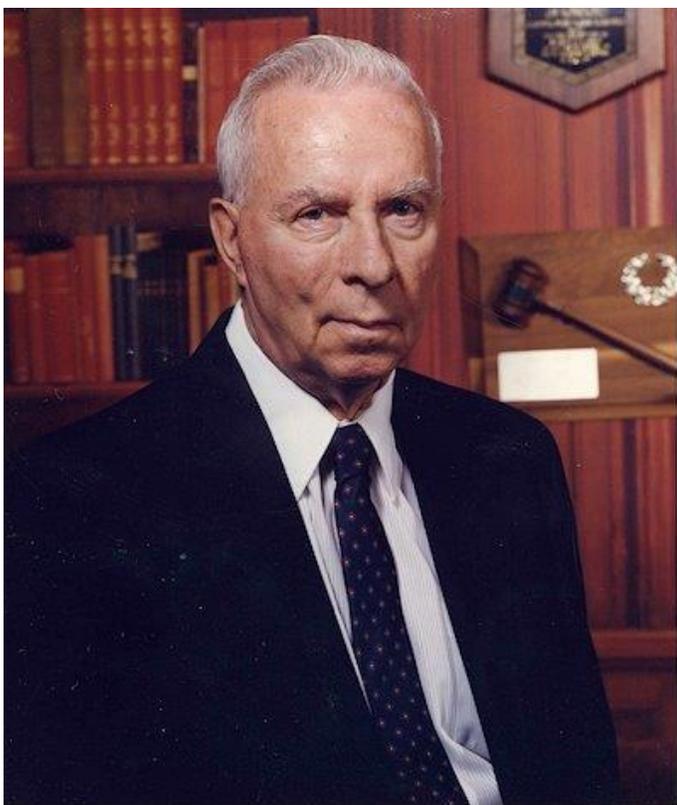
his administrative duties, he taught a course each year. He was dedicated to experiential student learning, and loved taking students into the field. Jack was instrumental in the establishment, success and growth of the University. From the time he was hired as a founding dean and throughout the rest of his life Jack remained a strong supporter of CSUB, and his long-term commitment to student success at CSUB is reflected in the John and Emily Coash Scholarship Endowment that Jack and his wife established.



*Jack Coash and his wife established the John and Emily Coash Scholarship Endowment*

According to Jack, once the Founding Deans were hired, they had two years to build, hire faculty, set up curricula, and recruit students. This was obviously a tremendously time-consuming and stressful set of tasks, with the fate of the College/University at stake. With international experience and a strong work ethic, Jack accepted the challenges, and was very successful in building the School from scratch. While at CSUB Jack not only founded the School of Science (later the School of Arts and Sciences), he also founded the Department of

Physics and Geology and helped establish the California Well Sample Repository (CWSR) on campus. The CWSR remains the only facility in California providing permanent storage of geological samples and data for public use. The CWSR was founded in 1975, and the first CWSR building was dedicated on campus in 1976. Jack served as the Founding Director of the CWSR during this time, overseeing initial operations and building construction from 1975-1977. Jack was also instrumental in establishing a degree program in Earth Sciences (1970), which was replaced with a Bachelor of Sciences Degree in Geology in 1981. Approval of the Master of Science Degree in Geology in occurred in 1986 just before his retirement. In 1987, at age 65, Jack retired as Dean Emeritus of the School of Arts and Sciences, at CSUB.



*CSUB Geologist and Founding Dean, Dr. Jack Coash, was inducted into the CSUB Hall of Fame.*

Jack Coash made impactful, long-lasting contributions to CSUB and the community. Despite his administrative obligations, he never lost his dedication to students or his love of taking students into the field for experiential learning. His abilities, persistence and willingness to take on difficult challenges made for an enduring record of achievement at CSUB. Jack's many years of devotion to CSUB and the community, his instrumental role in transforming

CSUB from a vacant field into a thriving University, and his founding of a successful School, undergraduate and graduate programs, and a unique community resource (CWSR), make Dr. John "Jack" Coash very worthy of the CSUB Faculty Hall of Fame.

## **FACULTY AND STAFF NEWS**

### **Anna Cruz**

One more year has passed, and we are still living with the pandemic. By now, most of us have gotten used to our new way of life and masks are just a regular part of our outfit. This was also my first year as an Assistant Professor at CSUB. I started in Spring 2021 and it was a challenge as it was the first time I had to teach online. I also found out I was pregnant and had the fun of teaching while dealing with morning sickness ("in my case, all day sickness"). Fortunately, I had the opportunity to teach Geological Oceanography which is one of the subjects that I am most passionate about. It was really nice experience! On the research side of things, I started getting my lab set up and helped with the installation of the Department's new ICP-MS, which will provide research opportunities for CSUB students and faculty.

I taught California Geology and Society and Geochemistry in the Fall. Everything started smoothly, however, in the middle of the semester my little one decided he'd had enough and wanted out. He was born near the end of October instead of mid-December! This was a really scary week for my husband and I with a lot of things happening very quickly. However, in the end, seeing our baby's face we can say that everything we went through was worth it. I'd like to thank Dr. Bob Crewdson and Alyssa Kaess for stepping in to take over the classes at short notice so as to minimize disruption for the students. I look forward to coming back in the Spring and can't wait for the returning to face-to-face as I miss the more personal connection with students and colleagues.



*Anna with Benji and Rigi*

### **Adam Guo**

Another year of online teaching because of COVID-19 impacts. This year, I taught a few undergraduate and graduate courses in my expertise including Sedimentation/Stratigraphy and Advanced Clay Mineralogy, as well as a non-major general course, California Geology and Society. In the past couple of years, I have been sweeping my research group and drawing new blood into it. Cindy Rodriguez finished work on her wildfire thesis project. Kari Hochstatter analyzed her XRD samples to investigate the kaolinite-dickite diagenesis in the San Joaquin Basin. Both of them successfully defended their thesis and graduated. Blaine Whitaker, a new graduate student, joined the group and started his thesis work on wildfires. In the school and department, I still actively served on some committees including Alumni Hall of Fame, Intercollegiate Athletics Advisory Committee, etc.



*Adam enjoying a hike with his children.*

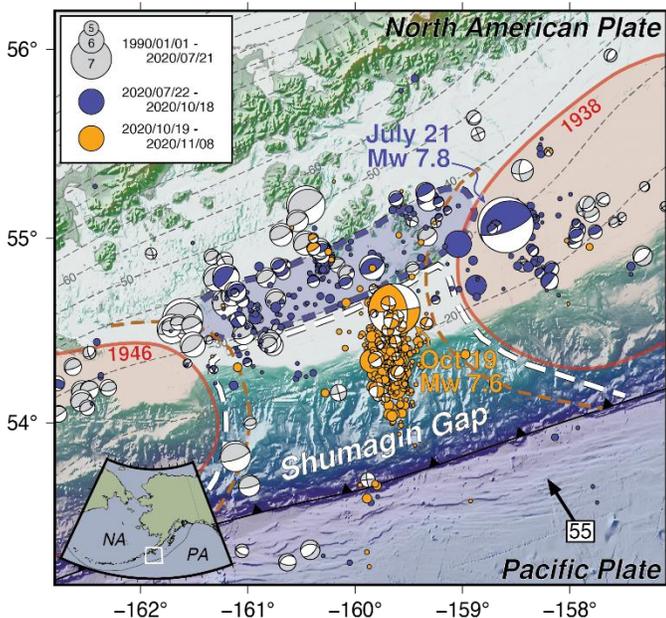
At home, Yan and all the children have been doing well. Children started going back to the classroom this past fall. We are so blessed that they didn't contract the virus. Time goes so fast. Angelina will be a high school student in the fall of 2022. Dania enjoyed her first-grade adventure. Belinda was admitted into the "GATE" program and came to like gymnastics more and more.

### **Matthew Herman**

Despite working mostly remotely for the past year, I feel like I am really settling into the department and my job as a professor. I felt brave enough to come into the office occasionally (at least I was brave enough before the end of the Fall 2021 semester and the rise of the Omicron variant...). It has been great to see people in person, some for the first time since my interview! In fact, during the program review most of the department came in, which was pretty invigorating! Coming into the department does make me realize that I really should start filling out my office – it is very dull and echoey without the standard piles of books, rocks, and papers on every surface, and without any maps on the wall. In the meantime, my at-home office has plenty of these materials strewn about, to the great excitement of my daughter who loves to page through my introductory physics book and pick up samples of Hawaiian basalt.

I was very excited this year to finally start working with some students on research projects. I was on the Master's thesis committee for Toni Ramirez, who had a really nice project modeling landslides triggered by earthquakes in the Kern River Valley. Toni did a great job

presenting and defending her work, confidently answering several tough questions by yours truly and the rest of the committee. I am also working with Danny Dorado, an undergraduate who is absorbing everything I can remember about faulting and stresses in the Earth and developing computational tools to model this deformation. Danny is progressing really well, and will soon be making the leap to working on problems that no one (not even I!) know the answer to. Welcome to the world of research, Danny!



Map of seismicity near the Shumagin Islands (Alaska) showing the July 2020 sequence in blue and the October 2020 sequence in orange. Previous seismicity is shown in grey. The October events surprisingly occurred inside the "Shumagin Gap," where earthquakes have not been previously observed.

Speaking of research, my own projects are progressing nicely. I was the lead author in a study of a surprising large earthquake in the Aleutian Islands, published in AAAS' premier open-access journal, *Science Advances*. I have also contributed to several other published studies with collaborators across the world, at the U.S. Geological Survey, Penn State, Utrecht University, and more! These projects have focused on patterns of deformation and hazard implications in the Pacific Northwest, earthquake swarms in Puerto Rico, and the tectonics of the East African Rift in Botswana revealed by seismicity. I have been fortunate to present this work at several meetings, including my first in-person meeting since the start of the pandemic (the Geological Society of America meeting in Portland, OR). I also presented remotely at the Seismological Society of America, European

Geosciences Union, and American Geophysical Union meetings. In fact, I even convened a hybrid session at the AGU meeting on a large and strangely behaved earthquake in the South Sandwich Islands (between South America and Antarctica). Despite the fact that few people heard about this event, it had some really curious and interesting characteristics, including the fact that it was the first earthquake since the giant 2004 Indian Ocean event to send a tsunami into all the world's ocean basins! The hybrid session at the meeting ended up being a giant mess, but sort of worked out. This just means that there is room for improvement!

I am also continuing to improve my remote teaching skills, continuing to lead the Natural Hazards course and teach a section or two of Intro Geology each semester. I am very excited to co-teach the Senior Field Seminar this semester with Dr. Katie O'Sullivan. But a bit nervous too; I have not looked at a rock in the field in over a decade! Hopefully, my previous geological knowledge will return, and my knowledge of other things like tectonics and geodynamics will help in other areas of the course. Speaking of tectonics and geodynamics, I am looking forward to developing and teaching my own courses in the department, including Plate Tectonics at the undergraduate level and Geodynamics at the graduate level. I hope these will be available next academic year – keep an eye out for them!

Last, but not least, I have been giving science talks whenever I can. In 2021 I gave talks at Caltech, Penn State, the USGS (twice), several at CSUB in the department and in NSME, at Sacramento State, and the Buena Vista Museum of Natural History. Whew! I am tired just listing all of those! Seriously, though, I love talking about science to many different people, and all of these have given me unique chances to give everything from highly technical to very general presentations. It had been challenging to adapt to my audiences and also very rewarding! I have had so much fun that I am going back to the Buena Vista Museum to give another *Meet the Expert* talk in February. Come check it out!



*Matt Herman and his little helper, Evie!*

## **Chris Krugh**

Another year must have gone by because I am getting constant reminders to submit my blurb for the newsletter ;). Seriously, the past 2 years have been a haze of near continuous Zoom meetings. I am hoping that we will soon be able to regularly get together face to face, go on field trips, and safely travel to be with friends and family. On the science side of things, I was finally able to get structure from motion photogrammetry software and a small drone that will be used to create high resolution digital elevation models for research and teaching. The funding for this equipment is from a Provost Office mini grant aimed at supporting the development of a future research proposal to the National Science Foundation or another funding agency. Grad students in my lab have been making progress on their research. Toni Ramirez successfully defended her MS Thesis where she investigated the susceptibility of southern Sierra Nevada hillslopes to earthquake-induced landslides. Congrats and great work Toni! Karol Casas is continuing her examination into the role that high rates of tree mortality are likely to

have on post-fire debris flow hazards in the southern Sierra Nevada.

On the family side of things, my wife Dr. Anna Cruz and I were excited, albeit a bit surprised, to welcome the arrival of our son Benjamin 7 weeks early! Thankfully things went well, and everyone is doing great... we're just in need of sleep.



*Chris with his son, Benjamin (Benji)*

## **Katie O'Sullivan**

This year saw the return of field trips and lab work thanks to the COVID vaccines! The Senior Seminar and Mineralogy & Petrology classes went to Lake Isabella to investigate metamorphic and igneous rocks and the structural relationships between them. I got to teach Planetary Geology in Spring of 2021, which was an especially exciting time given that the Mars 2020 landing happened in the middle of the semester! I even did an interview with the KGET Sunrise Show to give my expert opinion (read: express my excitement) on the event. Graduate students Briana Acevedo and Craig Hulsey used the Electron Microprobe labs at UCLA and University of Colorado to begin their

analysis on a lunar meteorite. So far they've found anorthosites, troctolites, and basalt pieces in the brecciated meteorite.

Undergraduate Tara Bonas has been helping their research with literature review and data analysis. Craig Hulseley defended his Thesis Proposal entitled "Petrographic and Geochemical Analysis of a New Lunar Meteorite from Northwest Africa".

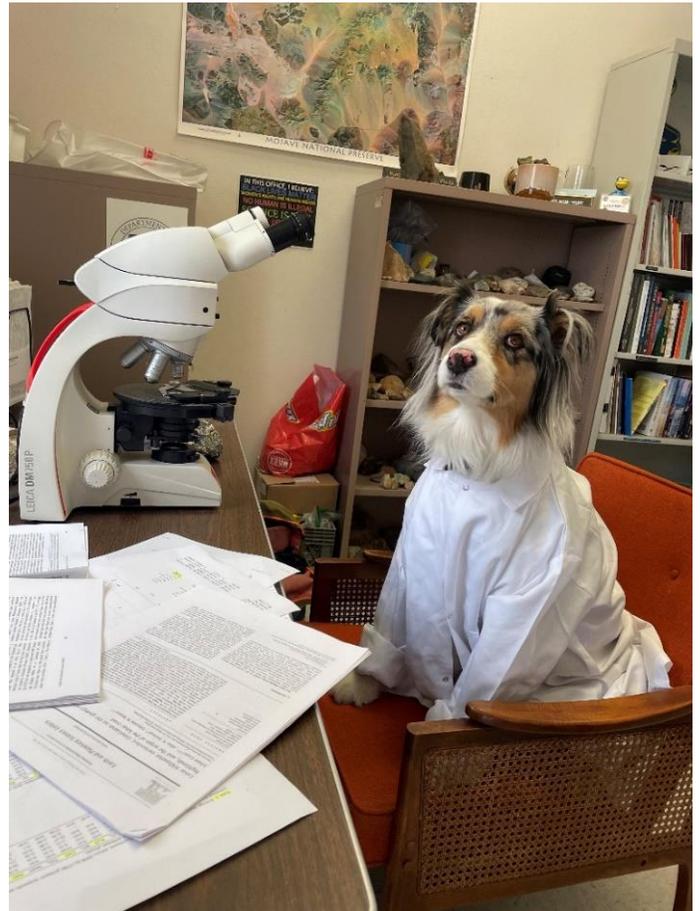


*Briana Acevedo hunts down olivine crystals at the UCLA electron microprobe lab.*

Students in the 2021 Summer Undergraduate Research Experience (SURE) program also got to work on analyzing data from the meteorite. The SURE program is open to all CSUB students and this year we had geology and non-geology majors alike helping out with the research: Brian Aguilar, Tara Bonas, Rossely Cruz, Amritpal Kaur, Alissa Montejo, and Jennifer Rubalcaba. Briana Acevedo was the graduate student mentor for this program.



*Tara Bonas and Happy admire the boudinage in the Lake Isabella amphibolite.*



*Happy dons her lab coat to lend a helping paw with the petrographic analysis during the SURE program.*

This summer wasn't all research - I got to go to Yellowstone Country and visit some of my geology bucket list places. At the top of this list was the Stillwater Complex, a layered intrusion that formed similarly to the first rocks on the Moon. I also explored the colorful rocks and hot springs of the giant Yellowstone volcano.

Yellowstone wasn't the only volcano I visited this year- graduate student Emily Oliver and I went to the Mojave Desert to explore the insides of an ancient volcano there. Emily is using giant plagioclase crystals to investigate the history of the volcano for her master's thesis. This next year I look forward to more rocks in the lab, more field trips, and above all else, more face-to-face time with students and colleagues.



*Katie and Happy enjoying the grand Yellowstone views.*

### **Tony Rathburn, Department Chair**

Year number five as Chair passed very quickly as we all continued to adjust to the challenges of 2021. I could not have made it without the teamwork, dedication, and support from everyone, including **Sue, Elizabeth, Chris, Adam, Liaosha, Katie, Matt, Anna, Alyssa, Larry, Pam, Jesus, Nick, John M., John Y., Bob C., Brian, Bill, Jan, Dirk, Rob, and Bob H.**

I remain in the role of Interim Director of the California Energy Research Center until we complete a search this year for a new director.

My research voyages off San Diego scheduled for the summer and fall of 2021 were postponed again due to Covid-19 restrictions. These expeditions are part of the NSF-funded Geopaths Project and the W. M. Keck Foundation Grant in which we work closely with colleagues from the University of San Diego, Oklahoma State University and Scripps Institution of Oceanography.

Due to sea conditions and ship engine problems we were not able to recover our seafloor experiments that we set out two years ago. We will leave them sitting at 4000 meters for another 12 months and try to recover them next year. This project is in



*Tony Rathburn navigating the rocky shores of 2021.*

collaboration with Ken Smith at the Monterey Bay Aquarium Research Institute and Ashley Burkett at Oklahoma State University. We are examining the deep-sea colonization of various substrates, including plastics, by foraminifera (single-celled organisms that generate a hard “shell” that is called a “test”). Our analyses of previous colonization experiments at this site have yielded some surprising results, including a new genus of foraminifera.

I published a research paper in 2021 which focused on the comparison of paleo-oxygenation proxies (I/Ca and fossil foraminiferal test porosity) based on deep sea core sediments collected off the coast of Brazil. This paper, published in *Palaeogeography*,

*Palaeoclimatology, Palaeoecology*, was in collaboration with colleagues that included those from Syracuse University, Yale University, and Brazil.

In 2021 my teaching duties included "Historical Geology", a new course on dinosaurs, and the grad level course, "Research Methods and Strategies". Teaching these courses in virtual mode is more challenging, but still fun.

## Liaosha Song

This is my fourth year at CSUB. A work from my lab was published in *International Journal of Coal Geology*, titled *Preservation of organic carbon in the Cretaceous Hue Shale on the North Slope of Alaska: Insights from pyrite morphology*. Zach Webb, Austin Fowler, and Victoria Lee made contributions to this work and were included in the author list. Zach won the Outstanding Graduate Paper due to his co-authorship in this publication. Other publications of mine include *Petrophysical analysis and mudstone lithofacies classification of the HRZ shale, North Slope, Alaska*, and *Pore characterization of the Marcellus Shale by nitrogen adsorption and prediction of its gas storage capacity*. Although teaching is still mostly online, research is getting back to normal. Elizabeth Duginski joined my lab. She is currently working on her master thesis about pore networks in Stevens Sandstone of Elk Hills Oil Field. This work will help understand the injectability of CO<sub>2</sub> in this rock formation for CO<sub>2</sub> geological sequestration. Tabitha Guadian also joined my lab for her senior research project about the Hue Shale on the North Slope of Alaska. I also went on a few non-research, non-teaching, laid-back, geological expeditions (a.k.a. hiking). It is probably the best way to get some fresh air while maintain social distancing.



Liaosha Song at the beautiful Glacier Point of Yosemite National Park (photo credit Jennifer).

## How well do you know the CSUB Geology faculty?

See if you can guess the answers to these questions about CSUB geology faculty. The answers are included later in the newsletter.

Which 4 CSUB geology faculty have conducted Alaskan geology research?

Which CSUB geologist taught in France?

Which 2 CSUB geology faculty have degrees in Marine Geology?

Which CSUB geologist conducted postdoctoral research at the University of Delaware?

Which CSUB geologist conducted Masters Degree research focusing on New Zealand geology?

## Dirk Baron, Professor Emeritus

I am enjoying retirement in Central Oregon. Revisiting favorite geologic and other natural wonders of the Pacific Northwest and discovering new ones is one of the things keeping me busy. I always enjoy hearing from students and alumni and even writing the occasional recommendation letter. Stay in touch!



*On an early season ski trip up Mt. St. Helens. Amazing to see that the crater, empty on the last visit there 30 years ago, is now filled with a huge lave dome and a fast-growing glacier!  
Spirit Lake and Mt. Rainier in the back.*

### **Jan Gillespie, Professor Emeritus**

I've kept pretty busy working for the US Geological Survey this year. Got a paper submitted and had a deep (2500 ft) monitoring well drilled between the Elk Hills and Buena Vista oilfields that should give us a lot of new data about the aquifer. Being vaccinated made me either brave (or foolish) enough to get out more. I traveled to Seattle and South Dakota to visit family and kayaked the Colorado River from Glen Canyon Dam to Lee's Ferry—an easy overnight route known as "Dam Down".



*Mountain biking in the Ecuadorean Andes with stratovolcano for scale*

The highlight of the year was a trip to Ecuador and the Galapagos Islands. The Galapagos are a hot spot similar to Hawaii except the oldest islands are in the eastern part of the chain whereas in Hawaii, the eastern islands are younger. My favorite part was snorkeling with the seals! I also had a visit from Drs. Staci Loewy and Pat Mickler (for those who had classes with them back in the day). They are now at the University of Texas at Austin. We took them and their two kids—Sierra and Lyell to the Grand Canyon and rappelled into Keyhole Slot in Zion.



*Drs. Loewy and Mickler in Keyhole Slot.*

## Rob Negrini, Professor Emeritus

It's hard to believe that I retired more than six years ago! In the post-pandemic half (well, almost half!) of this time, Jana and I have spent countless hours cross-country skiing and hiking in the beautiful mountains surrounding Bakersfield. It really is quite amazing how many nice places you can access with nobody else around (our preference), and within only an hour and a half's drive from home. The geology is remarkable as well.



*Rob xc skiing on Rancheria Road, just west of the Shirley Meadows ski area, taken after the December storms of 2021 (photo taken by Jana).*

I was excited to see that Governor Newsome has budgeted more than \$80 million to CSUB for a science and engineering building focusing on energy issues. Providing that this money survives the normal revision process from the other branches of state government, this building and its supporting funding will go a long way to providing CSUB STEM fields with additional sources of funding from the state, local and federal governments as well as, hopefully, matching funds from local industry. CSUB, through its faculty and student research efforts and educational and training activities will, thus, help to continue our service area's contribution to energy production and research in California for generations to come.

Doing our small part, Jana and I continue to provide financial support to the Geological Sciences Department (ACCT #TR36) and encourage all who are reading this to join with us. We've earmarked our contribution to support student research that will most likely be submitted soon to a peer-reviewed journal

because the Department's solid record in that area has, in the past, led to the procuring of resources, both financial and equipment, so critical for this part of our mission.



*An amphibolite from near the top of Tehachapi Peak, representing the deep crustal rocks of the southernmost Sierra Nevada, just north of the Garlock Fault (photo by Rob Negrini).*

## Sue Holt

Another strange year, but we made it through. We continued telecommuting through August, but most staff returned at the beginning of the Fall semester. There were many precautions set in place and as all of our classes (save one lab) were remote, so for the most part it was Elizabeth and myself on the 3rd floor. Occasionally faculty and students came by – always good to see folks in person! Not seeing students face-to-face for 2 years has left a huge gap in our familiarity of them. I now know names, but can't put a face to most of them., which is sad. Students are the reason we're all here!

I missed spending time with my grandkids and friends and family outside of Bakersfield, but hopefully this year Omicron will subside and I'll be able to get back to traveling, and we can all start seeing each other in person more!



*Liam 7, Lila 5, Lars 3*



*Sarasvati (Zara) 1 ½ and Siddhartha (Sidd) 4*

## **KERN HIGH SCHOOL DISTRICT'S DUAL CREDIT GEOLOGY PROGRAM**

Dual credit programs give students a chance to earn college credit as well as high school credit by passing one class. The Kern High School District has had a Dual Credit Geology Program for over 20 years. The programs started at South High School with the MS cubed program. Seniors in the program took the Honors Geology class and earned credit at CSUB for Geology 201.

The program expanded twice over the years. First Ridgeview High school was added and then Frontier, North, Highland and Arvin High schools were added. There has also been a summer class run through Ridgeview High School for two years. In the last few years, schools from other districts also have run Dual credit programs in Geology through CSUB (currently Ontario High School and Montclair High School in the Chaffey Joint Union High School District, and soon Cesar E. Chavez High School in the Delano Joint Union High School District).

### **Karen Blount, Highland High School**

The benefits of this program are many. This is an opportunity for students to work at the college level while in high school and at a slower pace. The current program runs the one semester college class over a whole (2 semester) high school year. This provides instructors opportunities to discuss the differences between a college class and a high school class. We also discuss study habits and what is expected of a college student. I have had many discussions with students about how to study and how to modify what they are doing to improve the results of their efforts. One of my favorite discussions with one of my students after graduation included the student saying "Everything you told us was right" referring to life in college.

Another benefit is the funding for field trips. All schools take their students on three days of field trips. In the Kern High School District, the minimum is usually a day trip to a place like the Los Angeles Museum of Natural History and a two-day trip to Yosemite. Some schools take more and longer trips. Other sites included Morro Bay, Montana de Oro, Red Rock Canyon and Fossil Falls. For many of our students, they have never been to these places.



*Some of Karen Blount's students on one of many field trips she led.*



*Karen Blount's students enjoying the great outdoors.*

I had students who had never been to a museum and had never ridden on public transportation, so the shuttle busses in Yosemite were novel. Another student had only seen water falls in photos and video, to see them in person and feel the water spray was something they will never forget. Most students had never taken a hike and to walk around the Sequoias in the Mariposa Grove was an impactful experience. The students that hiked to Vernal falls, a challenging hike, were changed by the experience. Experiencing geology and nature firsthand changed how they viewed the world.

I am proud of the years I taught this program. I am now retired. It changed how many students viewed the world. Many have said, they see scenery differently and wonder how it formed. One of my students just finished their masters in Geology. Another half dozen or so have majored in Geology.

Those are the ones I know about. Others are considering Geoscience programs. For one class to have such deep impacts on students speaks to importance of this program. I am happy to say the program I taught continues and I hope the programs continues at all these schools for many years to come.



*Karen Blount with one of the many, many students she taught during her career.*

### **THE CALIFORNIA WELL SAMPLE REPOSITORY (CWSR)**

The California Well Sample Repository (CWSR) is located on the south side of the CSUB campus. The CWSR remains a very valuable resource that is sincerely appreciated by industry, government agencies and the academic community. The facility was constructed in 1975 to be a publicly accessible library of geological data. A second building was added in 1986 immediately behind the first building. The combined 12,000 sq ft are filled with geologic data including cores, well files, paleontological reports, check shot surveys and many other data that are not available elsewhere. Government agencies, industry, researchers and students from all over the country make use of the facility.



*Do you remember when the CWSR had plenty of room? Note the rows of cores laid out carefully on the floor in the background (photo from CSUB Library archives).*

Since 1987 volunteers from the CSUB 60+ Club donate their time to organize the data at the facility. Enrolled geology students hired for part time positions, assist with the operation of the facility too. However, once virus protocols were invoked in March 2020, volunteers and student employees were not allowed to work in the CWSR. Nevertheless, requests still keep coming in and **Charles James**, the curator overseeing the operation of the CWSR, continues to provide the community with unique and valuable data and samples.



*A photo from CWSR's past. Do you recognize this guy? (photo from CSUB Library archives)*



*Under CSUB geologist Liaosha Song's guidance, Austin Fowler and Zach Webb sample a core of the Vedder Sands at the CWSR.*

The CWSR depends entirely upon donations to operate, and relies heavily on volunteers. Please consider volunteering and/or donating materials (book collections, well sample materials, rock collections). Materials that are not useful for the CWSR can be used to support student scholarships. Please contact **Larry Knauer** for more information (contact information is included on the website ([www.wellsample.com](http://www.wellsample.com))).

### **Zach Webb, Alumnus**

When Dr. Rathburn contacted me to inquire if I was interested in contributing to this newsletter, I was both honored and excited. I decided to take the opportunity to share with you all how the Department of Geological Sciences at CSUB has positively impacted my life. I know that I will always look back to these years as some of the best times of my life where I made lifelong friendships with some of the finest folks around, grew academically and professionally through projects and challenging coursework, developed the fundamental professional skills needed in any career path, and simply had a blast exploring the geologically complex and stunning state of California.



*Packsaddle Cave field trip in Dr. O'Sullivan's Geochemistry course in Fall 2017.*

As I take time to sit back and reflect on how fortunate I was to be a student in a department that fully supported my goals and ambitions by providing a quality education, financial backing to ease the cost of my education, professional development that has refined essential skills for the professional workforce, and friendships that will stand the test of time, I am filled with a deep sense of gratitude for each professor, colleague and classmate that has impacted my life for the better.

I was a first-generation transfer student from Bakersfield College who took a chance on CSUB Geology and undoubtedly made the right choice. I originally pursued geology for a multitude of reasons. As far back as I can recall, I have always asked questions and been interested in my surroundings and how these surroundings have changed over time. I have also, like many of us all, deeply enjoyed every opportunity to get outdoors and experience the tranquility and solitude that nature has to offer.



*Field mapping at Lake Isabella in Senior Field Seminar in Spring 2019.*

When I stumbled upon the field of geology and learned how these scientists reconstruct our surroundings and utilize fundamental scientific principles to find resources, mitigate disasters, and model the future through understanding the past, I was hooked. These are just a few reasons why I chose to commit to study geology in my collegiate years and became excited about the opportunities that CSUB geology provided for students.

As a student, I did my best to fully commit to my academics, leadership opportunities, and educational outreach. My professors always did an excellent job stimulating conversations in the classroom and providing labs that required me to apply course content to real-world examples. Mineral and rock identification, geospatial analysis, structural interpretation of geologically complex tectonic regimes, and endless lithologic descriptions of sedimentary core samples are just a few examples of the efforts that CSUB Geology faculty and staff provided for my colleagues and myself to develop the fundamental skills that geoscientists need to succeed.



Zach Webb (left), Austin Fowler (middle), and Kalvin Katipunan (right). Best friends from CSUB Geology.

I can confidently attest to the quality of preparation that CSUB geology provides its students in field work and field mapping. During summer field camp experiences you meet geology students from all over the country. CSUB geology students are known to be well prepared and advanced in field mapping techniques relative to other educational institutions across the nation.



Summer field camp at Southern Utah University in Summer 2019. Location: Parowan Gap

CSUB professors prepared my colleagues and myself to succeed in our summer field camp and continue the legacy that CSUB geoscience students have held for years.



Summer field camp at Southern Utah University in Summer 2019. Preparing to hike Kanarrville Falls.

As a CSUB geoscience student I also took every opportunity to serve in a leadership role. I served as President of the American Association of Petroleum Geologists student chapter at CSUB where I worked alongside some phenomenal officers to provide educational outreach, networking, and fieldtrip opportunities to students who invested their time into the club. We all were fortunate to have excellent field trips led by some brilliant geoscience professionals across the state of California and apply our education to real-world examples that are currently studied by world-renowned research institutions.



Spring Geology Club trip to San Diego, California in Spring 2019. Location: UCSD Scripps Institution of Oceanography.



*Spring Geology Club trip to San Diego, California in Spring 2019 Scripps Institution of Oceanography Geological Collections Manager, Alex Hangsterfer providing a private tour for CSUB Geology Club students, showing them the facilities and a variety of deep-sea sediment cores.*



*Cameron Campbell (Director of the Division of Mine Reclamation at the California Department of Conservation, formerly Inland District Deputy of CalGEM) discussing turbidites with CSUB Geology Club students in La Jolla, California on the Geology Club spring field trip in Spring 2019.*



*Cameron Campbell and Afton Van Zandt (Associate Oil and Gas Engineer at CalGEM) discussing the Rose Canyon fault on the Geology Club Spring field trip.*

These trips acted as a catalyst to build relationships among colleagues who we spent countless hours in the classroom and lab with. This comradery really enhanced the atmosphere and made for an enjoyable experience I am grateful for. As a CSUB geology student I also had the opportunity to participate in K-12 STEM educational outreach across campuses in Kern County. It was always a joy to witness students' faces light up when we showed them fossils and geodes or had them interact and build landscapes with the Department's Augmented Reality sandbox. CSUB geology outreach activities provided opportunities for me to engage future scientists with our educational materials and aid these youngsters in developing fundamental scientific skills. I am deeply grateful for these experiences.



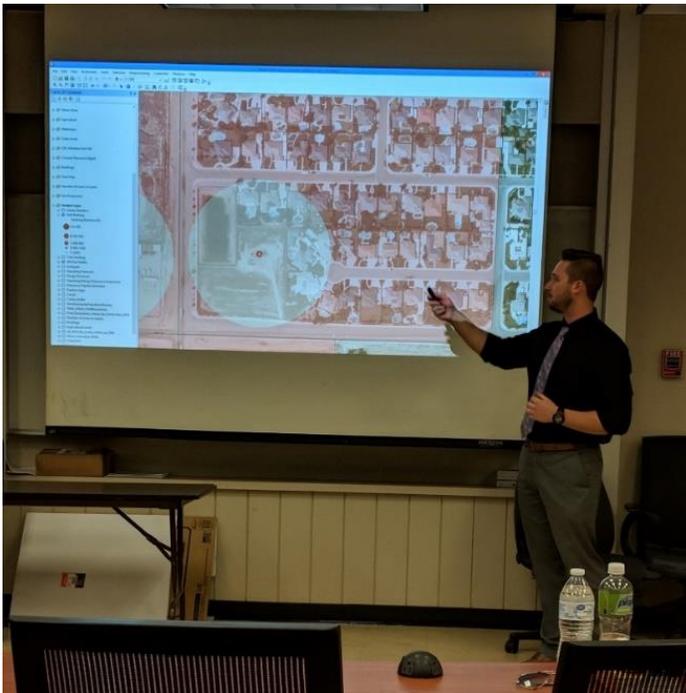
*2018-2019 Geology club Vice President Austin Fowler (left) and President Zach Webb (right) promoting the club and the department at an educational outreach event.*

I was fortunate to compete and earn an internship with CalGEM (California Geologic Energy Management Division of the California Department of Conservation) from 2017-2019 as an undergraduate and graduate student. This opportunity allowed me to utilize geological and technical skills learned from courses in CSUB geology and apply them in assisting geologists and engineers with underground injection control, area of review, aquifer exemption, and project by project reviews that are aimed at protecting the environment, preventing pollution, and ensuring public safety through sound science and engineering practices in the petroleum sector.

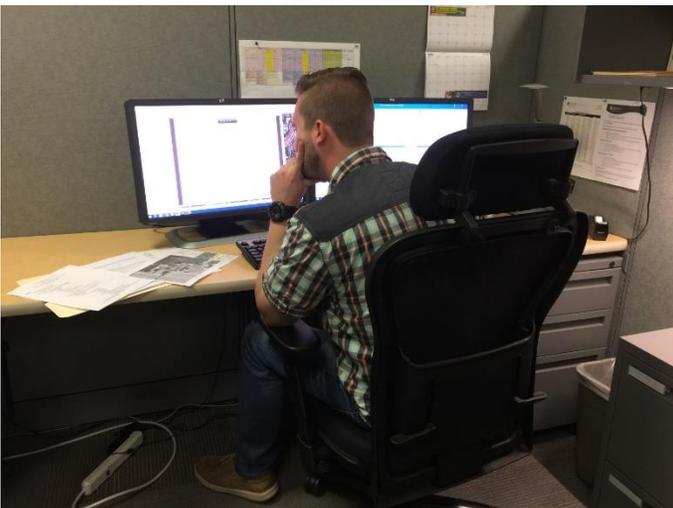
As a graduate student I had the opportunity to captain the CSUB Imperial Barrel Award (IBA) 2020 team where we prospected for hydrocarbons utilizing real-world industry data. I also had the opportunity to contribute to peer-reviewed and published research that utilized pyrite framboids as proxies to assess preservation

analytical skills that are critical to careers across the spectrum.

The CSUB Department of Geological Sciences has time and time again provided me with the building blocks to succeed. I received a quality education, participated in leadership positions, and had the opportunity to gain professional industry experience. I was fortunate to earn multiple scholarships, honors, and distinguished awards for my efforts. This support played an essential role in my success by relieving some of the financial burdens that students face when pursuing an education. Geology scholarships provided me the opportunity to fully focus on learning, growing, and refining skills needed to succeed in a career. The friends and mentors I have gained from the Department are treasured folks who I am proud to know and have contributed to the best years of my life. If you are looking for a quality education that develops transferrable and professional skills, allows you to travel and study outdoors, and is comprised of people who provide support and root for your success, then study Geology at the Department of Geological Sciences at CSUB.



*Zach Webb presenting a project from an internship with CalGEM in Spring 2018.*



*Zach Webb using ArcGIS to perform geospatial analysis on pipeline management for CalGEM in Spring 2018.*

potential of organic matter in the North Slope of Alaska. I credit CSUB geology with providing me these opportunities to develop fundamental geologic, scientific, technical, organizational, and



*Zach Webb with Department of Geological Sciences Chair, Dr. Rathburn, at Commencement Award Ceremony in Spring 2019.*



*Zach Webb receiving Roadrunner Society Induction award in Spring 2019 with Elizabeth Powers (left) and Sue Holt (right).*

## **ANSWERS TO: HOW WELL DO YOU KNOW THE CSUB GEOLOGY FACULTY?**

Which 4 geology faculty have conducted Alaskan geology research?

**Matt Herman, Liaosha Song, Chris Krugh, and Tony Rathburn**

Which CSUB geologist taught in France?

**Katie O'Sullivan**

Which 2 geology faculty have a Masters Degree in Marine Geology?

**Adam Guo and Liaosha Song**

Which geologist did postdoctoral research at the University of Delaware?

**Anna Cruz**

Which geologist did Masters Degree research that focused on New Zealand geology?

**Matt Herman**

## **DONATIONS**

Support from the community and our alumni provide critical help to maintain the quality of education for our students. We sincerely appreciate those who have donated to the Department:

### **Corporations and Organizations**

Aera, Chevron, California Resources Corporation, Schlumberger, Penn State/Africa Array, Pacific Section APPG, the San Joaquin Geological Society, the Kern County Mineral Society, and the Pacific Section SEG, Maranatha Landscape & Supplies.

### **Individuals**

Robert and Jana Negrini, the John and Mary Coash Family, Florn Core, David Hanley, Robert (Bob) Lewy, Jenny Zorn, Wally Kleck, William Hoag family, Steve Collett, Gregg Wilkerson, Thom Davis, Chris Krugh, the Claude Fiddler Student Research Endowment, and the Claude Fiddler Field Endowment.

Our apologies if we forgot someone. Please let us know so that we can acknowledge you in our next newsletter.

## **STUDENT NEWS**

### **Student Internships**

Despite challenges posed by the pandemic, CSUB geology students were successful in obtaining geoscience internships. Here are two examples of summer internship stories from CSUB Geology undergraduates:

### **Danny Dorado: COAST Intern at Channel Islands National Marine Sanctuary (NOAA)**

Over the summer of 2021 I applied for a COAST internship and was selected to be hosted by the Channel Islands National Marine Sanctuary. My internship included a few different projects which consisted of working behind the scenes of a sanctuary advisory council meeting, hosting a webinar and creating an ArcGis StoryMap of the areas explored within the sanctuary. I had the opportunity to work from the office located on the University of California, Santa Barbara campus and decided it would be best to move to Santa Barbara. Relocation provided a better means to connect with the staff and other interns. The support I was shown by my team

and fellow interns was one of the most impactful parts of the entire my internship. Additionally, the projects provided me different experiences such as working with the community and understanding different methods of education outside of the classroom. The advisory council meeting I assisted with allowed me to observe the importance of community input in a science and governmental setting. Hosting the webinar pushed me out of my comfort zone as I spoke virtually in front of a live audience for a large amount of people. The StoryMap allowed me to explore a new skill set that I have continued to use for the 2021-2022 school year and plan to use in future endeavors. I experienced the management side within science rather than being involved with direct research, but I saw how the education team implemented science communication with the public which is something I am personally passionate about. Despite not being involved with research I assisted one of the scientists in the field and rode on a boat for the first time; during our trip we encountered a pod of dolphins which I can only describe as magical. This internship was truly a life changing experience and I find myself even more excited for my future career path in science.



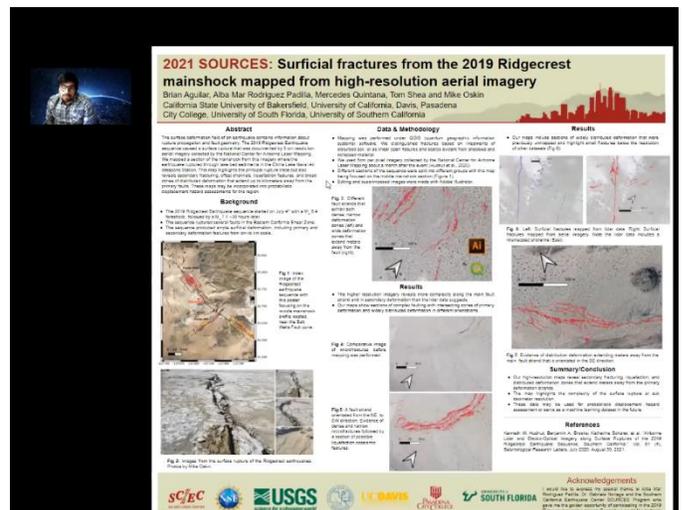
Danny Dorado working at sea as a summer COAST Intern at the Channel Islands National Marine Sanctuary (NOAA).

## Brian Aguilar: internship with Southern California Earthquake Center SOURCES

(Supported Opportunities for Undergraduates and Researchers to Collaborate on Earthquake Science) program. The following text was excerpted from Brian's profile on the CCEC Internship website:

<https://www.scec.org/user/baguilar18> .

Brian was a 2021 SOURCES intern at the Southern California Earthquake Center and worked on the 2019 Ridgecrest earthquake which ruptured a set of orthogonal faults in the best monitored continental earthquake sequence to date. As a member of a research team, he worked with 2-20 cm resolution drone imagery collected by Pierce et al. (2019) and 5 cm resolution orthophotography collected by NCALM to map portions of the surface rupture in detail. The team is quantifying subtle patterns in the fracture networks comprising the rupture, including rotations,



Brian Aguilar presented research posters at the Southern California Earthquake Center's annual meeting in both 2020 and 2021.

changes in scarp-facing directions, alternation between blind and surficial fault rupture, and trade-offs between localized and distributed deformation.

Prior to working with Alba Padilla, Brian worked on the BASIN project, a multicomponent, passive-source earthquake hazard project between LSU, Caltech, Cal Poly Pomona, and

other universities that focused on characterizing the amplification of seismic waves as they travel through sedimentary basins. The goal was to first map the structure of the San Gabriel and San Bernardino basins that are known to amplify seismic waves in the Los Angeles area, and to integrate the basins' structure into computer simulations of ground motion. Here, he worked with Dr. Patricia Persaud of LSU. Brian interpreted receiver function data to identify the Mohorovicic Discontinuity in the eastern end of the San Bernardino Basin.

Brian's publications/poster presentations from his internships:

**Aguilar, B. J.**, Rodriguez Padilla, A. M., Quintana, M., Shea, T. A., & Oskin, M. E. (2021, 08). Surficial fractures from the middle of the 2019 Ridgecrest mainshock mapped from high-resolution aerial imagery. Poster Presentation at 2021 SCEC Annual Meeting. SCEC Contribution 11439

Rodriguez Padilla, A. M., Quintana, M., Prado, R., **Aguilar, B. J.**, Shea, T. A., Oskin, M. E., & Garcia, L. (2021). Near-field high-resolution maps of the Ridgecrest earthquakes from aerial imagery. *Seismological Research Letters*, (accepted). SCEC Contribution 11063

**Aguilar, B. J.**, Persaud, P., & Clayton, R. W. (2020, 08). Identifying the Moho and an intracrustal interface along a Nodal Seismic Line in the eastern San Bernardino Basin. Poster Presentation at 2020 SCEC Annual Meeting. SCEC Contribution 10612

About Brian: He was Vice President of the Geology Club at CSUB, and a MESA leader for



*Brian Aguilar and his very helpful field assistant, Dominic.*

the MESA program at Bakersfield College. In his free time, he likes to go hiking, playing music, reading, and spending time with his son.

Brian is double-majoring in Geological Science and Communication at CSUB. He will graduate in the Spring of 2022 with his B.S. in Geological Sciences and his B.A. in Communication with an emphasis on Digital Media. Brian plans to pursue a PhD in either Mineralogy or Planetary Sciences.

## **CSUB Geology Students Honored by Professional Organizations**

Several **CSUB geology** students were recognized by the San Joaquin Geological Society and awarded merit-based, summer field camp assistantships designed to help defray the costs of attending a summer field camp. We still require a field camp to graduate and field camps are still quite expensive and over and above the cost of CSUB courses (university tuition, fees and faculty still have to be paid). **These awards are co-sponsored by the San Joaquin Geological Society (SJGS) and the Pacific Section of the American Association of Petroleum Geologists (PSAAPG).**

Summer field camp is a required, 5-6 week culminating experience where students apply their geological skills to solve field-based problems in varied geologic settings and environments. Many field camps visit regions outside of CA and several students travel overseas for this transformative experience. It bears repeating that fees (several thousand dollars) for field camps are not included in CSUB tuition, and geology students must pay these fees above the cost of their 4-year degree expenses. Scholarships and field camp awards make a significant difference for geology students.

The following CSUB students each received \$1000 field camp reimbursement awards from **SJGS and AAPG for 2021:**

Bradley Squires  
Briana Acevedo  
Ariel Espindola Mercado  
Adrian Montoya  
Blaine Whitaker

**The Pacific Coast Section of the Society of Exploration Geophysicists (PCS-SEG) Outstanding CSUB Geology Major Award (\$500)**

The Society of Exploration Geophysicists (PCS-SEG) presented their award to recognize an outstanding CSUB geology major and to help the student cover the costs of the required summer field camp course. The award demonstrates the commitment by PCS-SEG to encourage the educational and practical development of high-performing students in CSUB's Department of Geological Sciences.

2021 Award Winner:  
Bradley Squires

**Kern County Mineral Society Field Camp Award (\$1500 each)**

Kern County Mineral Society (KCMS) presented two CSUB Geology students with awards to help cover the costs of their required summer field camp. The KCMS was established in 1935, by individuals who shared a common interest in collecting, displaying, and sharing their knowledge of rocks and minerals. Their generous award to CSUB geology students reflects the sincere interest of KCMS in helping young people pursue careers in geology.

2021 Award Winners:  
Bradley Squires and Briana Acevedo

**Department Awards**

Students from the CSUB Department of Geological Sciences have also been honored with several merit-based awards established through the generosity of a number of donors with ties to CSUB and the local community. Recipients of these annual awards are selected by an award committee consisting of CSUB Geological Sciences faculty.

The following describes awards and awardees for 2021:

**Herman W. Weddle Scholarship:** This memorial scholarship was established by James Weddle in honor of his father, Herman Weddle, a geologist with Standard Oil Company to support CSUB students majoring in geology. Awards are for geology majors who work on well core or well samples and make use of the California Well Sample Repository.

2021 Award Winners (\$685 each):  
Jared Hanson  
Michael Hernandez

**H. Victor and Virginia C. Church**

**Scholarship:** This scholarship was established in honor of Dr. H. Victor Church, a geologist and founding member of the Well Sample Repository at CSUB, and his wife Virginia C. Church, a former teacher, to support CSUB students majoring in Geology.

2021 Award Winner (\$1,800):  
Tara Bonas

**C.E. Strange Scholarship:** This scholarship was established by Mr. C. E. Strange, a local geologist, who wanted to provide financial assistance to undergraduate students majoring in Earth Science.

2021 Award Winners: (\$450 each):

Brian Aguilar  
Tara Bonas  
John Cronin  
Danny Dorado  
Tabitha Guadian  
Jasmin Gutierrez  
Jared Hansen  
Michael Hernandez  
Amber Illig  
Conner Lesh  
Marissa McCosh  
Marisela Rodriguez  
Prabhjot Singh  
Hector Zavala

**Sam Gonzalez Memorial Scholarship:**

The family of Sam Gonzalez and friends have developed this scholarship to honor their son and friend by supporting geology majors in pursuit of an undergraduate degree and a career in the field of geology.

2021 Award Winner: (\$530)  
Prabhjot Singh

**Chevron Scholarship for Outstanding Students in the Department:**

2021 Award Winners: (\$2,500 each)  
Craig Hulsey and Bradley Squires

## **CSUB Geology Students Honored with Awards from the CSUB School of Natural Sciences, Mathematics, and Engineering:**

May 2021 — The School of Natural Sciences, Mathematics and Engineering Scholarships awarded the following 2021 Awards to CSUB Geology Majors:

### **Theodore Decker Scholarship**

This scholarship was established by Jack Decker as a memorial tribute to his son.

2021 Award Winner (\$713):  
Tara Bonas

### **Kegley Family Merit Scholarship:**

2021 Award Winner:  
Bradley Squires

### **Outstanding Geology Graduate Student in CSUB School of Natural Sciences, Mathematics, and Engineering (NSME):**

Presented to the most outstanding graduate student in each department.

2021 Award Winner:  
Karine Hochstatter



*Karine Hochstatter enjoying the great outdoors.*

### **Outstanding Geology Undergraduate Student in CSUB School of Natural Sciences, Mathematics, and Engineering by Program:**

Presented to the most outstanding undergraduate student in each Department.

**2021 Award Winner:** Bradley Squires

### **Outstanding Published Paper in CSUB**

**School of Natural Sciences, Mathematics, and Engineering (NSME):** Presented to the student with the most outstanding publication in NSME.

**2021 Award Winner:** Zachary Webb

With his advisor, Liaosha Song, Zach was a coauthor of the paper:

*"Preservation of organic carbon in the Cretaceous Hue Shale on the North Slope of Alaska: Insights from pyrite morphology," published in the "International Journal of Coal Geology"*

See the following link for more about Bradley, Karine, and Zach and their awards:

<https://news.csub.edu/meet-nsmes-outstanding-graduates>.

### **Student Research Poster Competition Award CSUB School of Natural Sciences, Mathematics, and Engineering:**

**2021 Award Winner:**

Cindy Rodriguez (Faculty Mentor: Junhua Guo)

### **CSUB CSU Future Scholars Scholarship:**

**2021 Award Winter:**

Kimberlee Danielle Dorado \$1,000

### **Student Research Scholarships (SRS):**

**2021 Award Winter:**

Christopher Matthew Cook \$1,000

### **Federated Indians of Graton**

**2021 Award Winner:**

Lori Sanchez \$4,528

## **CSUB GEOLOGY CLUB**

We're hoping the CSUB Geology Club will be up and running again Fall 2022. But until then we are always available on Facebook to keep up on club activities, and job and scholarship opportunities.

## ALUMNI NEWS

Please contact Sue Holt [sholt3@csub.edu](mailto:sholt3@csub.edu) to update your career and contact information.

### Class of 2021 Bachelor of Science

Acevedo, Briana  
Alvear, Maya D.  
Bloomberg, Kobi  
Mercado, Ariel Espindola  
Garcia, Alexandria  
Kerwin, Spencer  
Montoya, Adrian  
Squires, Bradley  
Whitaker, Blaine

**Alex Garcia, Adrian Montoya, Briana Acevedo, and Blaine Whitaker** are enrolled in the CSUB Master's Program.

**Ariel Espindola Mercado** is working as a contract geologist on a lithium project in Arizona.

**Bradley Squires** has applied to graduate school just recently and is awaiting a reply. Until then he is working as a Geo Technician with Rangefront Geological on the Summa Silver Project in New Mexico on a short term project. In June he will be participating in an Exploration Geology Internship with Free-port McMoRan in Tucson, AZ.



*Blaine Whitaker happy to be graduating!*



*Briana Acevedo, Adrian Montoya, and Bradley Squires waiting to receive their diplomas.*

## CLASS OF 2021 MASTER OF SCIENCE

Aragon, Travis (Fall 2021)  
Hochstatter, Karine  
Harsch, Morgan LeighAnn Kayser  
Obenshain, Grant  
Ramirez, Toni  
Rodriguez, Cindy

**Morgan Kayser Harsch** is a Geoscience Specialist at CRC.

**Grant Obenshain** is an Associate Oil & Gas Engineer with CalGEM in the Idle Well Program.

**Travis Aragon** is an Associate Oil & Gas Engineer with CalGEM.



*Grant Obenshain receiving his diploma from President Zelezny.*



*Morgan Kayser Harsch receiving her diploma from President Zelezny.*



*Cindy Ramirez and Toni Rodriguez before receiving their diplomas.*

## THE FUTURE OF GEOLOGY JOBS

According to the US Bureau of Labor Statistics (USBLS), the number of jobs for geoscientists is projected to grow 5% from 2019 to 2029, which is faster than the average for all occupations. The demand for energy, environmental protection, and responsible land and resource management is projected to generate much of this growth. A rise in jobs for geoscientists in the professional, scientific, and technical services industry, where most geoscientists work, is projected by the USBLS to offset slower growth in the oil and gas extraction industry. Discovering and developing sites for alternative energies, such as geothermal energy and wind energy, are among the geoscience job opportunities that are expected to increase. The robust median salaries and projected job growth for geology jobs are higher than the average for most occupations monitored by the U.S. Bureau of Labor Statistics.

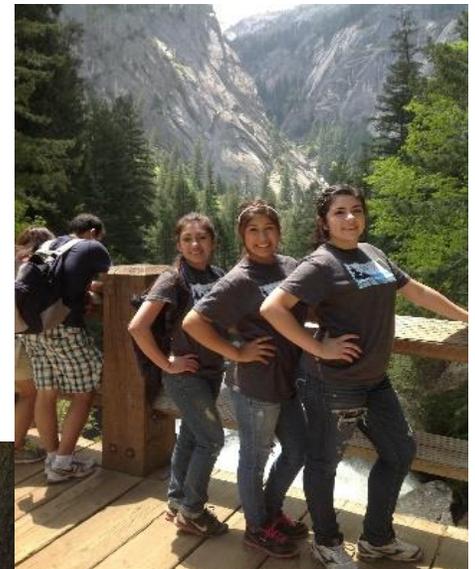
In June of 2021 there were 1,195 geoscience jobs advertised in *Indeed* at the national level

and 190 jobs advertised in California; 409 of these in the nation and 58 of the jobs in the state were at entry level. Due to the unprecedented growth in demand for critical minerals used in battery and computer technologies, in December 2019 geoscience organizations in Australia, Canada and the U.S. created the Critical Minerals Mapping Initiative (CMMI) to advance understanding and promote development of crucial mineral resources. Given the mineral resources in the region and the rapidly increasing demand, we also expect permanent mining job opportunities to increase in the region and elsewhere. According to the American Geoscience Institute (AGI), by 2028 there will be a shortage of 35,000 geoscientists, and over the next decade geoscience employment will expand by 4–8%, depending on the specific job.



## DUAL-CREDIT PHYSICAL GEOLOGY HIGH SCHOOL CLASSES OVER THE YEARS...

*Photos provided by:*  
Karen Blount Frontier High School  
Chris Carrisalez Arvin High School  
Teri Madewell South High School  
Jon Walker North High School  
Paul Cicciana Ontario High School







## DONATIONS

We are committed to providing students with the quality of education that they need to become successful, contributing members of the community. Please consider becoming a supporter of our scholarship and field camp programs that make it possible for financially-challenged students to continue their studies and attend summer field camp. COVID has created additional financial difficulties for students and the Department. The Department has a number of outreach, field experience and educational initiatives that recruit students and enhance student learning. These programs depend on your support. Every donation makes a difference. As a result of budget cuts and changes in priorities, many geology departments across the country have reduced their standards, removed field camp requirements and reduced field and applied skills from their program. Please give back to the Department that is working hard to give current students the traditional field training and advanced technical education required to be a successful geologist. Donations from alumni and other engaged community members allow us to enrich and maintain classes and other student experiences beyond what state funding alone can provide. You can also help students with field camp expenses (thousands of out-of-pocket dollars not covered by CSUB tuition) by donating to an established scholarship, starting your own annual scholarship, or specifying what you want donated funds to the Department to be used for (see below).

In the future, if you would like to receive this newsletter via email, please contact Sue Holt at [sholt3@csub.edu](mailto:sholt3@csub.edu) with your email address.

Name:

Affiliation (if applicable):

Address:

City, State, Zip Code

Email:

Please indicate the amount you want to donate:

\$100 \$500 \$1,000 \$2,500  
\$5,000 Other \_\_\_\_\_

Please indicate if you want your donation to go to one of these specific causes:

- Sam Gonzalez Memorial Scholarship** (to support students who after exploring other fields have discovered Geology as their calling)
- Student Scholarships (will be added to the CE Strange Scholarship Fund)**
- Field Activities (will be added to the Claude Fiddler Field Endowment)**
- Undergraduate Student Research**
- Unrestricted to support current needs identified by department**

## THANK YOU!

Return to the address below, to the attention of Tony Rathburn.

9001 Stockdale Highway,66 SCI  
Bakersfield, CA 93311



**DEPARTMENT OF  
GEOLOGICAL SCIENCE**  
CSU BAKERSFIELD

**9001 Stockdale Highway  
Bakersfield, CA 93311**

**Address Service Requested**

**Geological Sciences Department  
2021 Newsletter inside**