



# CSU Bakersfield Geological Sciences Fall 2018

## DEPARTMENT NEWS

Another exciting year has come and gone, and we have lots of news to share with you. We hope to hear from you as well.

**Student Success.** We are especially proud that the Department is a clear leader in graduating geology majors, including women and other minorities, in the CSU system. In 2017-2018, CSUB graduated more geology majors than any other geology program in the CSU system, awarding over 20% of all geology degrees conferred in the CSU system. CSUB tied for the largest number of female geology graduates, comprising over 21% of all women geology graduates in the CSU system, and minorities comprised over 45% of 2017-18 geology major graduates at CSUB. CSUB student research also remains strong and diverse, with geology students garnering a number of awards and media recognition (see the student news section).

## New Faces

**We hired another new geologist this year and we are currently searching for a tenure-track geologist** to start fall, 2019. This past year we hired Assistant Professor **Liaosha Song, a petroleum geologist**, who received his PhD from West Virginia University. Liaosha's position expands our faculty numbers, and we look forward to bolstering our petroleum geology course offerings and strengthening CSUB's petroleum-oriented research. We are thrilled to welcome him to our team.

In addition to replacing Dirk Baron (who retired in August) this year and Jan Gillespie (who will retire next August), we hope to hire a second expansion faculty within the next few years. As we grow, we are very fortunate to have part-time instructors helping to cover courses: **Lisa Alpert, Karen Blount, Bob Crewdson, Larry Drennan, Luke Hamlin, Steve Kiouses, Pam Knight, John McCormick, Nick Moreno, Brian Pitts, and Gregg Wilkerson.**

As a result of a recent MOU with the United States Geological Society (USGS), we have **3 USGS hydrologists, Olga Rodriguez, Maryanne Bobbitt and Nicole Deatherage, based at CSUB in the Department of Geological Sciences.** In addition to their work for the USGS, Olga volunteered to help with our GIS night course, and Maryanne and Nicole are current CSUB graduate students (in geology and biology respectively).

Through funding from a collaborative international proposal submitted by **Rathburn, Basak,** and our Brazilian colleague, **Dr. Anna Cruz, a postdoctoral Research Scientist from Brazil,** is now conducting marine science research at CSUB. Over the next year at CSUB, she is funded to work with Rathburn and Basak on core samples collected off the coasts of Brazil and California.

**John Yu,** recently retired from the Division of Oil, Gas, and Geothermal Resources (DOGGR), is also now based in the Department of Geological Sciences as an “Affiliated Scientist.” John is working on a textbook, and plans to work with **Liaosha Song** to expand course offerings in petroleum-related topics next fall.

**Seminar Series.** **Adam Guo** continues to do an amazing job of organizing a diverse array of local, regional and national speakers to present interesting talks for our seminar series. This fall talks included topics related to gold, paleoclimatology, zeolites, engineering geology, and unconventional shale gas exploration. Please plan to join us for future seminars—you won’t be disappointed. Our spring seminar schedule is not yet available, but will include seminars from the search candidates, so stay tuned. Check 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 faculty have a long, remarkable history of obtaining substantial external funding. According to a 2018 report from the CSUB Grants Office, the Department received an average of \$1.3 million research dollars per year over the last 3 years (an average of over

\$200,000/year per faculty member), representing up to 14% of all yearly CSUB awards over that time frame. Funding highlights include the second 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, Guo and Baron**), and four Biology, Math and Engineering faculty as co-PIs and team members. Another highlight was the first year of a 3-year, \$297,459 **Geopaths NSF grant** awarded to **Rathburn** (lead PI) and **Baron** (retired). 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. **Chandranath Basak** has two NSF grants focusing on geochemistry and paleoceanography. As mentioned above, a new international grant is funding **Dr. Anna Cruz,** a postdoctoral Research Scientist from Brazil, to work with **Rathburn** and **Basak** to conduct research on core samples collected off the coasts of Brazil and California. We also recently learned that a Keck Foundation Grant (\$150,000) was awarded to **Basak** and **Rathburn** to help upgrade the geochemistry lab and engage students in research.

**Drop by and see our evolving, new look.** We have added a microscope and nine picture frames (with student and faculty photos) on the walls of the student study and tutoring room (former library). This room has become very popular with students, and faculty appreciate access to convenient tea and coffee. Please come by and join us for coffee/tea and conversation anytime that is convenient.

We continue to add new photos to the two wall-mounted monitors in the hallway, and we have added a large, donated amethyst geode and a photo collage near the elevator to welcome visitors to the third floor of Science II. As an



outreach project, graduate students taking the “Early Life On Earth” course have redesigned the Mesozoic and Cenozoic fossil display on the third floor. Paleontology course students had previously redesigned the adjacent Paleozoic fossil display. Plus, we now have a **new drinking fountain** with filtered water refill station in the 3<sup>rd</sup> floor hallway. The water is drinkable again!

In addition to our large, student-designed, student built displays on the first floor of Science II, a collaborative effort with Kern County Mineral Society members focuses on the creation of a new display that focuses on the minerals of Kern County. Another display highlighting weather and climate will also be completed soon. Thanks to **Chris Krugh**, we have added several framed maps to the first floor hallways. Please drop by and visit our student-designed, student-built, educational outreach exhibits.

We are continuing to put together a 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.** As usual, we were very actively engaged in community outreach, and this year we put the mobile, augmented reality sandbox to greater use. This geology student-built sandbox uses X-Box and computer technology to project dynamic topography on sand contained in a wooden box. The colorful contours change automatically as you shift the sand with your hands. We also use the sandbox in course labs—it is a great tool to teach contouring concepts. If you haven’t experienced this sandbox, make a point to come by—it is AMAZING and FUN!

With guidance from **Elizabeth Powers** and **Chris Krugh**, students in the Geology Club were very active again this year. Students worked in a variety of settings, including CSUB outreach events and educational demonstrations in K-12 classrooms. Significant progress was made on a number of projects, and some of the highlights are included in other sections of this newsletter. We gave several tours of the Department this year, and visitors included several University donors, local geologists, members of the Keck Foundation, a Councilman and a Congressman (D. Valadao). Our seminar series, outreach displays, outreach events and Department tours are typically team efforts by geology faculty, staff and students.

**Coming Soon—The Magic Planet** Through funding from Chevron, NSME, the CSUB Dept. Of Geological Sciences and an IRA grant awarded to **Tony Rathburn**, the Head Room in Science I will soon have an exciting, new educational globe. Acquiring the Magic Planet is part of an effort to use 3-D visual technology and real data to help convey the concepts and relevance of Earth System Science to students of all ages. This 30-inch diameter globe is the same version that is used in many educational facilities and museums. Using 360-degree imagery of actual data sets, the globe transforms into a dynamic planet, capable of showing literally hundreds of global processes, from the spread of an infectious disease to atmospheric circulation to global changes in forest cover, to El Nino temperature variations, to plate tectonics, to ocean current patterns, and many others. The globe is not limited to Earth processes, as it can also be transformed into the moon or any planet in our Solar System. In addition, the Geological Sciences Dept. plans to make 3-D movies of field trips that can be shown on the globe. Geology faculty intend to incorporate the Magic Planet in both labs and lectures, and we anticipate that this globe will be a major educational facility, not only for CSUB faculty and students, but for visitors as well. We hope to have this amazing device installed in the Head Room (soon to be the “Globe Room”) sometime in the spring. Be sure to be on the lookout for an announcement of the arrival of this dynamic, Magic Planet.

**CSUB Geology Recognized in Money Magazine's "Best Colleges for Your Money 2018"** In Money Magazine's most recent ranking of America's 727 "Best Colleges for Your Money," the CSUB Dept. of Geological Sciences was singled out as having a "renowned petroleum geology program that readies students for the energy industry."

**Emergency Preparedness Event** This year, the Department's community engagement efforts added a major event to the list of Department accomplishments. In collaboration with the Kern County Office of Emergency Services and other County agencies, the CSUB President's Office and the Department of Geological Sciences hosted the first annual Emergency Preparedness Fair. The event was free and open to the public, and was held on the Don Hart Lawn East. **Chris Krugh** and **Tony Rathburn** worked on the initial negotiations and logistics, then **Elizabeth Powers**, **Chris Krugh** and the **Geology Club** set up Geology booths at the 2-day fair. This event, hosted for the first time by CSUB, had a broad array of hands-on exhibits that included the Fire Safe Trailer and the Quake Cottage (visitors experienced the shaking of a simulated earthquake). CSUB Geology's augmented reality sandbox and stream table were also big hits, both offering hands-on experiences where you can make it rain, create a stream, cause erosion, build and destroy a mountain, construct a dam and fill a lake. Emergency responders were there with emergency gear, including a helicopter, a fire engine, and SWAT and rescue vehicles. Food was provided by the Salvation Army, and the event featured over 20 booths, exhibits and demonstrations focusing on emergency preparedness and safety, and much more. The Red Cross, the Buena Vista Museum of Natural History and Science, and the Kern County Mineral Society were among those that had booths at the fair. The event was highlighted in TV and newspaper coverage.

This community-wide event was part of National Preparedness Month, and other events were held throughout the month as well. **Tony Rathburn** participated in a press conference held at the Kern

County Fire Department. Rathburn was also a participant in a live webchat panel with the Kern County Fire Chief, interviewed for local TV and quoted in the *Mountain Enterprise* newspaper. We are currently planning for next year's Emergency Preparedness Event on campus, which promises to be even bigger, with a wider variety of attractions. We hope to see you and your family there next September!

We want to continue our close connections between the Department (students and faculty) and alumni and local industries. We also want to increase student experiences in applied geology and professional development. If you, or someone you know, are interested in teaching a course, leading a field trip, giving a seminar, or giving guest lectures (geology, professional development, etc.) to our students, please let us know.

#### FACULTY AND STAFF NEWS

**Chandranath Basak publishes paper in *Science***  
CSUB Assistant Professor Chandranath Basak in the Department of Geological Sciences is the first author of a high-impact paper published in 2018 in the prestigious journal *Science*. The international, peer-reviewed journal *Science* is one of the world's top academic journals, with an impact factor of 37.205. This study by Chandranath Basak and his colleagues from Max Planck Research Group for Marine Isotope Geochemistry, University of Oldenburg, Germany, Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Germany and Lamont Doherty Earth Observatory, Columbia University provides direct evidence for a slow and layered deep ocean at the peak of the last glacial period, also known as the Last Glacial Maximum (LGM; ~21,000 years ago). Basak, the lead author of the paper said 'A slow ocean possibly helped in storing a lot of carbon in the deep ocean during this time period'. The LGM is a time when there was three times more ice on the continents than today. Since much of the water was stored as ice, the sea level dropped by about 120m. Global temperatures were about 4°C lower than today. Studies like the one published in *Science* will take us one step closer to

knowing the role of ancient oceans in Earth's dynamic history.

**Brian Pitts** was recognized by Antelope Valley students and Provost Jenny Zorn. Students indicated that **Dr. Pitts** is "terrific." They indicated that Brian values Antelope Valley students and provides them with a great experience—he is tough, but goes out of his way to help students learn the material.

**Katie O'Sullivan** was chosen as the NSME Rising Runner of the year. The Rising Runner program recognizes CSUB alumni of the last 10 years excelling in their work and giving back to their community. Each of the 4 schools at CSUB selects a Rising Runner, and these distinguished alumni participate in an awards ceremony and panel discussion with students. A 2007 CSUB geology grad, Katie worked at Occidental Petroleum, then earned a PhD at Notre Dame, interned at NASA and taught English in France before returning to CSUB as a Lecturer in Geological Sciences. At Notre Dame she worked on the petrology and geochemistry of moon rocks astronauts brought back from Apollo 12, the second manned mission to the moon.

For the rest of Katie's story, see: <https://www.csub.edu/alumni/AlumniNews/AlumniArchivedNews/2018/20180131-RisingRunnerKatieOSullivan.html>

## FACULTY AND STAFF

**Dirk Baron**, Professor Emeritus

Highlights in another year that went by way too fast were recognition with Pacific Section AAPG Distinguished Educator Award and my retirement this summer after 21 productive years at CSUB. In my last semester, I taught two of my favorite classes, Hydrogeology and the ever-popular general education Water and the West to great groups of students. Summer and fall saw two long-overdue successful MS Geology thesis defenses. Really appreciated the students' surprise going away party and slide show with pictures from my time at CSUB. I'll stay affiliated with the department joining Bob Horton, Rob Negrini, and Dr. Coash as Emeritus Professors of Geology. It

was fun to look back at my time at CSUB on the occasions of the AAPG Award and the students' slide show. I was lucky to have a great group of colleagues and support from the community. Seeing students and graduates succeed makes it all worthwhile. So stay in touch and keep us posted on your careers and accomplishments!



**Spring 2018 Pacific Section AAPG Convention**

**Janice Gillespie** Work continues apace on the Groundwater Monitoring Plan for California's SB4 (aka the fracking bill). However, these days I'm mapping protected aquifers from Utah where I get to look out at the red rock cliffs when I avert my gaze from the computer screen!

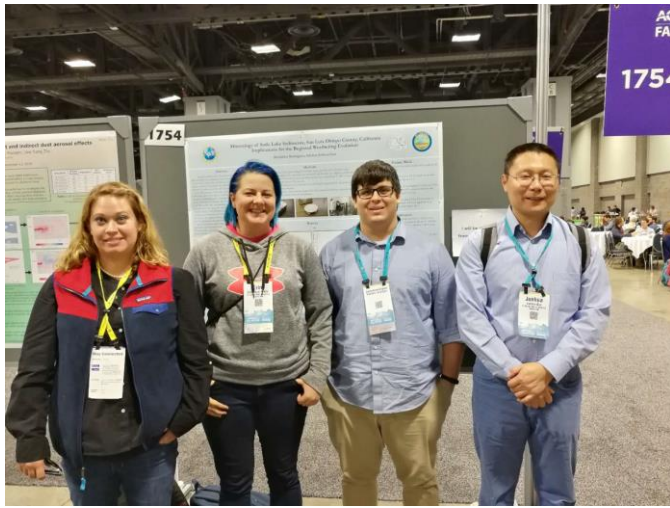


I've also been serving as a member of the Underground Injection Control Review Panel which should be bringing me to Bakersfield in late January. I was also honored to get the AAPG Division of Environmental Geosciences research award this year.

Looking forward to retirement in August!!!!



**Adam Guo** This year I taught undergraduate and graduate courses in my expertise as well as mentored several students. Two master students, **Nick Mitchell** and **Jeff Kimber**, defended their theses and graduated in the summer of this year. Currently, **Alex Rodriguez** continues working on the Soda Lake samples and is anticipated to defend his thesis work in the coming summer semester. He presented his partial results at the 2018 AGU Fall Meeting in Washington, D.C. This fall, a new graduate student, **Cindy Rodriguez**, joined my research group. Currently, she is working on her thesis proposal about the impact of wildfire on physical properties of slope soils. **Sade Haake**, **Obeyd Mohammadi**, and **Karla Lopez** all completed their thesis manuscripts and are expected to defend in the coming semester.



**2018 AGU Fall Meeting, with graduate students (from left to right) Maryanne Bobbitt, Erin Walter, and Alex Rodriguez in Washington, D.C.**

In the past year, my IODP post cruise studies yielded a few papers published in *Geosphere*, *Marine Geology*, and *Progress in Earth and Planetary Science*. **Nick Mitchell** and **Christine Pyle**'s thesis work have been submitted to research journals. This Fall, I started my formal AfricaArray Coordinator role and attended the annual meeting in Houston. Geology students, **Jesus Moreno** and **Janet Arroyo**, presented their project progress and results. This year, I also continued as the department seminar series coordinator.

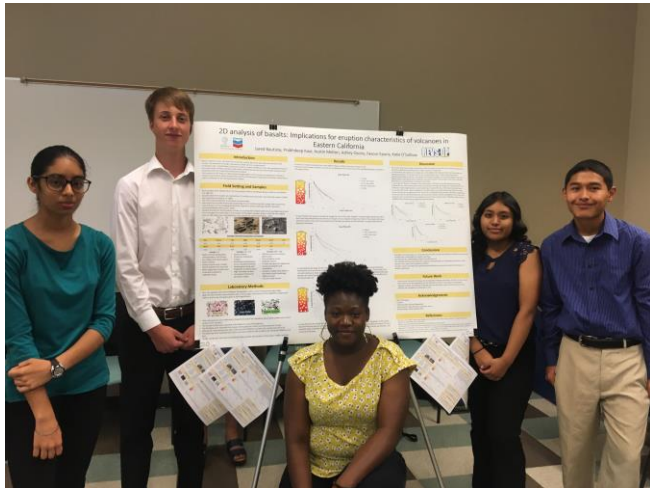
Yan and all children at home have been doing well. Three big sisters did a great job in school. Angeline was honored on the "Principal's List" and Alice was enrolled in the GATE program. They all enjoy mathematics, reading, and painting.

**Chris Krugh** A lot has happened this past year...my sixth at CSUB! I was awarded tenure, promoted to Associate Professor, and granted a sabbatical leave. I am currently using my sabbatical to wrap up a couple of research projects focused on landscape evolution in the southern Sierra Nevada. A portion of this work was recently published in *Geosphere* ([Krugh and Foreshee, 2018](#); open access...check it out!). Another area of research is aimed at constraining faulting and exhumation histories along the Sierra Nevada Frontal Fault Zone (SNFFZ). This work combines low-temperature thermochronometry (apatite (U-Th)/He and fission track dating) with quantitative stream profile analysis along the



Eastern Sierra escarpment. My research activities typically incorporate and expand upon research conducted by CSUB undergraduate and graduate students. I am excited to have additional students join my research group and I am currently working with several students to develop new research projects focused on the impact of wildfire, climate change, earthquakes, etc... on rockfall, landslide, and debris flow processes in the region.

**Katie O'Sullivan** This year I participated in the REVSUP summer program with 4 local high school students and geology major Favour Epuna. Our research was on the textural characteristics of the Cima Volcanic Field in eastern California and Virginia Rodriguez and I presented this research at the annual Geological Society of America (GSA) meeting this past November. Favour and I are continuing this research throughout this academic year.



**REVSUP participants presenting their research at the poster session. From left to right: Prabhdeep Kaur, Austin Melton, Favour Epuna, Ashley Osorio, and Jared Bautista.**

The Geology 2010 class had another fabulous trip to Zzyzx this year as well. We climbed sand dunes, explored lava tubes, and looked at some of the oldest rocks and fossils in California!

This fall I've had the pleasure of being part of a mentor group for girls at Buttonwillow Elementary School. This group is focused on providing STEM experiences to young girls and has been very rewarding for both the girls and the mentors.



**Katie O'Sullivan meeting Apollo 17 astronaut Jack Schmitt.**

At the GSA meeting I got to meet the only geologist to have ever walked on the Moon, Apollo 17 astronaut Jack Schmitt! He has been a hero of mine ever since grad school and we got to chat about lunar troctolites. These are very enigmatic rocks and I had the opportunity to work on one during grad school, so I thanked Jack for picking it up while he was up there!

**Tony Rathburn Department Chair** I am in my second year as Chair, and the past couple of semesters have kept me busy! I am so very grateful for the team spirit and help from Sue, Elizabeth, Chris, Adam, Chandranath, Liaosha, Katie, Larry, Pam, John, Dirk, Jan, Rob, and Bob. The fall semester was especially challenging, and everyone stepped up to help.

Highlights of 2018 for me included collecting research samples (seafloor cores, grabs and water samples) during three separate research voyages off the coast of San Diego. We took local teachers and CSUB majors and non-majors with us on these expeditions and worked closely with colleagues from the University of San Diego and Scripps Institution of Oceanography. In addition, I co-led a high school teachers' workshop in San



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CSUB Geology Club*



Diego. These cruises and workshop were part of our GEOPATHS project funded by NSF. Another highlight is our seafloor experiment project. In collaboration with Ashley Burkett, at Oklahoma State University, and Ken Smith at Monterey Bay Research Institute (MBARI), we have begun analysis of calcareous benthic foraminifera that colonized our small “cages” that had been on the seafloor off the Californian coast at 4000 m for a year. Some of the rather surprising results of this work were presented at the Fall Geological Society of America Meeting (GSA). A second set of experiments was deployed by MBARI’s remotely operated vehicle, and we plan to recover these “cages” next spring, after 18 months on the seafloor.



I wrote/co-wrote 4 successful grant proposals in 2018, two with colleagues in Brazil, a Keck Foundation Grant with Chandranath, and an internal grant that helps to fund our new, soon-to-be installed, Magic Planet (previously mentioned in this newsletter). I also published 4 research papers in 2018, two in *Scientific Reports (Nature Group)*, 1 in *Marine and Petroleum Geology* and 1 in *Frontiers in Marine Science*. Two of these papers focus on methane seeps (hydrates) and the other two deal with the micropaleontology of organic-rich, oxygen poor environments. Each of these publications included student co-authors. My teaching duties included historical geology and a course entitled “Early Life On Earth.”

Please let me know if you have suggestions for field trips to local fossiliferous outcrops.

**Chandranath Basak** It has been over a year already since I joined CSUB as an Assistant Professor. Time flies. This has been a very busy year with multiple research cruises to prepare for, research proposal and papers to write, students to advise, and classes to teach. I enjoyed every bit of it and more so because I am always surrounded by our wonderful students, faculty, and staff. As I am writing this blurb for the departmental newsletter, I am processing research samples in a moving laboratory onboard research vessel Thomas G. Thompson in the middle of the Indian Ocean. On this expedition, I am collecting seawater to study ocean chemistry, which can be used to study past climate change through Earth’s



history. I am excited to say that the voyage is going well with fair weather and lots of samples. You can learn more about the voyage and my experience in this blog (<https://basak-clim-chem.weebly.com>). Also glad to report that I have been selected to participate in a 2 months long research voyage next summer through the International Ocean Discovery Program. The summer expedition will take me to south Pacific. Although it took several years, we could finally publish our research about climate and oceanic changes that happened 21 thousand years ago in



the prestigious journal *Science*. Oceans cover 70% of Earth's surface, so changes that happen in the oceans are crucial for our beloved planet. If you are interested, you can find the original research paper in the February 23, 2018 edition of the journal.

I will be teaching two courses this spring. "Geological Oceanography" will be offered for advanced undergraduate students and "Climate of the Past" is a graduate level class that will cover Earth's journey through times - hot and cold.

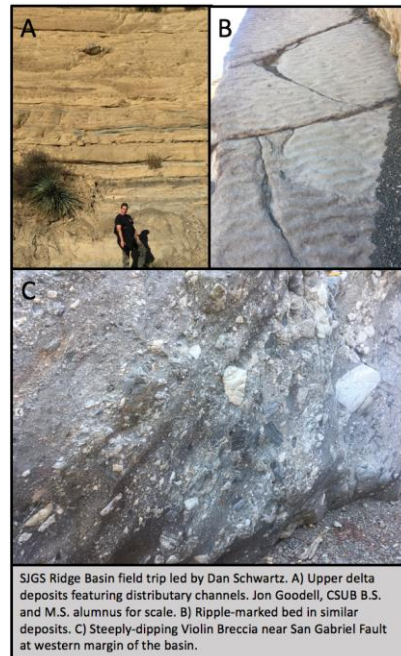
Our students have been hard at work creating new hallway exhibits featuring different aspects of Geology. So if you are in the area, please stop by to see these new displays. It would encourage our students, and we would also have an opportunity to meet you and know you.

**Rob Negrini**, Professor Emeritus.

For a retired academic, I had an appropriately productive (i.e., not *too* productive) year, by coauthoring two peer-reviewed articles. The first is, "Heaton et al., 2018. A Great Basin lake-level response to 38-34 ka Dansgaard-Oeschger oscillations", *J. Paleolimnology*, DOI 10.1007/s10933-018-0057-5". This article demonstrated that the Great Basin of the western U.S. responded to warm and cold temperature changes sourced in the North Atlantic region, with wetter and drier local climates, respectively. The article was by Eric Heaton, Greg Thompson, Dawn Fetzer, Negrini, Peter Wigand, Manuel Palacios-Fest, Roy LaFever, Anna Jacobsen, and Citlali Trigoso. Eric, Greg, and Dawn are all CSUB B.S. and M.S. alumni who now work locally in the local petroleum industry or regulatory agencies. Their M.S. Thesis research contributed directly to this article. Roy and Anna are professors from other departments at CSUB, and Citlali was a local High School student who is now at MIT that did some of the fundamental research for this article when in high school as part of the Chevron REVS-UP summer research program initiated by NSF funding procured by Professor Emeritus Dirk Baron. (Note: For a little self-deprecating humor regarding the *Journal of Paleolimnology*, please refer to the following: [www.cc.com/video-clips/nyextq/the-colbert-report-on-notice---journal-of-paleolimnology](http://www.cc.com/video-clips/nyextq/the-colbert-report-on-notice---journal-of-paleolimnology)).

The second article is: "Knott, J.R., Liddicoat, J.C., Coe, R.S., and Negrini, R.M., 2018, Radiocarbon and paleomagnetic chronology of the Searles Lake Formation, San Bernardino County, California, USA, in Starratt, S.W., and Rosen, M.R., eds., *From Saline to Freshwater: The Diversity of Western Lakes in Space and Time: Geological Society of America Special Paper 536*, p. 81–95". This publication provides further evidence that the magnetic pole wanderings of the 41 ka Laschamp paleomagnetic excursion (i.e., aborted reversal) reach the South Pole as opposed to the distinctly different, 34 ka Mono Lake excursion which has a distinctly different pole path that never travels very far south of the Equator. The article also concludes that the most recent highstand of Searles Lake occurred between 14 ka and 12 ka, at least 1,500 years prior to previously published estimates.

Although I didn't attend any society conventions this year, I did attend the wonderful field trip to the Ridge Basin put on by the San Joaquin Geological Society and led by Dan Schwartz, Ph.D. Among other highlights were the dramatically well exposed deltaic sand deposits including channel deposits and ripple marks from the uppermost part of the package (see photos A-C).



SIGS Ridge Basin field trip led by Dan Schwartz. A) Upper delta deposits featuring distributary channels. Jon Goodell, CSUB B.S. and M.S. alumnus for scale. B) Ripple-marked bed in similar deposits. C) Steeply-dipping Violin Breccia near San Gabriel Fault at western margin of the basin.

Other than professional activities, I've enjoyed the greater freedom to travel, hike and cross-country ski. Highlights include seeing the North Rim of the Grand Canyon for the first time. A two-mile hike from the road brought me to a spectacular overlook where Jana and I could see some of the campsites (Nankoweep and Unkar Delta) we used when we floated the Colorado River in 2009.

Because the North Rim is ~1,000 ft higher elevation than the South Rim you can commonly see the river, itself. We also do local hikes a couple of times a week such as Mt. Piños and the Mill Creek trail (see photo below).



That's it for this year. A couple of closing notes: 1. The SJGS field trip, remarkable as it was, was poorly attended. Of the myriad of CSUB alumni and students, only Jon Goodell, Greg Thompson, Lindsey Medina Thompson, and Matt Van Grinsven were present. Let's step it up RoadRunners! Perhaps more important, for all you alumni who are earning a good living, in part thanks to your CSUB Geology education, don't forget to give a tax-deductible donation, however small or generous, to the CSUB Geology Department. Make your check out to the Geology Department CSUB Foundation account TR036.

When I do it, I specify Student Research support in the subject field. Cheers and Best Wishes for 2019.

**Liaosha Song** I joined CSUB last August as an assistant professor. It took a while to settle down and get the class materials prepared. Thanks to the help from the staff and faculty members, everything is going well.



As a geologist, my research interests focus on 1) the nano-scale pore structure and storage capacity of unconventional reservoirs, 2) image analysis of scanning electron microscopy (SEM), computed tomography (CT) scanning, thin sections, core photos, and 3) well-log analysis and reservoir characterization. Prior to joining CSUB, I received my PhD degree in geology from West Virginia University. I also hold a BS degree in geology and an MS degree in marine geology from China University of Petroleum. My former research at West Virginia University EQT Corporation covered a wide range of stratigraphic disciplines in Appalachian Basin from Cambrian to Devonian.

Last semester I taught "Petroleum Geology" as well as "Dangerous Earth". This spring, I am teaching Well Log Analysis, and Principles of Geophysics (lead by Lisa Alpert). I am also teaching Subsurface Mapping of Petroleum

Reservoirs and Petroleum Prospecting Fall of 2019. In the future, I hope to develop courses related to reservoir characterization and image analysis.

My own ongoing research involves carbon dioxide sequestration, pyrite-hosted porosity and organic matter-hosted porosity in organic-rich shales, sequence stratigraphy of the Marcellus Shale, and characterization of unconventional reservoirs. I have submitted a proposal to American Chemical Society, and I am working on another proposal to National Science Foundation. Recently, a paper of mine has been accepted by AAPG Bulletin, titled: *An Efficient, Consistent, and Trackable Method to Quantify Organic Matter Hosted Porosity from Ion-milled SEM Images of Mudrock Gas Reservoirs*.

I am always looking for new projects to create opportunities for undergraduate and graduate research. Petroleum industry in Bakersfield has over one-hundred-years of history. I will bring in my knowledge on unconventional reservoirs. The goal is to add to the research productivity and funding at CSUB, and expand on the current research in unconventional and conventional reservoirs.

**John Yu** I initially became acquainted with the CSUB Geological Science Department through Dr. Rob Negrini, whom I met through his wife, Jana, at Bechtel 20 years ago. Since then, I have had the pleasure of working with Larry Knauer, meeting Dr. Janice Gillespie at various professional meetings and DOGGR, and befriending people such as Grant Obenshain, Zach Webb, Mario Ortiz, and David Kong at DOGGR. David Kong introduced me to Dr. Tony Rathburn, who invited me to be a part of the Department. I am grateful for the opportunity to be a part of CSUB's Geological Science Department and to continue working with my colleagues.

At CSUB, I am an affiliated scientist with the Geological Science Department, where I plan to work on cooperative research with other faculty.

I am also planning to teach a class on "Petroleum Reserves Estimation and Forecasting" in Fall 2019. Objectives of the course include learning how to use software to understand various compliant methods of preparing reserve estimates, learning to estimate and understand the impact of economics on those estimates, and properly



classifying those reserves using current reserve definitions. We will also discuss different types of

production forecasting methods. In the future, I also plan to teach a course called "The Life Cycle of an Oil & Gas Well," where students will learn how to build producing or injecting wells that comply with state regulatory requirements.

I am currently writing a second textbook on how to teach young engineers to use technology to comply with any state regulatory requirements. The first textbook has already been published in Chinese. A third textbook in English is planned to be written and published within the next 3-4 years.

**Sue Holt** This year has flown by with so many things happening in the Department. We've welcomed our newest faculty, Liaosha Song, we've enjoyed our Fall Colloquium speakers, several students defended their Master's theses, and as always, the department has been full of students studying, hanging out, and friendly laughter and camaraderie.





I enjoy my position in the department, as I assist students with all sort of problems, and, better yet, get to celebrate a multitude of accomplishments. As you read through this newsletter, you will get the sense of how many great things our students do and the well-deserved accolades they receive. I very much enjoy working with the faculty, lecturers, staff, and students in the department.

**Anna Soares-Cruz** I started as a visiting postdoctoral fellow in the Geology Department at CSUB, in the middle of August 2018, arriving from the Federal Fluminense University in Niterói, Brazil. I'm conducting research in paleoceanography together with Tony Rathburn and Chandranath Basak. I did my PhD in marine geochemistry and I'm working with ocean circulation changes during the last 40ka BP.



My ongoing research includes two big projects. The first focuses on the examination of neodymium isotopes in the water column and in coretop benthic foraminifera. This work involves research expeditions where water and sediment

samples are collected along a transect in San Diego, CA. I received a grant from the Brazilian government Agency (Capes), for this project, which allows me work here in CSUB. I also have two undergrad students, **Sarah Hughes** and **Bradley Squires**, helping me in this project.

In the second project we intend to map the Atlantic Intermediate Water geometry during the last 40 ka BP. The main objective of this work is to see how the vertical limit of water masses change during abrupt climate events. This big project involves 13 cores collected throughout the Brazilian Margin (Southwest Atlantic Ocean). Last semester, together with a team from Scripps Institution of Oceanography, I had the opportunity to go out to sea in a research ship (R/V R.G. Sproul), where we collected research samples and trained students. At the end of the fall, I was invited to give a lecture about my work here and part of my PhD thesis. What a great opportunity to share my research with all in the department!

I'm grateful I have met such kind and amazing people, who have made my stay at CSUB both pleasant and productive.

**Kathleen Madden, Dean of NSME.** It is a privilege to be the dean of the School of Natural Sciences, Mathematics, and Engineering at this exciting time in the school's history. With three new engineering programs, a new graduate nursing program, and growth in all of our science majors, enrollments are at an all-time high! Over the past three years, we've welcomed twenty-five new tenure-track professors (including three in geology), and we're currently running searches for seven more.



With all of this growth, we are busting at the seams, so the top-priority campus building project

is a new engineering building. Fund raising for this project is well underway. This building will free up space in the Science II building so that geology can stretch out a bit, and it will also house project-specific, interdisciplinary labs for all faculty and students.



This fall I am grateful to have been invited to join Dr. **Katie O’Sullivan’s** three-day Physical Geology course field trip. What an adventure! Kudos go to Dr. O’Sullivan for planning and implementing a great trip. It was fun to see the students’ excitement and enthusiasm grow with each fantastic stop. There were fossils, lava tubes, cinder cones, ancient lake beds, rock rainbows, anticlines, and synclines, so it is difficult to choose a favorite, but I think I have to go with hearing the sand “sing” on top of the Kelso Dunes. Amazing! And, thanks to the dedication of our professors, this field trip is but one example of the many field and research opportunities available to CSUB geology students!

It’s a great time to be at CSUB. Go runners!

**Jenny Grayson** Greetings geology alumni, students, faculty and staff! I am NSME’s new Pathways Outreach Coordinator. Before coming to CSUB, I worked with the U.S. Antarctic Program coordinating logistics for field research in Antarctica. Throughout my career I have worked with organizations such as the National Park Service, University of Alaska and the Alaska SeaLife Center in roles dedicated to outreach, communications and science. I am thrilled to be at CSUB where I am involved with all three!

For those of you who don’t know about Pathways, it is a grant-funded program focused on improving degree completion rates for underrepresented minority STEM students at CSUB. The program randomly selects a cohort of incoming freshman each year and supports them through workshops, advising, peer mentorship and more. The program is only in its second year, however, we are already seeing positive results!



As the Pathways Outreach Coordinator, I am expanding our focus to include transfer students. One of our initiatives is to make it easier for California community college students to transfer STEM credits to CSUB. Thanks to Dr. Rathburn, we now have 191 new agreements in place which will make it easier for geology majors to transfer their geology credits. Through these types of cooperative efforts, we are making CSUB a more transfer-friendly place and helping our STEM students graduate on time.

Looking back at 2018, a big highlight for me was attending a field trip to Zzyzx with **Dr. O’Sullivan’s** Physical Geology class. It was incredible to see the diverse geologic features outside CSUB’s back door. One of the things that filled me with awe was seeing and touching a rock estimated to be 2 billion years old. Over the course of the trip, I enjoyed speaking with dozens of geology students as well as several prospective transfer students from Bakersfield College. Get ready for the next generation of geologists! They are bright, talented and they reflect the rich diversity of our state.



## The California Well Sample Repository (CWSR)

The California Well Sample Repository (CWSR) is located on the south side of the CSUB campus. The facility was constructed in 1975 to be a publicly accessible library of geology 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 to be found elsewhere. Some, but not all, of the data in the facility is on its website at [www.wellsample.com](http://www.wellsample.com).

Volunteers from the CSUB 60+ Club have been donating their time to organizing the data at the facility since 1987. Enrolled geology students hired for very part time positions assist with the operation of the facility too.

Charles James holds the curator position overseeing the operation of the CWSR. The telephone number at the CWSR is 661-654-2324.

*Please consider donating to our established scholarships, establish a new scholarship, or donate directly to the department. Field camp expenses are a particular burden to students. Please help our students get the valuable field experience they need.*



**Volunteers and Warehouse crew: Jeffrey Buehler (student), Stan Jones (volunteer), Kim Jones (volunteer), Irene Randolph (volunteer), Bradley Squires (student), Lauren Little (student) Charles James (curator), Jamie Price (student), Jane Tsuda (volunteer), and Samuel McKinney (student). Not in warehouse photo is Christopher Moland (student).**

## DONATIONS

A new award has been established by the Kern County Mineral Society (KCMS) to recognize



**Stewart Harvin, CSUB Geology major with his award from the Kern County Mineral Society.**



CSUB Geology student achievements and to help students cover the costs of their required summer field camp course. Two awards of \$1500 each were presented to two CSUB Geology students, **Stewart Harvin** and **Virginia Rodriguez**, at an awards ceremony last spring. “The Kern County Mineral Society was established in 1935, by individuals who shared a common interest in collecting, displaying, and sharing their knowledge of rocks and minerals, while enjoying and preserving our great outdoors” said Ken Baird, KCMS President. He continued, “Our continued and undying interest in rock and mineral collecting has grown into encouraging and helping younger generation students in an earth science curriculum...” “Supporting CSUB geology students is now the most important thing that Kern County Mineral Society does...” said Steve Collett, Publicity Director for KCMS.



**Virginia Rodriguez, CSUB Geology major receiving her award from Ken Baird, President of the Kern County Mineral Society.**

CSUB Geology majors are required to attend an approved field camp during the summer of their junior or senior year. These five- to six-week long

field course experiences enable students to apply and hone their skills in remote regions to map geological features and determine the geologic history of these secluded environments. Field camps are coordinated and taught by experienced field geologists and often take place in isolated places in Utah or Montana, or in other countries. David Schaad, Educational Chairman of the KCMS said, “We at Kern County Mineral Society are excited to be able to support CSUB Geology Students towards their goal of work in some field of Geology.” At the award ceremony, CSUB Geology graduate student **Erin Walter** and CSUB Geology undergraduate **Michelle Nop** gave short presentations about their field camp activities, and highlighted the value and transformative nature of these immersive experiences. CSUB geology professor **Tony Rathburn** also gave a short presentation about the Geological Sciences Department. He said that, “Field experiences are critical for a geologist. He/she who sees the most rocks, makes the best geologist.”

Please donate and help our students. With dwindling state funds, an expanding number of majors, rising costs, and aging educational materials, it gets more and more difficult to provide the level of educational experiences to our students that we have been able to give them in the past. The rising costs of summer field camp (still required at CSUB) also makes it increasingly difficult for students to afford this valuable experience. If you are unable to give money this year, please consider donating “in kind” items that we can use or sell. **We can put your old car, boat, aquarium, or book, rock/mineral/fossil collection to good use, and you can also write this donation off on your taxes.** Call us to find out how to make an in-kind donation. We are in need of many new microscopes and also plan to resurrect our geotechniques facility in a suitable room with a sufficient number of appropriate computers. Recognition opportunities are available at CSUB. Talk with us about naming items, rooms or facilities in recognition of donors/businesses/loved ones.

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, Penn State/Africa Array, Pacific Section APPG, the San Joaquin Geological Society, and the Kern County Mineral Society.

### **Individuals**

Robert and Jana Negrini, the John and Mary Coash Family, Florn Core, 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**

**ZZYZX Field trip.** A total of sixty-two people participated on our annual 3-day trip to the Mojave Desert this year. Led by **Dr. Katie O’Sullivan**, geology lecturer and CSUB alumnus, the expedition exposed students and guests to a diverse array of geological features. Her leadership made this trip a very enjoyable, educational experience for everyone. CSUB NSME Dean **Kathleen Madden** and **Jenny Grayson**, CSUB NSME Pathways Outreach Coordinator, joined CSUB and BC geology students and faculty on a series of field trips based from the Desert Research Center (DRC), located at Soda Springs, on the western shore of Soda Dry Lake in the Mojave National Preserve. On DRC grounds you can still see many clues of what Soda Springs used to be used for by its former occupant, the health resort that was known as “ZZYZX.” Most people only know about ZZZYZX from a single exit sign on the road to Las Vegas, but to CSUB geologists it is a great base of operations to explore desert environments and discover the rich geological history of the region through hands-on experiences. Geology faculty discussed the natural history that could be explored at each field stop,

including the geologic evolution of the Kern River Gorge, the paleoecology of 300-million-year-old fossils from ancient tropical seas, the composition of volcanoes, lava flows and underground lava tube caves, the reasons for the accumulation of Kelso Dune sands, the events that caused Soda Lake to dry up, and the geologic processes that created the multicolored layers of Rainbow Basin. This year, this transformative trip was made possible through funding from the CSUB Geological Sciences Department, community donors and an Instructional Related Activities (IRA) grant awarded to **Chris Krugh**, Associate Professor of Geology.

### **Jesus Moreno received the PROUD award from the LSAMP Program for Outstanding Research in STEM and Service Leadership**

Jesus was one of only two geology students in the CSU System who received PROUD (Program Recognizing Outstanding Undergraduate Distinction) recognition this year from LSAMP (Louis Stokes Alliance for Minority Participation) Program). He was born of immigrant parents from Mexico and is the second of his siblings to attend CSUB. Originally pursuing a criminal justice degree, he saw the light and switched to geology after taking an earth sciences course at Bakersfield College. After transferring to CSUB, Jesus has been working for two years with **Dr. David Miller** on the provenance and



paleogeography of Cenozoic river systems in southern California. He has presented at Geological Society of America meetings, including as lead author on a study linking sedimentation in the San Joaquin Valley to plate tectonic interactions along the continental margin. Besides being a researcher, he participated as an intern in the Energize Colleges program on sustainability and energy conservation initiatives and the Edible Garden project at CSUB. He has been accepted into the Africa Array program, a five-week geophysical field study, at Penn State and Witwatersrand University, South Africa. He also produces a YouTube channel on geologic education, and is an officer in the CSUB Geology Club. Jesus attributes his successes to his older sister who exposed him to STEM-related subjects as well as to Dr. Miller and the supportive Geology Department at CSUB. Jesus hopes to attend graduate school after getting a B.S. in geology. He wants to encourage and excite young kids in STEM-related subjects just like his sister did.

**Salvador Vargas Receives Graduate Student-Faculty Collaborative Initiative Award** CSUB geological sciences graduate student Salvador Vargas recently received the 2018-2019 Research and Scholarship Award from the CSUB Graduate Student Center. His project, "Dissolved Rare Earth Elements Along Oxygen Gradient," examines Rare Earth Element (REE) dynamics along a redox gradient off the coast of San Diego. He is collaborating with his advisor, Dr. **Chandranath Basak**, assistant professor of geological sciences. "Mr. Vargas is working on an important and timely research topic," said Dr. Basak. Vargas is analyzing seawater samples collected off the coast of San Diego to determine the relationship between REE abundances and rates of dissolved oxygen. By comparing REE behavior in samples taken close to the coastline to those taken from the open oceans, he can better understand how REEs will be affected if oxygen levels decrease. The award provides \$1,250 for the student and \$250 for the faculty mentor.

**Jamie Price, CSUB undergraduate geology major, received a prestigious Eunice Miles**

**Scholarship**, covering full tuition for the Graduate Gemologist Program that Jamie will enroll in. This competitive, national Scholarship is named after Eunice Miles, the first female gemologist at the Gemological Institute of America (GIA) in New York. In the 1950s, Miles quickly gained a strong reputation in grading diamonds, and her development of an optical technique to detect diamond coatings solidified her as the "Grande Dame of Gemology." "We are very proud that Jaime has been honored with this highly regarded scholarship," said Tony Rathburn, Chair of the CSUB Geological Sciences Department. "It is wonderful that her accomplishments, passion for mineralogy, and persistence to overcome adversity have been recognized by this national scholarship program."

The 3-year **Geopaths Project** (described in the Grants section) involved students and teachers on 3 separate, 2018 research expeditions off the coast of San Diego. The first voyage in June was on the *R/V Sally Ride*, and the second two voyages were on the *R/V Robert Gordon Sproul* in July and September. Excerpts from press releases from the June and July cruises are included below.



**Salvador Vargas collecting samples on a Geopaths voyage aboard the *R/V Sally Ride*, the newest Scripps Institution of Oceanography research vessel.**



## **Hands-On Learning and Research on the High Seas: CSUB Students and Geology Professors Collect Samples from the Deep Sea**

The deep sea is the largest habitat on the planet, yet few land-dwellers get to see what lives in this remote environment. Through funding from the National Science Foundation, CSUB students accompanied CSUB Geology Professors **Tony Rathburn**, **Chandranath Basak** and research scientists from three other institutions on a research expedition to collect samples from deep-sea environments off the coast of San Diego. This voyage was an initial part of the scientific and educational research Geopaths project conducted in collaboration with co-principal investigators Professor **Dirk Baron** (CSUB), Professor Sarah Gray at the University of San Diego (USD) and Alexandra Hangsterfer and Professor Dick Norris at Scripps Institution of Oceanography (SIO). Students actively participated in the collection and preservation of research samples using state-of-the-art technology for 4 days and nights aboard the *R/V Sally Ride*. Named after the first American female astronaut and the youngest American to fly in space, the *R/V Sally Ride* is the most recent ship to be added to the American Research Fleet. This expedition also had educational research objectives, including assessment of the effectiveness of hands-on research experiences in recruiting and retaining geoscience majors.

“This was a great opportunity for students to sail on a research vessel, and experience what it is like to be a marine geoscientist,” said Rathburn, Chief Scientist of the expedition. “Students were treated just like every other scientist on board. They each had 8-hour watches during 24-hour operations, and hands-on responsibilities that required working both independently as well as with a team.” Students were mentored and trained on board by experienced research scientists, teachers and technicians from CSUB, USD, SIO and Oklahoma State University. The captain, crew and resident technicians provided students with safety training, tours of the ship, and knot-tying lessons. Together with students from the University of San Diego, six CSUB undergraduates and two graduate students worked side by side at sea with researchers to deploy and

recover research sampling devices, retrieve geological and biological samples, then preserve, archive and secure these samples for laboratory analyses on land.

Off the coast of San Diego, there is a region of water called the “Oxygen Minimum Zone” (OMZ) where dissolved oxygen in the water is significantly reduced compared to surrounding areas of the ocean. By sampling across the OMZ, the scientists want to learn how changes in oxygen availability in the water affects foraminifera (that become microfossils), and the sediments and geochemistry of their environment. Since OMZs are projected to increase in size with global warming and also serve as modern equivalents for organic-rich, petroleum-generating conditions, results from this study have a broad range of applications. **Sarah Hughes**, one of the CSUB undergraduate participants, said “Studying marine geology, biology, and ecology has been a dream of mine and it is now my reality. Because of this cruise, I have fallen in love with sailing for science and decided to make a career of it.”

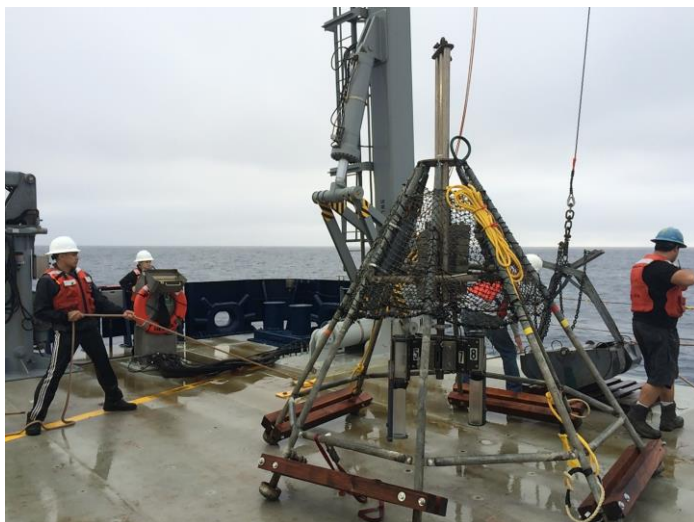


**CSUB undergraduate students Bradley Squires and Alejandra Ceja and CSUB graduate student Janet Arroyo (center) taking notes at the “command center” in the main laboratory on the research vessel *R/V Sally Ride*. Students were involved in all aspects of the science on board, including taking notes and making observations of data output from deployed sampling devices. Operated by Scripps Institution of Oceanography, the *R/V Sally Ride* is named after the first American female astronaut and the youngest American to fly in space (aboard Space Shuttle Challenger in 1983). Photo: T. Rathburn.**

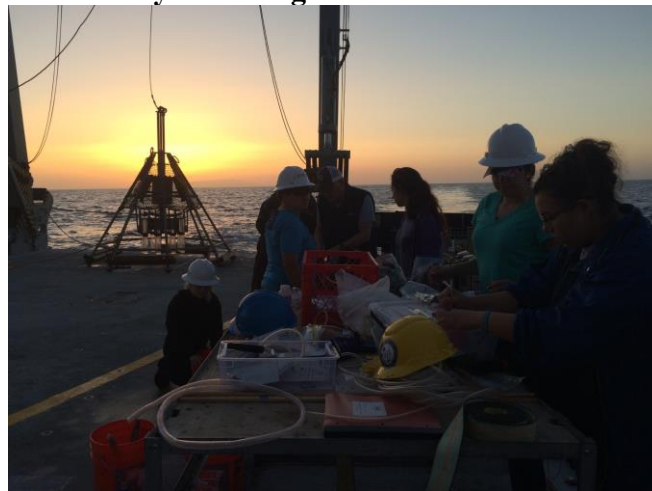
“Geoscience includes much more than just rocks. There is a wide array of exciting, well-paid job opportunities for trained geoscientists, including those that involve environmental science, oceanography, climate change and resource management. Participating on a research cruise is one way to see if a career in geoscience is right for you,” said Rathburn. “We are planning to take many more CSUB undergraduates and teachers out to sea on 6 more cruises over the next 3 years, and are looking for students and local science teachers to join us.”



**Undergraduates Emily Andrade (University of San Diego), Brandon Tamondong and Claudia Rios (CSUB) (left to right) examining organisms attached to a rock just brought up from the deep-sea floor. Samples like these will be used for geoscience research and educational activities. Photo: T. Rathburn.**



**CSUB undergraduate Sarah Hughes operates the movable A-Frame as CSUB undergraduate Brandon Tamondong holds the tag line in preparation for deployment of the grab sampler. Sampling equipment deployment and recovery are some of the many hands-on activities that students experienced aboard the research vessel, *R/V Sally Ride*. Student researchers, along with geologists, paleontologists and geochemists will study samples from this voyage in order to assess the influence of changes in dissolved oxygen availability in the region. Photo: T. Rathburn.**

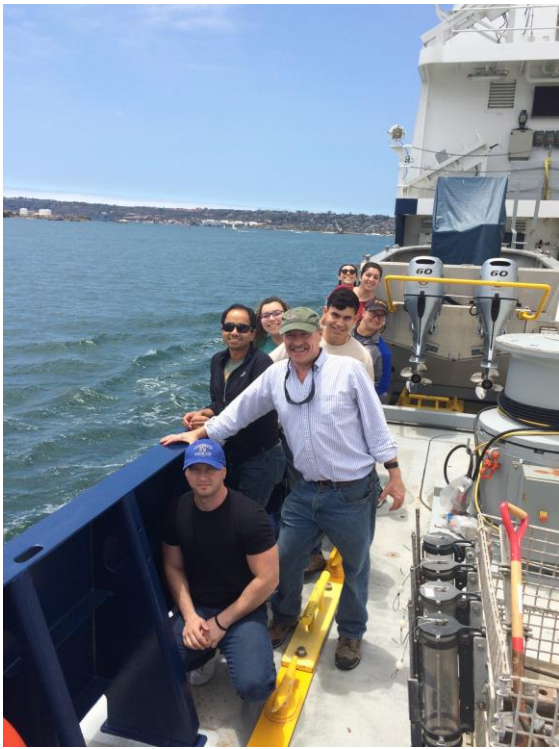


**Together with Professors Ashley Burkett (Oklahoma State University) and Keith Macdonald (University of San Diego), students from CSUB and USD sample seafloor sediments at dawn on the deck of the R/V Sally Ride sailing off the coast of San Diego. The multicorer shown in the background collects seafloor surface muds using 8 clear tubes. Left to right: CSUB undergraduate Sarah Hughes, Professor Ashley Burkett (OK State), Professor Keith Macdonald (USD), and undergraduates Angela Klemmedson (USD), Claudia Rios (CSUB), and Emily Andrade (USD). Photo: T. Rathburn.**



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and follow our  
adventures and  
accomplishments.  
CSUB Geology Club*





Scientists and students sailing aboard the *R/V Sally Ride* off San Diego. Front to back: Jesus Robles (CSUB graduate student), Dr. Tony Rathburn (CSUB Geology Professor and Chief Scientist), Dr. Chandranath Basak (CSUB Geology Assistant Professor), Salvador Vargas (CSUB undergraduate), Emily Andrade (USD undergraduate), Dr. Ashley Burkett (OK State Geology Assistant Professor), Claudia Rios (CSUB undergraduate) and Alejandra Ceja (CSUB undergraduate).



The science party on the bow of the *R/V Sally Ride* in San Diego.

## Teaching on a Floating Laboratory: Local High School Teachers and CSUB Students Sail with Scientists on the High Seas

Off the coast of San Diego, Kern County high school teachers and CSUB students actively helped scientists collect and process water and seafloor samples as part of a series of research and educational expeditions funded by the National Science Foundation (NSF). Eight CSUB undergraduates, one CSUB graduate student, and three local high school teachers accompanied CSUB Geology professor **Tony Rathburn** and Assistant Professor **Adam Guo** for hands-on training in marine science on board the *R/V Robert Gordon Sproul*, a Scripps Institution of Oceanography research ship. Five of these participants also stayed for the post-voyage teacher workshop held in San Diego. This research project is conducted in collaboration with CSUB geology Assistant Professor **Chandranath Basak**, Professor Sarah Gray at the University of San Diego (USD) and Alexandra Hangsterfer and Professor Dick Norris at Scripps Institution of Oceanography (SIO). Retired Geology Professor **Dirk Baron** was also a Co-PI on the NSF grant.

During the research cruise, students and teachers were treated as full-fledged scientists, trained in safety procedures and ship operations, and were actively involved in all aspects of the science activities on board. **Bradley Squires**, a CSUB undergraduate, said that his participation on the voyage "... has made available new avenues that I never even knew existed before, and has definitely affirmed my choice to become a geoscientist." Another CSUB undergraduate who participated on the expedition, **Ariel Espindola**, indicated that "This cruise catalyzed a desire in me to explore additional prospects in scientific research as a student."

High school teachers **Roberto De La Rosa** (Centennial High School), **Marc Halling** (Frontier High School), and **Lonnie McConnel** (Bakersfield High School), and **Brandon Tamondong**, an undergraduate who wishes to become a science teacher, not only participated on the expedition, but also attended the post-voyage



teachers workshop in San Diego. “Never in my wildest dreams did I ever think I would be working hands on with some of the most advanced scientific equipment...” said Brandon. “I can honestly say that being on the *Sproul* was definitely a game changer for me...” Immediately after working side-by-side with marine scientists on the voyage, the three Kern County teachers, Emily Cullen (a pre-service teacher from USD) and Brandon joined seven San Diego high school teachers who had also participated on the research voyage, to work together in a workshop for the purpose of creating classroom lab activities that are based on samples, data and observations collected on the research voyage. These educational lab modules are designed to engage and excite students by using real data and real materials, in hands-on activities, to learn scientific concepts. Professors Gray and Rathburn, along with SIO Collections Manager, Alex Hangsterfer, led the workshop.

“Participating on an exciting research voyage, and then brain storming with a diverse array of experienced teachers and scientists provided an ideal combination to generate innovative educational modules” said Rathburn. “It was inspirational to see workshop participants work together to turn exciting ideas into engaging activities.” These modules, once tested in the classroom, will be made available upon request to high school and university instructors around the country. CSUB has introduced a Geological Oceanography course that will incorporate real data and seafloor samples in classroom and lab activities. More ocean-related courses are planned, including those that potentially involve participation on a research expedition.

There are a wide range of exciting, well-paid career opportunities in geoscience, including those in fields such as environmental science, oceanography, climate change and resource management. **Emily Oliver**, a CSUB undergraduate, remarked “Going on this research trip as an undergraduate was a great opportunity to see and experience what possibilities I have going into the field of geology.” She also appreciated being treated as an equal scientist on board, saying

that “I loved having this opportunity to be treated and working as a true scientist on this voyage and I look forward to exploring more of the geological field and the possibilities it has to offer.” Four to six more voyages are planned over the next two years, and each trip will take many more CSUB undergraduates and local teachers out to sea. Active participation on a marine research ship is one way to find out if a career in geoscience is right for you.

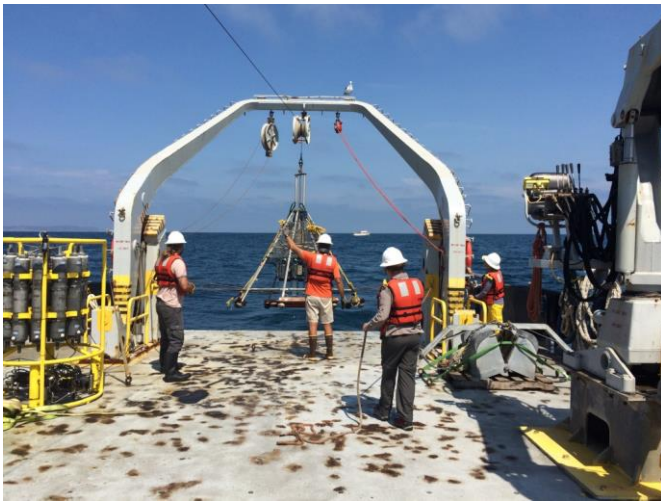
To learn more about the Geopaths project go to: <https://scripps.ucsd.edu/projects/geopaths/>  
For more information: contact Tony Rathburn, CSUB Dept. of Geological Sciences, [arathburn@csub.edu](mailto:arathburn@csub.edu).



**CSUB undergraduate student Emily Oliver learns how to tie knots from Scripps Institution of Oceanography technician Doug Penny on board the R/V Robert Gordon Sproul.**  
**Photo: T. Rathburn.**

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**Frontier high school teacher Marc Halling (left), together with Emily Cullen, a preservice teacher from San Diego, hold the tag lines, while a University of San Diego student operates the A-Frame, to actively help deploy the multicorer as Doug Penny, a Scripps Institution of Oceanography Resident Technician (hand raised), directs the operation. The teepee-shaped multicorer is used to collect cores of sediment and microfauna from the seafloor. Photo: T. Rathburn.**



**Above: At the GEOPATHS teachers workshop at Scripps Institution of Oceanography, high School teachers from Bakersfield and San Diego, along with CSUB geology major, Brandon Tamondong, developing lab activities that use real data and samples from the ocean. These lab activity modules, once tested in the classroom, will be made available upon request to high school and university instructors around the country. Photo: T. Rathburn.**



**(left to right) CSUB Geology Assistant Professor Adam Guo looks on as Brandon Tamondong (CSUB undergraduate geology major) and Jeanette Lopatka (science teacher, Cathedral Catholic High School, San Diego) and CSUB undergraduate Lizbeth Rios sample seafloor sediment cores collected from 300m water depth off the coast of San Diego.**



**During a tour of the local geology, University of San Diego Professor Sarah Gray (Co-PI of the project) explains the geologic history of the cliffs along La Jolla Shores. Left to right: Sarah Gray, and Kern County high school teachers Marc Halling, Roberto De La Rosa and Lonnie McConnel. Photo: T. Rathburn.**

## **CSUB students and Faculty Receive Awards at the American Association of Petroleum Geologists Meeting in Bakersfield**

Bakersfield Spring 2018

Two CSUB Geology Faculty and six CSUB Geology undergraduates were honored at the annual convention of the Pacific Section of the American Association of Petroleum Geologists (PSAAPG) held at the Marriott Convention Center Hotel here in Bakersfield. Geology Professor Dirk Baron received the Distinguish Educator Award for distinguished and outstanding contributions to geological education and counseling of students. Karen Blount, part-time lecturer in geology at CSUB, and a high school teacher at Highland High School, was presented with the Teacher of the Year Award for her dedication to student education. CSUB Geology alumnus Anne Draucker received the Service Award in recognition of singular and beneficial long-term service.

In addition, Six CSUB Geology majors received Martin Van Couvering Awards from the PSAAPG. CSUB undergraduates Stewart Harvin, Zachary Webb, Austin Fowler, Kalvin Katipunan, Gabriela Navarrete and Kenneth Watson each received this long-standing award. The Martin Van Couvering Award was created in 1972 and is given to worthy geoscience students. Students received free registration to the convention (\$50 value), an invitation to the All Convention Luncheon (\$50 value), and a check for \$100.

CSUB geology students and faculty also won awards from the Pacific Section, SEPM, the Society for Sedimentary Geology for their presentations at the PSAAPG Conference. Undergraduate geology major Sam McKinney (with CSUB Geology undergraduate co-authors Jeffery Buehler and Kenneth Watson, and their advisor, CSUB Geology Lecturer David Miller), won the John Cooper Memorial Award (and \$500) for the best undergraduate poster presentation in sedimentology/stratigraphy. The research poster was entitled “Using size and shape characteristics to differentiate between beach and fluvial conglomerates in Cenozoic Tecuya and Kern

River Formations, Southern San Joaquin Valley, CA”. CSUB Geology Graduate student Nick Mitchell was given the 2018 Patrick L. Abbot Memorial Award for the best poster presentation in sedimentology/stratigraphy by a graduate student. His poster was entitled “Mineralogical and Geochemical Characterization of the Miocene-Oligocene Santos shale, Southern San Joaquin Valley, California” (co-authored by his thesis advisor, Geology Associate Professor J. Adam Guo).

The Geology Dual-Credit Program and The Geological Sciences Department combined to have a very popular Exhibit Hall booth that included the Department’s new, student-built, Augmented Reality Sandbox. The conference enabled students and faculty to reunite with the numerous CSUB Geology alumni in attendance, and to network with local and regional geoscience professionals and companies.

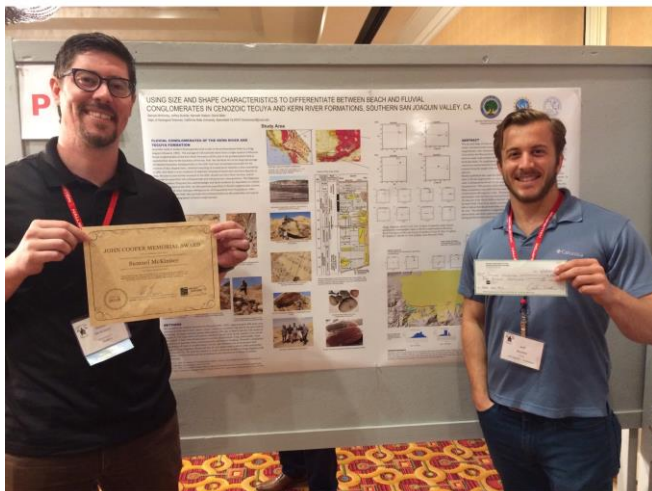
Several CSUB geology students and faculty also gave research presentations at the Convention. CSUB Geology graduate students Sade Haake (co-authors Geology Professors J. Adam Guo and W. Chris Krugh) and Karla Lopez (coauthors Geology Professors J. Adam Guo and Dirk Baron) each presented a research poster. CSUB Geology Professor Jan Gillespie was co-author of four papers while Geology Professors Junhua Adam Guo coauthored three papers and Dirk Baron, David Miller and William Chris Krugh each coauthored a paper. See photos on following page.

***Field trips and research experiences for students are made possible through grants, and your donations. Help us continue to deliver valuable field and lab experience to our students. PLEASE DONATE (see last page of this newsletter for details). Thanks!***





**CSUB graduate student Nick Mitchell with his 2018 Patrick L. Abbot Memorial Award for the best graduate student poster presentation in sedimentology/stratigraphy (Co-author, CSUB Geology Assistant Professor, Dr. Adam Guo).**



**Undergraduate geology major Sam McKinney (left) with CSUB Geology undergraduate co-author Jeffery Buehler won the John Cooper Memorial Award (and \$500) for the best undergraduate poster presentation in sedimentology/stratigraphy (co-authors Kenneth Watson and their research advisor, CSUB Geology Lecturer Dr. David Miller).**

**CSUB GEOLOGY STUDENTS INVITED TO VISIT UNITED STATES GEOLOGICAL SURVEY WELL DRILLING PROJECT IN THE VALLEY** March 20, 2018 Through collaborative efforts with the United States Geological Survey (USGS) and the generosity of their drilling team, CSUB hydrogeology students and faculty were invited to examine an active well drilling program currently underway in the Central Valley. **Kalvin Katipunan**, a CSUB undergraduate geology major, remarked, "The field trip to visit the USGS Well Site in Lost Hills was a wonderful experience. It was great to see Geologic fundamentals put into practice."

The USGS is the technology lead in implementing the State Water Boards' Oil and Gas Regional Groundwater Monitoring Program. The program is supported by the California State Water Resources Control Board, The U.S. Bureau of Land Management, and the USGS. A group of 27 students in the department's Hydrogeology class and three CSUB Geology faculty and staff visited the drill site on March 13, 2018. The two USGS geologists in charge of the project gave an overview of the drilling project, drilling and sampling methods, geophysical logging, and their findings to date. **Zachary Webb**, a CSUB geology major and intern at the Division of Oil, Gas, and Geothermal Resources (DOGGR), said that he was grateful to "... have the opportunity to connect classroom applications to a real world setting..."

The well is one of several planned wells designed to help us learn more about the aquifer in the San Joaquin Valley and to monitor the effects of oilfield activities on the aquifer. This well was drilled to a depth of 1860' and will eventually be able to continually monitor and sample four different parts of the Tulare aquifer near the Lost Hills oilfield. The greater than usual depth of the well will allow us to determine the depth to the base of the protected water within the aquifer—defined by the US EPA as any water less than 10,000 ppm salt (about 1/3 the salinity of sea water). Although water with salinity greater than about 1500 ppm is not typically used for irrigation or drinking, this water is more easily desalinated

than the more saline water in the ocean and is a resource we may be able to use during extended droughts. **Austin Fowler**, a CSUB geology student, said that “The opportunity introduced real world applications which helped visualize the procedure and types of equipment that is needed for the water well.”



**CSUB hydrogeology students listen as a member of the United State Geological Survey well drilling team explains operations at the Lost Hills well site.**

Several CSUB Geology students have recently worked as interns with the USGS, and CSUB Geology Professor, Jan Gillespie is on leave, working closely with USGS hydrogeologists. As a result of this close association, the CSUB Department of Geological Sciences has an ongoing MOU with the USGS, providing a base of operation for three USGS hydrogeologists (see story on page 1). In return, these geologists provide a valuable resource for students and projects.

**CSUB Geology Students Receive Awards From Professional Organizations May 2018** — Students from California State University, Bakersfield were recognized at the San Joaquin Geological Society’s annual “CSUB Night”. Several students were presented with 2018 summer field camp scholarship awards to reimburse them for costs associated with attending a summer field camp. **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 typically a 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 experience.

“The required summer field camp is a culminating experience, with hands-on, field-based activities that can’t be duplicated in the classroom.” Anthony Rathburn, Professor and Chair of Geological Sciences at CSUB, said, “We sincerely appreciate the opportunities and funding that local organizations make available to our students”

“These scholarships recognize the hard work of our students and significantly help with the cost of attending field camp.” - William C. Krugh, Assistant Professor of Geology at CSUB

The following CSUB students each received **\$1000 scholarships from SJGS and AAPG** for 2018:

Virginia Rodriguez  
Steward Harvin  
Rick Fewtrell  
Mario Ortiz  
Jacob Jackson  
Grant Obenshain  
Ethan Sarti

In addition, the San Joaquin Valley Petroleum Institute announced the CSUB student recipients of the **San Joaquin Valley Petroleum Institute Scholarship**. This scholarship was established by the San Joaquin Valley Chapter of the API to support CSUB students pursuing studies related to the petroleum industry.

**2018 Award Winners:**  
Erin Walter  
Stewart Harvin  
Zachary Webb  
Michael Juybari-Johnson  
Virginia Rodriguez

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 2018:

**Dr. John and Emily Coash:** Dr. John Coash, Dean Emeritus of the CSUB School of Arts and Sciences, along with his wife Emily, established this scholarship in support of undergraduate or graduate-level students majoring in either Geology or Nursing.

**2018 Award Winner: (\$810)**

Zach Levinson

**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.

**2018 Award Winners (\$500 each):**

Favour Epuna  
Jacob Jackson  
Mario Ortiz  
Morgan Kayser

**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.

**2018 Award Winners: (\$600 each):**

Christopher Richardson  
Erika Woods  
Ethan Sarti  
Favour Epuna  
Gabriella Navarrete  
Grant Obenshain  
Jacob Jackson  
Kalvin Katipunan  
Mario Ortiz  
Morgan Kayser

Rick Fewtrell  
Salvador Vargas  
Stewart Harvin  
Virginia Rodriguez

**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.

**2018 Award Winners: (\$500 each)**

Bradley Squires  
Ariel Espinola

**Herman W. Weddle Scholarship:** This memorial scholarship was established by James Weddle in honor of his father, Herman Weddle, a geologist, to support Geology majors working on well core or well samples.

**2018 Award Winners: (\$525 each)**

Grant Obenshain  
Mena Moerike

**Chevron Scholarship for Outstanding Geology**

**Students:**

**2018 Award Winners: (\$ 2500 each)**

Megan Varga  
Zachary Webb

**CSUB Geology Students Honored with Awards from the CSUB School of Natural Sciences, Mathematics, and Engineering May 2018 —**

The School of Natural Sciences, Mathematics and Engineering Scholarships awarded the following 2018 Awards to CSUB Geology Majors:

**Dr. Ed. Sasaki Scholarship:** Awarded to a worthy student majoring in Biology, Pre-medicine, or Nursing, Mathematics, or Physical Sciences such as Chemistry, Geology, and Physics.

**2018 Award Winner:**

Bradley Squires



**Kegley Family Merit Scholarship: Merit Awards to students enrolled in sciences.**

**2018 Award Winner:**  
Bradley Squires

**Theodore Decker Scholarship:** This scholarship was established by Jack Decker as a memorial tribute to his son. Must be a major in physics, computer science mathematics, geology/geophysics, chemistry or engineering.

**2018 Award Winner:**  
Megan Varga

**Fairie Decker Scholarship:** This scholarship was established by Jack M. Decker in memory of his wife, Fairie Decker, to assist CSUB students preparing for careers.

**2018 Award Winners:**  
Mary Guenette  
Rick Fewtrell  
Jacob Jackson

**Jeanette Haskin Scholarship:** This scholarship was established by Jeanette Haskin to award Women majoring in Science.

**2018 Award Winner:**  
Maryanne Bobbitt

**CSUB Student Research Competition, Physical and Mathematical Sciences**

**Research Presentation 2018 Award Winner:**  
Sade Haake

**Poster Presentation 2018 Award Winner:**  
Sade Haake

**Outstanding Graduate Student in The Department of Geological Sciences**

**2018 Award Winner:**  
Sade Haake

**Outstanding Undergraduate Student in The Department of Geological Sciences**

**2018 Award Winner:**  
Zachary Levinson

**\*Outstanding Undergraduate Student in CSUB School of Natural Sciences, Mathematics, and Engineering:** Presented to the most outstanding undergraduate student in the School.

**2018 Award Winner:**  
Zachary Levinson

Join the CSUB Geology Club site on Facebook to keep up on club activities, and job and scholarship opportunities. Mark your calendars for the **Geo Club BBQ March 8, 2019 at Lengthwise Brewery on District Blvd at 6pm.**

**ALUMNI NEWS**

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



**Join us on Facebook on the CSUB Geology Club page.**

**CLASS OF 2018 BS**

Deandra Alvear, William Ballard, Israel Cruz, Carlos Enrique-Villagas, Stewart Harvin, Diana Hernandez Garcia, Nathan Hobbs, Craig Hulse, Calvin Katipunan, Trevor Miller, Gabriela Navarrete, Michelle Nop, Jonathan Pineda, Luis Poire, Zach Wolpe, and Dylan Young earned their BS degree.



*Spring 2018 Undergraduate Commencement*

**Karol Casas, Morgan Kayser, Jacob Jackson, Mena Moerike, Grant Obenshain, Mario Ortiz, Toni Ramirez, Alejandro Rodriguez, Cindy Rodriguez, Ethan Sarti, Salvador Vargas, and Erin Walter** earned their BS degree and are in the Master's Program at CSUB.

**Janet Arroyo** and **Laura Estenssoro** earned their BS degree and are in the Master's Program at Cal Poly Pomona.

**Zach Levinson** earned his BS degree and is in the Master's program at Sacramento State University.

**Tony Gallagher** earned his BS degree and is now in the Master's Program at University of Alaska Anchorage.

#### **CLASS OF 2018 MS**

**Nick Mitchell** and **Christine Pyles** both completed their Master's degree.

Also earning their Master's are:

**Bibi Tan** who is a Geologist with E&B Natural Resources Corp.

**Jason Cotton** who is a Geology Analyst with Berry Petroleum Company.

**Charlie Gomes** works with Division of Oil, Gas, and Geothermal Resources.



*Spring 2018 Undergraduate Commencement  
l to r: Dr. Chris Krugh, Virginia Rodriguez,  
and Dr. Tony Rathburn. Virginia was awarded  
scholarship to 2 graduate school and is in the  
process of making her decision.*

*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.*



*Brandon Tamondong's photo won first place in the Department photo contest. It is displayed along with second and third place photos in the Student Tutoring and Learning Center.*

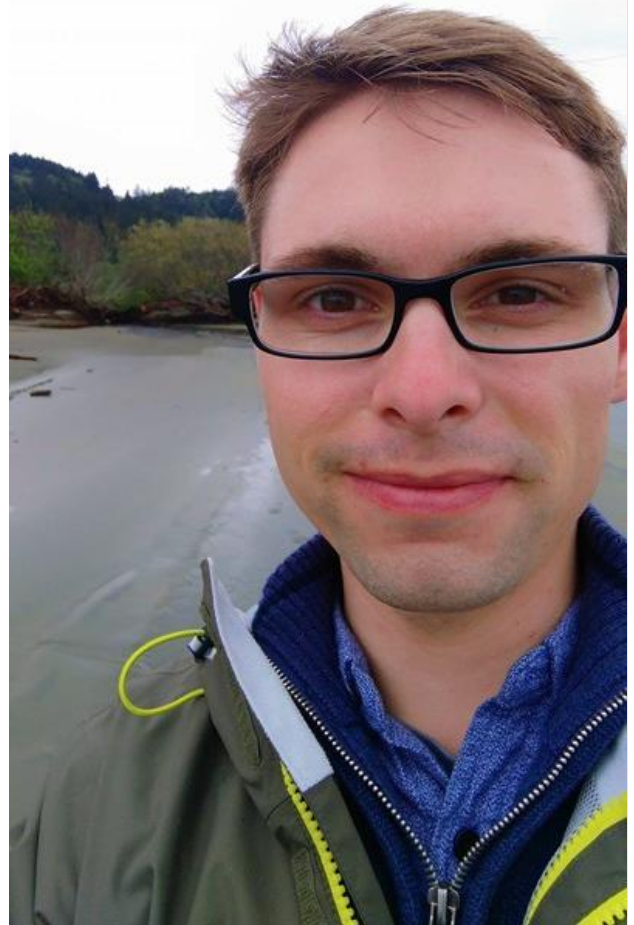


## Alumni Profiles:



California State University Bakersfield has given me an amazing opportunity to be able to continue pursuing my dreams in geology. I was able to work in the field for most of my thesis project, which is what I love to do. I received a fellowship through the Center of Research Excellence in Science and Technology (CREST), as well as a grant through the National Center for Airborne Laser Mapping (NCALM). I worked with very bright-minded, determined students who were very encouraging. The professors and staff really do care about your day to day success as well as future successes. Because of my time at CSUB I am now a Ph.D. student.

Abigail (Abby) Martens, class of 2017



The Geology department at CSU Bakersfield provided me with a quality education, access to highly qualified instructors, and numerous opportunities for financial assistance. I feel confident in my understanding of the field as I start my Master's degree this Fall!

Darby Scanlon, Class of 2017







# 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. 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.

## Thank You!

Return to the address on the back of this page, to the attention of Tony Rathburn.

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Affiliation (if applicable):

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Address

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City, State, Zip Code:

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Email

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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**

On March 8<sup>th</sup>, Lengthwise Brewery was once again the setting for the Geology Club BBQ. There was a very successful turnout with 90 tickets sold. The Club put on a great feast followed by a presentation of beautiful engraved mugs to the faculty and staff. Please think about joining us next year, the BBQ funds the Club's spring trip each year.



*Above are current undergraduates, Master's students, and Master's graduates who are now working in industry positions.*



**California State University, Bakersf  
Department of Geological Sciences  
66 SCI  
9001 Stockdale Highway  
Bakersfield, CA 93311**

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