# Earth & Planetary Sciences at UC Santa Cruz

## Fall 2021

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# Chair's welcome

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**& Amy Kornberg**
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Greetings, alumni and friends of the department!

I hope 2021 has been treating you well. The past year has been one of challenges, as all of the staff and faculty in EPS have been putting in extra effort to sustain our high-quality research, teaching, and mentoring, while at the same time dealing with disrupted work environments, lack of child care, and other pandemic-related difficulties. But things are improving and we've been enjoying a return to face-to-face interaction thanks to mandatory vaccination and mask wearing, which have allowed us to have a safe and mostly in-person fall quarter. We're also looking forward to even more personal contact in the winter, as the large classes also transition back to face-to-face instruction. Being back in the classroom and making connections with students has been so rewarding this fall.

That's not to say that everything will go back to exactly as it was in the "before times…" The forced innovation from remote teaching has revealed some new approaches that instructors will integrate into their classes, even as we return to teaching in-person. It's safe to say that our department seminar series will have a mixture of in-person and remote speakers moving forward, which allows us to invite exciting speakers from far-away places without breaking the budget! We're also planning to hold more online alumni events in the future, to stay in touch with those of you who aren't AGU attendees, including one this winter (rest assured, we'll still hold the AGU alumni receptions as well!).

Speaking of AGU, although the meeting is likely to be smaller than normal, there will still be a strong contingent from UCSC and we look forward to seeing you there if you're attending. Be sure to stop in at our alumni reception in New Orleans to catch up with friends and colleagues! I was at the GSA meeting in Portland last month, and it was fantastic to bump into alums and hear about their successes.

We have some of our own successes to celebrate as well. Terry Blackburn and Xi Zhang both received tenure, and we held an in-person celebration outside at Harvey West Park – the first time that many of us had seen each other in person for more than a year.

Margaret Zimmer received a NSF CAREER grant and Thorne Lay was awarded the Royal Astronomical Society gold medal in geophysics, while Emily Brodsky won the Price Medal, also from the Royal Astronomical Society. Ian Garrick-Bethell was invited to participate as a project scientist

# Chair's welcome - continued

on the Korea Pathfinder Lunar Orbiter mission, exploring how the moon sustained a magnetic field in its early history. As usual, the EPS department continues to rake in the accolades!

We also love hearing about your accomplishments, so thanks to all who shared updates for this newsletter. This year's issue has a bumper crop of alumni news, so make sure to read through to find out what your friends and classmates have been up to. As always, we're pleased to share the latest news from the department, and I hope this newsletter brings back fond memories of your time at UCSC.

Best wishes,

Matthew Clapham


Adina Paytan Lab Halloween Party 2021

# Department News

Margaret Zimmer

Emily Brodsky

Jasmeet Dhaliwal

**Prof. Margaret Zimmer** received a Faculty Early Career Development (CAREER) Award from the National Science Foundation (NSF) to support her research on the role of Earth's subsurface in regulating the water cycle.

**Prof. Emily Brodsky** was awarded the 2021 Price Medal of the Royal Astronomical Society in recognition of her outstanding multi-disciplinary contributions to earthquake mechanics, frictional behavior, and rock-fluid interactions.

**Postdoctoral Scholar Jasmeet Dhaliwal** was awarded an American Association of University Women (AAUW) 2021-22 American Fellowships.

**Prof. Thorne Lay** was awarded the Gold Medal (Geophysics) from the Royal Astronomical Society in recognition of his outstanding work in seismological analysis, which has had an exceptional impact on our perceptions of the structure and dynamics of the Earth.

**Researcher Adina Paytan** received a Fulbright Award in Marine Resources.

**Prof. Ian Garrick-Bethell** and **Researcher Mikhail Kreslavsky** are among the nine participating scientists who will join the Korea Pathfinder Lunar Orbiter (KPLO) mission science team.

Alumna **Kathy Sullivan** (B.S Earth Sciences 1973) was appointed to President's Council of Advisors on Science and Technology (see page 22).

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GEODES Geoscientists Encouraging Openness & Diversity in the Earth Sciences


**GEODES is a student-run discussion group that aims to promote communication and diversity within the EPS Department. In 2016 GEODES received the Chancellor's Achievement Award for Diversity**

Thoughts from GEODES…

Greetings from GEODES! Whether you interact with GEODES as an attendee, a supporter, or someone who only reads about us in the newsletters, we want to thank you for your continued support of GEODES. We are especially grateful for the chance to interact with the department in person once again, and we look forward to hosting more events geared toward community building, professional development, and raising awareness of issues facing underrepresented minorities in the geosciences.

Our department, like many geoscience departments across the country, faces issues related to Diversity, Equity, and Inclusion (DEI). AGU's 2018 demographic data show that ~44% of students identified as female and ~1% chose "Prefer Not to Answer" (the lack of the term "non-binary" or other alternative options is common throughout the data). These numbers drop as experience increases (women make up ~36% of early-career, ~26% of mid-career, and 15% of experienced members). Data on race/ethnicity of minoritized AGU members are harder to come by, though it is worth noting that a 2018 study by Bernard and Cooperdock, published as a Nature Geoscience comment, found only 6% of geoscience Ph.Ds from 1973 to 2016 were awarded to Underrepresented Minorities (URM; this includes Hispanic or Latinx, Black, and Native American individuals).

Other metrics of diversity are harder to quantify, given that religion, sexual orientation, disability status (among others) are "invisible" identities. This is all the more reason why GEODES, the DEI committee, and the UCSC URGE (Unlearning Racism in the GEosciences) pods want to work with members of the department to increase awareness of issues facing minoritized groups so that we might find a solution, or at least take steps to improve the inclusiveness of our department.

In the past, GEODES has hosted events such as a Queers and Allies Mixer, Research mixer events, and workshops on Imposter Syndrome, Work-Life Balance, and Grad School as a First-Gen student. More recently, we have focused our energies on a few topics, of which we are particularly proud:

- Two workshops on Explicit and Implicit Bias and Microaggressions with Dr. Teresa Maria Linda Scholz, UCSC's Chief Diversity Officer with the Office for Diversity, Equity, and Inclusion. Dr. Scholz's workshops teach folks how to spot these biases and what we can actually do to combat these biases when we encounter them, and we look forward to having this discussion with the EPS community.
- A presentation by Dr. Rebecca Hernandez of the American Indian Resource Center titled "American Indians 101", which provided a brief education on tribes, reservation, California Natives and current issues facing American Indians. GEODES will host a follow-up presentation by Dr. Hernandez this fall.
- Workshops for undergraduate and graduate students on topics such as CV writing or preparing for the qualifying exam. We plan to host more professional development events this upcoming year including a workshop on applying to graduate school.

We in GEODES hope to continue to provide events like these for the department, but we know we have more work to do and that we cannot do it alone. We are always open to feedback and ideas for future events!

Love,

GEODES

# Success in Learning and Understanding GeoScience
# Geopaths

UC Santa Cruz GEOPATHS is an NSF-supported initiative to improve student success in the Earth and Planetary Sciences (EPS) department, driven by a national initiative to broaden participation in the geosciences (IUSE: GEOPATHS).

UC Santa Cruz GEOPATHS is particularly focused on increasing student academic support, facilitating meaningful research opportunities and building a sense of belonging within the EPS community.
Academic support will be facilitated through small cohort learning communities that build necessary skills for geoscience careers. Research opportunities will be supported via paid summer internship matching and community building will be encouraged in the GeoLounge (coming soon), a student space reserved for academic and professional development.

The following undergraduates will be presenting posters at 2021 AGU on their summer internship experience and the ones with an asterisk received an AGU Student Travel Grant! Additionally, I will be presenting a talk on the development and management of the internship program. Elizabeth Brown also presented a poster at a USGS conference on her summer research.

- Ariel Santero*
- Efrain Ruiz*
- Elizabeth Brown*
- Mia Alonso*
- Gracie Creed*
- Nicole Yerena*
- Jordan Vena*
- Connor Roebuck
- Ben Pritkin
- Melinda Martinez
- Max Maier
- Antonio DeWitt-Hernandez
- Jeff Bordiga
- Sarah Groff
- Alexandra Herrera
- Ani Chaudhary
- Jami Clayton
- Jennifer Overklift
- Michael Redmond
- Dylan Elliot
- Clara Stanbury
- Raymond Hess







# Brief Updates from EPS Faculty

**QUENTIN WILLIAMS**

Quentin escaped from the thankless job of being UCSC Acting/Interim Graduate Dean (no happy graduate student, or happy advisor, *ever* meets with the Graduate Dean).

Alumni update: He hired Kat Armstrong (Geoslug class of '08) after her Ph.D at U. Bayreuth in Germany, and some time at UC Davis, as a beamline scientist to work at the Advanced Light Source at Lawrence Berkeley Labs.

**THORNE LAY**

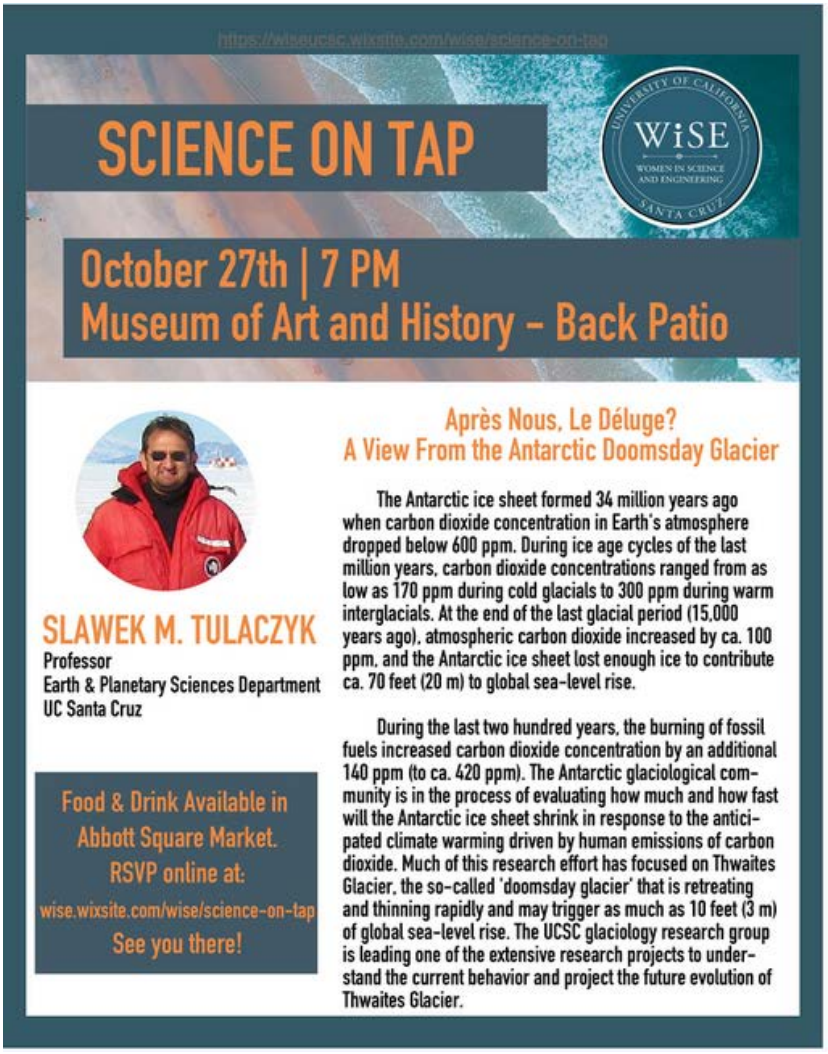
Thorne Lay engaged in studies of recent large earthquakes along the Alaska Peninsula, South Sandwich Islands, Kermadec and the Loyalty Islands. He also has focused on excitation of far-field tsunamis from earthquakes beneath a continental shelf, such as off of the Alaska Peninsula. Thorne also received the Gold Medal for Geophysics from the Royal Astronomical Society.

**PATRICK CHUANG**

Just before the pandemic, Patrick's research group participated in a large international field project based in Barbados studying trade cumulus clouds. The response of these clouds to greenhouse warming is a primary determinant of future warming, but currently they are neither well-understood nor accurately quantified in climate models. They also recently wrapped up a study of particulate emissions from power plant cooling towers, which found that they are significant emitters of small particles, but actually scrub larger particles from the atmosphere. The findings are relevant to a possible switch from freshwater to saltwater in dozens of California power plants.

**SLAWEK TULACZYK**

Sarah Neuhaus defended her glaciology Ph.D. in summer 2021, and Lili Callahan completed a senior thesis (Physics B.Sc.) based on Antarctic data. The pandemic disrupted Slawek's Antarctic field research. The big glaciological project that he is leading was supposed to have two austral field seasons in 2020-21 and 2021-22 on Thwaites Glacier, which is known in the media as the 'Doomsday Glacier.' These seasons have been delayed, but, in the meantime, he used the lull in field data collection to do exciting and productive research with Dr. Terry Blackburn and his students, Gavin, Graham, Jessica, and Sophia. Thanks to them, this problematic year worked out better than he expected.



# Brief Updates from EPS Faculty - continued

**MARGARET ZIMMER**

Between COVID-19 restrictions and wildfires, the 2020-2021 academic year was eventful for the UCSC Watershed Hydrology Lab. One of their main research field sites burned down in the August 2020 SCU lightning complex, which caused research delays due to needing to re-instrument the site. Luckily, they were able to secure two NSF RAPID awards and an NSF GLD award to study the impacts of wildfire on important watershed processes. This has produced some exciting research findings and new collaborations with colleagues near and far!

**MATHIS HAIN**

Mathis Hain has been building the Earth System Biogeochemistry learning community with graduate students from across EPS and Ocean Sciences. After the last year had forced much of their interactions on-line they are now looking forward to making use of their new lab space in EMS116, Casey Moore's former Structural Geology lab. The space is now fitted with workstations, meeting table, projection system and a growing reference library covering scientific programing, oceanography, geochemistry, physical chemistry, climate science, geology and Earth history. By fostering interdisciplinarity, collaboration and community they have supported each other in advancing their scholarship, learning both technical and professional skills. The group's cutting-edge research in topics such as global element cycles, the fertility of the ocean, and Earth's carbon budget at the end of the last ice age led to two successful and one pending NSF Collaborative Research grants with colleagues at UCSC and other institutions.

**XI ZHANG**

Nick Zube and Diana Powell successfully defended their Ph.D. dissertations in spring 2021. Nick became a data scientist in the industry. Diana went to Harvard University as a Hubble postdoc fellow and will become an assistant professor at the University of Chicago in 2023. Nina Robbins Blanch completed her senior thesis with honors in the physics department and went back to Europe for a master's program. Taylor Duncan moved to Canada to a Ph.D. program. A new postdoc, Kazumasa Ohno, came from Japan and joined Zhang's group. Most of the theoretical research on planetary atmospheres in the group were not significantly affected by the pandemic. Postdoc Xinting Yu did need to go to campus several times a week to complete her lab experiments. The experiments went well and produced very interesting results. Xi's group has made good progress in developing several state-of-the-art planetary atmospheric models and published good papers. In general it was a productive year

**ANDY FISHER**

Andy spent a LOT of time moving courses online: making dozens of virtual-lab videos, recording presentations, coding HTML, meeting on Zoom, and answering questions on Slack. He and his group ran simulations of hydrothermal circulation below Earth's seafloor and in the seafloor of ocean worlds, ran lab and field experiments to enhance managed recharge (improving water supply and quality), and ran California's first "recharge net metering" program. G. Gorski finished his Ph.D, and E. Boseman-Ahmet, E. Goad, and J. Flores finished B.S. projects and degrees. The current hydrogeology group includes five Ph.D. students (Andy is also co-advising two others), one Specialist, and three undergraduate researchers.

# Brief Updates from EPS Faculty - continued

**SUSAN SCHWARTZ**

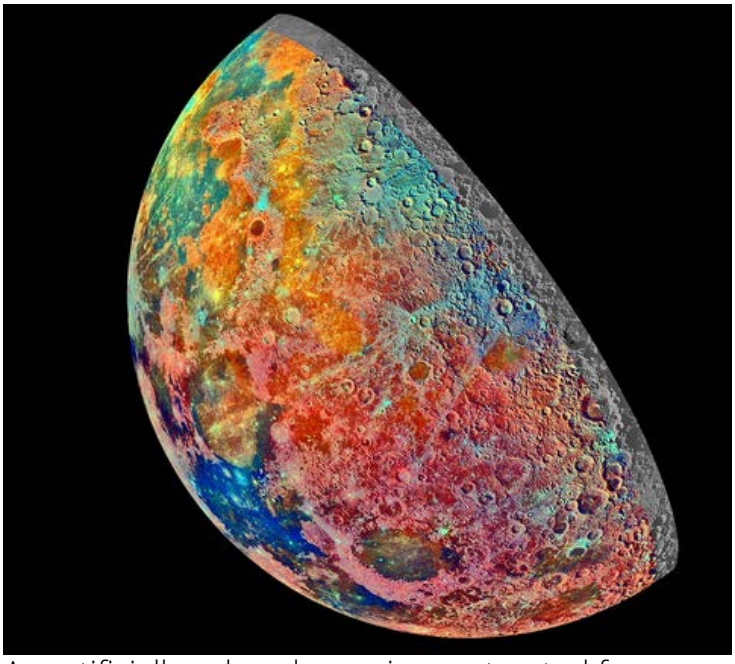
The 2020-21 academic year was challenging for everyone and research activities in Susan's group slowed but did not halt. With regard to graduate students, Travis Alongi published a manuscript suggesting that the southern Cascadia margin is likely locked to the trench, Heather Shaddox published a paper on afterslip and slow slip on the San Jacinto Fault in southern California, defended her Ph.D. and moved on to pursue an NSF postdoctoral fellowship at UC Berkeley. Em Schnorr kept seismic instruments running on a slow- moving landslide in the East Bay to investigate seismicity and possible temporal variations in seismic velocities accompanying motion. Susan continued to work on data she helped collect during the Alaska Amphibious Community Seismic Experiment in 2018-2019 to better understand the earthquake behavior at the Alaska/Aleutian convergent margin.

**TERRY BLACKBURN**

This past year, Terry's research group has been investigating how subglacial precipitates—sub-ice accumulations of calcite or opal-- record the response of polar ice sheets to past climate change. Geochronologic and geochemical characterization of these samples reveal that changes in subglacial water chemistry are correlated in time with ocean temperature. Working with EPS glaciologist Slawek Tulaczyk, they show that subglacial water chemistry changes with ice sheet thickness and that ice sheet volume is controlled by the ocean temperature abutting the polar ice sheet. Terry also enjoyed the challenge of renewing one of EPS core curriculum classes EART 110A, Evolution of Earth.

**IAN GARRICK-BETHELL**

Earlier this year, Ian was selected as a NASA Participating Scientist on South Korea's first mission to the Moon, the Korea Pathfinder Lunar Orbiter (KPLO). For the next few years, he will be helping the Korean magnetometer team interpret their measurements of magnetic fields near the Moon. The Moon no longer possesses a dynamo and global magnetic field, like the Earth, but there are records of its dynamo field stored in crustal magnetic anomalies spread across its surface. KPLO's measurements will provide insight into how exactly these crustal magnetic anomalies formed, and the history of the Moon's dynamo. The mission launches in August 2022 and arrives at the Moon in early 2023.

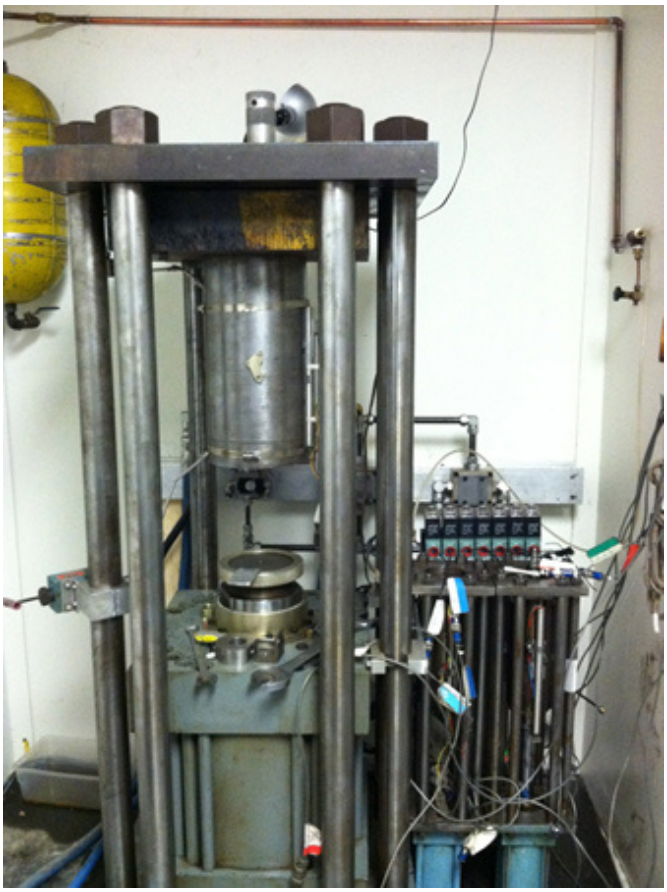


An artificially colored mosaic constructed from a series of 53 images taken through three spectral filters by Galileo's imaging system as the spacecraft flew over the northern regions of the Moon on 7 December 1992. The colors indicate different materials.

# Brief Updates from EPS Faculty - continued

**HEATHER SAVAGE**

This year, after some COVID-related delays, the rock mechanics lab finally had our new triaxial deformation apparatus installed. With this machine, we will be able to explore friction of rocks at pressures and temperatures that are relevant to the conditions under which earthquakes get started and propagate. We are putting the new machine to immediate use, looking at frictional properties of rocks from Oklahoma that have failed during induced earthquakes, as well as investigating the properties of fault rocks from subduction zones.



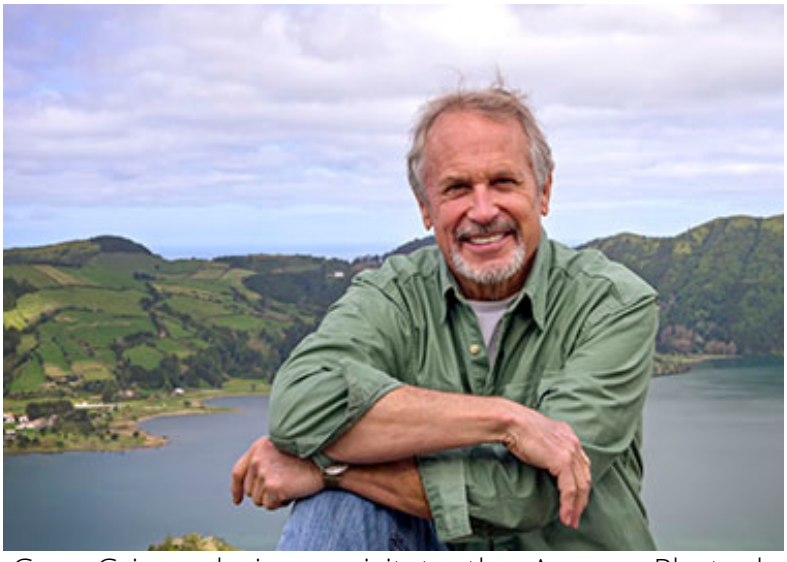
The triaxial deformation apparatus uses a confining medium (kerosene or argon) to apply a uniform pressure around a sample. The hydraulic ram can then apply a differential stress. Intensifiers control the confining pressure as well as the pore pressure within the sample.

**NOAH FINNEGAN**

Over the last year, my research focused on exploring how past land-use practices are recorded by river channels (with Ph.D student Will Chapman), how deformation and groundwater flow are coupled in large landslides (with Ph.D student Colleen Murphy), and what determines the lifespan of fault crossing river channels (with Ph.D student Kelian Dascher-Cousineau). During the pandemic, in addition to teaching my own classes online, I also honed my skills as a facilitator of virtual elementary school (for kindergarten and third grade). I kept sane by exploring the fantastic geology of the Sierra Azul via both road and mountain bike.

**GARY GRIGGS**

This fall Gary started his 54th year of teaching at UCSC, but has no plans to retire, although he has discovered a number of his former graduate students and undergraduates have retired. He also realized that his first students from the late 1960s and early 1970s are now in their early 70s, and has for some time been told by students in his large oceanography class that their mother or father, or both, took his class. Several years ago, for the first time, a student told him that her grandmother had taken his class. Gary recently finished his 13th book (The Ominous Ocean- Rogue Waves, Rip Currents and other Dangers Along the Shoreline and at Sea) that will be out in the Spring.



Gary Griggs during a visit to the Azores. Photo by Deepika Shrestha Ross.

# Brief Updates from Current Graduate Students

**Travis Alongi**

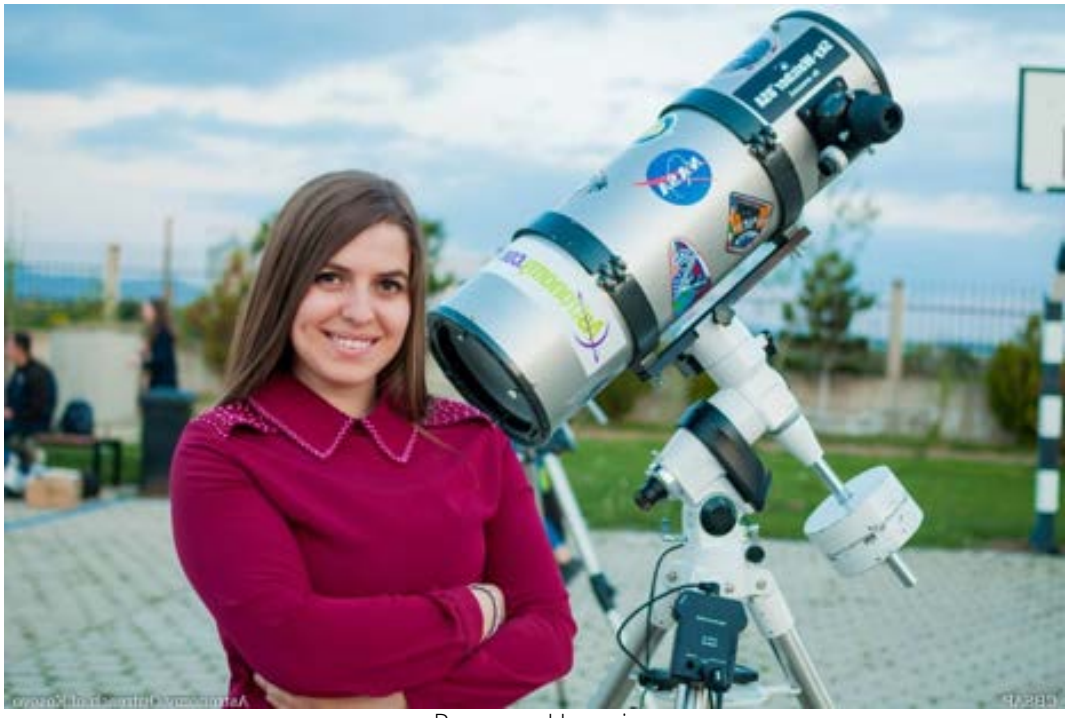
In the seismo-lab we had two people who recently earned their Ph.Ds: Dr. Heather Shaddox and Dr. Ricky Garza-Giron.

These folks defended ouside the Earth & Marine Sciences Building to a live audience as well as broadcasting the whole thing over zoom. We set up a big screen TV outside along with 30 chairs. The presentation was projected onto the TV and live streamed over zoom. The Ph.D. defenders used wireless microphones, a camera, and clicker to control and project the presentation via zoom. There were up to 80 people watching via zoom and around 30 in person. These are the largest overall turnouts for defenses that I've ever seen, it was really spectacular.

**Pranvera Hyseni**

Pranvera Hyseni is a graduate student from the Republic of Kosovo, pursuing a master's degree in Earth and Planetary Science. She is the founder of Astronomy Outreach of Kosovo (AOK) - the largest astronomy outreach program in Eastern Europe. AOK reaches over 25,000 people every year, and thanks to this work, Hyseni was chosen as one of the five most influential women in Kosovo.

Recently, Hyseni was involved in the provisional discovery of a new main belt asteroid while participating in one of the International Astronomical Search Collaboration's campaigns. Using special software called Astrometrica, designed to find dim moving objects between images taken minutes apart, she was able to process raw image data provided by PanSTARRS automated telescope operated by the University of Hawaii. Once an object is found, its precise ephemeris can be checked against the global database of minor planets kept by the Minor Planet Center at the Smithsonian Astrophysical Observatory to determine if it is a known object or a potential new discovery. Over the course of one month, she and her astronomy partner, Hap Griffin, found 27 objects not already in the database. Of those, 10 met the criteria for further study. In July of this year, she was notified that one of the 27 reported objects was verified to be a new asteroid and was given a preliminary designation 2020 SS13. Hyseni is eager to pursue her interests in solar system research and astronomy outreach.



Pranvera Hyseni

# EPS Research

## Model reveals interactions between rivers and fault lines

EPS Graduate Student and Faculty created a model that uses the movement at fault lines to understand river flow and vice versa

As tectonic plates slip past each other, the rivers that cross fault lines change shape. The shifting ground stretches the river channels until the water breaks its courses and flows onto new paths.

In a study published July 8 in Science, researchers at UC Santa Cruz created a model that helps predict this process. It provides broad context to how rivers and faults interact to shape the nearby topography.
The group originally planned to use the San Andreas fault in the Carrizo Plain of California to study how fault movement shapes the landscapes near rivers. But after spending hours poring over aerial imagery and remote topographic data, their understanding of how the terrain evolves began to change. They realized that rivers play a more active role in shaping the area than once thought.

“The rivers are their own little beasts, and they interact in really interesting ways with the kinematics and the motion along these faults,” said Kelian Dascher-Cousineau, seismology Ph.D. student at UC Santa Cruz and lead author on the study.

As the offset of a fault grows, it elongates river channels and slows the flow of water. With lower speeds, the river carries less sediment. The material builds up and eventually chokes the path, forcing the water to change course in a process known as avulsion. This diversion happens rapidly, and the unexpected flooding can easily become destructive for nearby communities.

Over the last few years, geomorphologists have gained a clearer idea of how these avulsions happen in different types of rivers. But identifying long-term patterns in the way that rivers respond to fault movement still proves challenging.

In California’s Carrizo Plain, many stream channels are offset by movement along the San Andreas Fault. A new interpretive framework helps explain how stream channels and fault movement interact to shape the topography of the landscape. (Photo by John Wiley)

“You can’t really observe channels for thousands of years at a time,” said Dascher-Cousineau. To make up for that inability, the researchers used the well-studied past of the San Andreas Fault at the Carrizo Plain to test their model.

“We have a history that we actually know really well from the earthquakes, and we can use that as a natural experiment to see what the channels are doing over these geomorphologically relevant timescales,” said Dascher-Cousineau.

The group closely examined images and maps of the Carrizo Plain and began testing complex models of river flow and sediment transport. They slowly removed variables, eventually identifying the most important elements in the system. The resulting model introduces a new framework for thinking about how rivers and active fault-lines interact.

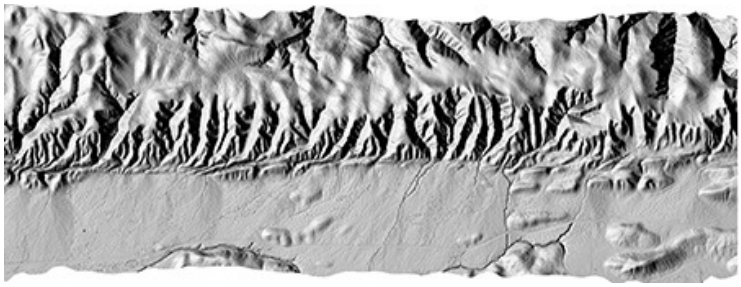
# Fault Lines & River Flow Model - continued

"Most seismologists typically have a view that the surface of the Earth is a passive thing that just responds to the faulting," said Noah Finnegan, professor of Earth and planetary sciences at UC Santa Cruz and co-author on the study.

"This paper embraced the fact that rivers are constantly changing and was able to show that the coevolution of the fault-offset and the river provides us with information that we weren't able to get previously," he said. "You get a richer understanding of how the system works by recognizing that there's an interesting coupling going on there."

In addition to predicting when fault-crossing rivers will abandon their original channels, the model can also help scientists estimate how quickly the sides of a fault are moving past one another—an important question to many seismologists that can be difficult to measure accurately.

"If you know something about how the river works, you can get quantitative constraints on the rate of slip on the fault, which is something that is a common goal of studies of faults," said Finnegan. "Alternatively, if you know something about the rate at which the fault is slipping, you can learn something about how efficient the river is at moving sediment, which is a basic question in almost every study of rivers and is almost impossible to know in a really accurate way."



This aerial image of the San Andreas Fault in the Carrizo Plain shows numerous curved drainages where fault slip has stretched stream channels to the left. Eventually, the channels get 'reset' when water overtops the channel to flow straight across the fault again. (Image credit: Kelian Dascher-Cousineau/B4 Lidar Project)

Although it addresses complex questions, the model itself is surprisingly straightforward.

"Like with a lot of discoveries, once you see it in the right way, there's incredible simplicity," said Finnegan. "I'll never look at these landscapes in the same way again."

The group created the model while working entirely virtually—a challenge that Finnegan said inspired creativity.

"We were forced to look at remote topographic data and aerial imagery that made us think in a more synoptic way about this," he said.

How the model will fit different regions and the fault at a larger scale remains to be seen.

"We've outlined the set of physics that should operate in one range of conditions," said Dascher-Cousineau. Next, they will turn their focus to new types of topography.

Emily Brodsky, professor of Earth and planetary sciences at UCSC, is also a coauthor of the paper, in addition to Dascher-Cousineau and Finnegan. This research was supported by the NASA FINESST fellowship and the Southern California Earthquake Center.

# EPS Research

## Haziness of exoplanet atmospheres depends on properties of aerosol particles

A laboratory study, by EPS Postdoctoral Scholar and faculty member, of haze particles produced under different conditions helps explain why some exoplanets may be obscured by hazy atmospheres

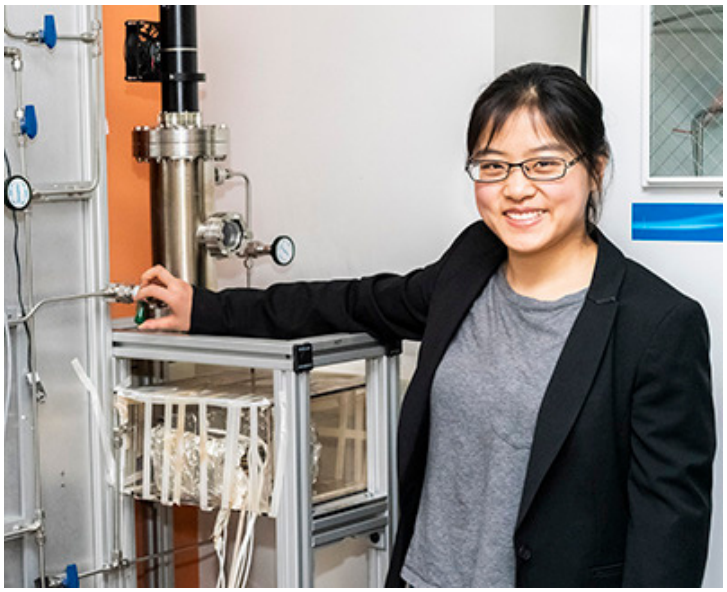
Many exoplanets have opaque atmospheres, obscured by clouds or hazes that make it hard for astronomers to characterize their chemical compositions. A new study shows that haze particles produced under different conditions have a wide range of properties that can determine how clear or hazy a planet's atmosphere is likely to be.

Photochemical reactions in the atmospheres of temperate exoplanets lead to the formation of small organic haze particles. Large amounts of these photochemical hazes form in Earth's atmosphere every day, yet our planet has relatively clear skies. The reason has to do with how easily haze particles are removed from the atmosphere by deposition processes.

"It's not just haze production but also haze removal that determines how clear the atmosphere is," said Xinting Yu, a postdoctoral fellow at UC Santa Cruz and lead author of the study, published July 12 in Nature Astronomy.

Yu and her colleagues measured the properties of haze particles produced in the laboratory under conditions representative of exoplanet atmospheres, including a range of gas compositions, temperatures, and energy sources. Coauthor Xi Zhang, associate professor of Earth and planetary sciences at UC Santa Cruz, said laboratory experiments like this are essential for understanding haze formation and its impact on observations.

"We can't bring haze samples back from exoplanets, so we have to try to mimic the atmospheric conditions in the laboratory," he said.



Xinting Yu, a 51 Pegasi b Postdoctoral Fellow at UCSC, measured the properties of haze particles produced in the laboratory under conditions representative of exoplanet atmospheres. (Photo courtesy of Heising-Simons Foundation)

According to Yu, haze removal depends on a critical material property of the particles called surface energy. "Surface energy describes how cohesive or 'sticky' the material is," she said.

Sticky haze particles readily bond with each other when they collide, growing into larger particles that fall out of the atmosphere onto the surface of the planet (a process called dry deposition). They also make good condensation nuclei for cloud droplets and are easily removed by wet deposition. Hazes produced on Earth typically have high surface energy and are therefore 'sticky' and efficiently removed from the atmosphere.

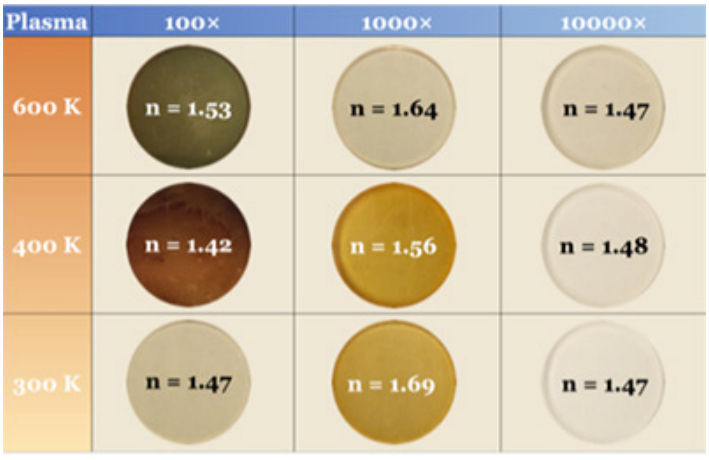
# Haziness of Exoplanet Atmospheres - continued

Yu's laboratory experiments show that the hazes produced in exoplanet atmospheres are highly diverse, with properties that depend on the conditions in which they are produced.

"Some of them are similar to the Earth haze, have high surface energy, and are easy to remove, leading to clear skies," she said. "But some of them have very low surface energy, like a non-stick pan; they do not bond with other particles very well and remain as small particles hanging in the atmosphere for a long time."

The study found that a critical factor is the temperature at which the haze particles are created. Hazes produced at around 400 Kelvin (260°F) tended to have the lowest surface energies, leading to less efficient removal and hazier atmospheres. This finding actually corresponds with observed trends, Yu said, noting that exoplanets at temperatures of 400 to 500 K tend to be the haziest.

Cooler planets located in the habitable zones of their host stars are more likely to have clear atmospheres, she said. "We may not have to worry about habitable exoplanets being too hazy for future observations, as hazes tend to have higher surface energies at lower temperatures," Yu said. "So it is easy to remove these hazes, leaving relatively clear atmospheres."




Researchers measured the refractive indices at visible wavelengths (n) for haze samples created under a range of conditions. (Image credit: Yu et al., Nature Astronomy, 2021)

Astronomers are looking forward to having a powerful tool for characterizing exoplanet atmospheres with the upcoming James Webb Space Telescope (JWST). When an exoplanet transits across the face of its star, its atmosphere filters the light from the star, giving astronomers with a sensitive enough telescope (like JWST) an opportunity to identify the chemical components of the atmosphere using transmission spectroscopy.

A hazy atmosphere would interfere with transmission spectroscopy, but the hazes themselves may still yield valuable information, according to Zhang.
"Hazes are not featureless," he said. "With better telescopes, we may be able to characterize the composition of exoplanet hazes and understand their chemistry. But the observations will be very hard to explain without data from laboratory experiments. This study has revealed the huge diversity of haze particles, and understanding their optical properties will be a high priority for future studies."

In addition to Yu and Zhang, the coauthors of the paper include UCSC undergraduate Austin Dymont, astronomy professor Jonathan Fortney, and graduate student Diana Powell at UC Santa Cruz, as well as scientists at Johns Hopkins University, Cornell University, University of Texas at Austin, and University of Grenoble Alpes, France. This work was supported by NASA and the Heising-Simons Foundation.

# Undergraduate Awards

HOLLY DAY BARNETT SCHOLARSHIP
Briana Prado
ELI SILVER EPS OPPORTUNITIES FUND
Ryann Ritchie
WEBER HOLT AWARD
Jaycee Favela
Roy Flores
Benjamin Grenier
Dylan Skutches
Kelsey Hilton
KATHRYN D. SULLIVAN IMPACT AWARD IN EARTH & MARINE SCIENCES
Brooke Santos
Raymond Hess
KORET SCHOLARSHIP
Kathryn Anderson
SUMMER TRAINING ACADEMY FOR RESEARCH SUCCESS (STARS) FELLOWSHIP
Briana Prado
PBSCI DEAN'S AWARD
Michael Scudder
CA ECOLOGY AND CONSERVATION SCHOLARSHIP
Kathryn Anderson

UNDERGRADUATE RESEARCH IN SCIENCE AND TECHNOLOGY AWARD
Amy Wu
Kathryn Anderson
CANDIDATES FOR HONORS IN THE MAJOR (EPS):
Dylan Elliot
Brenton Hirao
Stephan Kriley
Isis Lemus
Emma Morimoto
Nicole Yerena
Jonathan Puscizna
CANDIDATES FOR HIGHEST HONORS IN THE MAJOR (EPS):
Cosmo Varah-Sikes
Josepth Cherayil
Gracie Creed
CANDIDATE FOR HONORS IN THE MAJOR (ESCI):
Jonathan Puscizna
CANDIDATE FOR HIGHEST HONORS IN THE MAJOR (ESCI):
Michael Wilshire

# Undergraduate Degrees



Vanessa Ashley Alarcon
Amy Flores Alvarez
Ava Marie Ascarrunz
Rae Nicole Belhumeur
Kyle Ryan Bicknell
Elizabeth Raymond Brown
Paige Alexandra Callahan
Joseph J Cherayil
Paul Anthony Colosi
Claire Noelle Cook
Noma Grace Creed
William Dean
Isabela De La Rosa
Daniel Douty
Giffin Sawyer Dulay
Taylor Marie Duncan
Dylan Andrew Elliott
Jairo Flores
Matthew Augustine Galvin
Evanda Regina Goad
Isaac Paredes Hernandez
Brenton Wayne Hirao
Noah Alexander Ketterer
Aline Kieu
Stephen Bernard Kriley
Isis Citlali Lemus
Catherine Hayun Lew
Nicholas Lien
Christopher Jesus Madrigal
Oliver Peter Mirassou
Peter Oliver Mirassou
Leonel Giovanni Moreno
Emma N Morimoto
Morgan Chimezie Nwosu
Scarlet Rose Passer
Jeremy Peters
Jonathan Alexander Puscizna
Gabriel Antonio Quevedo
Nina Blanch Robbins
Ryan D Rosenstein
Samuel Delaney Ross
Efrain Ruiz
Manuel Eduardo Sanchez
Clara Whitworth Stanbury
Cosmo T Varah-Sikes
Jamey Stone
Charles Hardwood Thompson
Nupur Nimish Vachharajani
Cosmo Varah-Sikes
Saurabh Bhushan Vaze
Esme Wilder Wahl
Fiona Autumn Weaver
Michael Patrick Wilshire
Madeline Elise Yee
Nicole Yerena
Yue Yu
Elizabeth Simone Yunerman
Gemma Quetzal Zuniga

# Graduate Awards

AARON AND ELIZABETH WATERS AWARD:
Will Chapman
Garrett Zeff

J. CASEY MOORE FUND AWARD:
Will Chapman

ZHEN AND REN WU MEMORIAL FUND AWARD IN GEOPHYSICS:
Travis Alongi

ELI SILVER EARTH AND PLANETARY SCIENCE OPPORTUNITIES FUND GRADUATE AWARD:
Amanda Donaldson

EARTH'S ENVIRONMENT FUND AWARD:
Gavin Piccione

CHANCELLOR'S DISSERTATION YEAR FELLOWSHIP FOR 3 QTRS:
Rachel Maxwell

GEOLOGICAL SOCIETY OF AMERICA STUDENT RESEARCH GRANT:
Maddie Wood

ENVIRONMENT FUND AWARD:
Gavin Piccione

KATHRYN D. SULLIVAN RESEARCH IMPACT AWARD IN EARTH & MARINE SCIENCES:
Jenny Pensky

AGU OUTSTANDING STUDENT PRESENTATION AWARD:
Will Rush
Jenny Pensky

BEST OVERALL PRESENTATION AT 2021 UCSC GRADUATE RESEARCH SYMPOSIUM:
Colleen Murphy – "Sluggish Slides: Why Some Landslides Never Pick Up the Pace"

ARCS SCHOLARSHIP:
Maddie Wood

NATIONAL SCIENCE FOUNDATION (NSF) GRADUATE RESEARCH FELLOWSHIP PROGRAM (GRFP):
Julia Krogh

NSF POSTDOC FELLOWSHIP:
Heather Shaddox
Graham Edwards

EPS DEPARTMENTAL OUTSTANDING TA AWARD(STUDENT VOTED):
Will Rush - Winner
Genesis Berlanga - Honorable Mention
Ryan Greene - Honorable Mantion
Jo Holo - Honorable Mention
Emily Kam - Honorable Mantion

# Graduate Degrees

**Conrad, Jack**
Ph.D. (Fall 2020)
THE INTERNAL HISTORY OF THE MOON AND KUIPER BELT OBJECTS FROM GRAVITY AND TOPOGRAPHY

**Garza-Girón, Ricky**
Ph.D. (Summer 2021)
A GEOPHYSICAL STUDY OF ACTIVE VOLCANIC REGIONS AND SUBDUCTION ZONES

**Mason, Nick**
M.S.. (Fall 2020)
LANDSLIDE DERIVED BOULDER MOBILITY IN ARROYO HONDO

**Shaddox, Heather**
Ph.D. (Summer 2021)
(DUMPSTER) DIVING FROM THE LAND INTO THE SEA WITH SEISMOLOGY

**Edwards, Graham**
Ph.D. (Summer 2021)
APPLICATIONS OF THE URANIUM DECAY SYSTEMS IN DEEP TIME AND THE QUATERNARY: CHRONOLOGIC INSIGHTS WITHIN PLANETARY INTERIORS AND BENEATH

**Neuhaus, Sarah**
Ph.D. (Summer 2021)
GEOPHYSICAL AND GEOCHEMICAL EXAMINATION OF THE ICE-OCEAN BOUNDARY TO DETERMINE PAST AND PRESENT GLACIAL CONDITIONS

**Zube, Nicholas**
Ph.D. (Winter 2021)
ISOTOPIC EVOLUTION DURING EARTH-MOON FORMATION AND GENERAL CIRCULATION IN JUPITER'S MIDDLE ATMOSPHERE

# In Memoriam - Robert E. Garrison (1932-2021)

Professor Robert E. (Bob) Garrison passed away on Friday, November 26, 2021, at his home in Santa Cruz, in the presence of his wife Jan, son James and daughter-in-law Alma. Bob came to Santa Cruz in 1968 and was one of the original group of six faculty members that established and developed the Earth Sciences Board at UC Santa Cruz and brought it to international prominence. Bob Garrison was an extraordinarily kind and giving person in his encouragement and influence on the development of a large number of UCSC graduate and undergraduate students, researchers, faculty members and colleagues, who have, in turn, gone on to make their own contributions and impacts. He, and his wife Jan, graciously opened their home and hearts and made a long stream of students and visitors welcome and appreciated.

Robert E. Garrison (1975)

Bob was born in Texas in 1932 during the Great Depression when many people, including his parents, were struggling because of the harsh economic conditions and lack of jobs. Searching for a brighter future, his family had migrated from Indiana to Texas, because they had heard of jobs in the oil fields. His father did get a job working for the Texas Oil Company (Texaco) in Saudi Arabia, and after his return the entire family moved to San Francisco, when Bob was still a teenager. He enrolled at Stanford University and graduated in 1955 with a B.S., supporting himself by serving food in a campus dormitory.

It was in a field geology course to the Santa Lucias, taught by Bob Compton, that Bob first was exposed to the sedimentary rocks of the Monterey Formation, which was to become the cornerstone of much of his subsequent research career. He stayed on and received a M.S. degree at Stanford in 1958, which was followed by a Fulbright Fellowship to study at the University of Innsbruck in Austria for a year where he developed an interest in limestones. The year in Europe marked another important point in Bob's life, meeting his lifelong partner Jan.

Bob, second from left, at Stanford field camp in the Santa Rosa Mountains, Nevada (1954)

# In Memoriam - Robert E. Garrison continued

Following the Fulbright he returned to the states and worked for two years for Sunray DX Oil Company in Wyoming, where he developed an appreciation of the commercial applications of geology.

The 60's were some of the most exciting years in Bob's career and life. He and Jan were married in 1963. From 1961-65 he studied for his Ph.D. at Princeton University under the mentorship of Alfred Fischer, returning for two years fieldwork in the Austrian Alps and making seminal contributions to our understanding of the Jurassic pelagic limestones and radiolarites there. He spent a year at our sister campus, UCSB, as an Assistant Professor in 1965-66, moved north to join the faculty at the University of British Columbia from 1966-1968, and returned to California as an Associate Professor in the new Earth Sciences program at UC Santa Cruz. In 1966 he participated in geologic field training of Apollo astronauts in the Bend, Oregon region, including three who walked on the lunar surface. In 1969 he sailed to the northwestern Pacific Ocean as Sedimentologist on Leg 6 of the fledgling Deep Sea Drilling Project. And he initiated his work on the siliceous rocks of California's Monterey Formation, of which he became a foremost expert.

Bob Garrison was an outstanding sedimentologist who made critical contributions to the science through his research, publications, influence on colleagues, and shaping of his many students. He fundamentally changed our understanding of the origin, distribution and diagenesis of fine-grained marine sediments, most notably the siliceous, calcareous and phosphatic rocks. He also generated enormous international goodwill, cooperation, integration and scientific progress with his tireless efforts to involve scientists from all institutions, regions, and countries in the understanding of the sedimentary deposits of the deep sea and continental shelves.

Throughout his career, Bob Garrison consistently

Jan and Bob Garrison (2011)

addressed fundamental sedimentologic problems in fields that had previously been inadequately addressed because of the lack of appropriate methodology or due to being outside of popular trends in research. Bob's work focused on the origin, diagenesis and distribution of fine-grained, deep-sea and biologically generated or mediated sediments. Bob's scientific curiosity was guided by his concern for the human condition, and in the last ~25 years, his research focused primarily upon the origin of the sedimentologic resources of energy and fertilizer necessary for our communal well-being.

Bob was also a superb and thoughtful teacher at all levels. He helped students develop a broad understanding of the world's geologic and cultural diversity by bringing his extensive international experience (and never-ending stream of visiting colleagues) into many classes, seminars and field trips. He was committed to providing opportunities in academia to people who were outside of the traditional pathways, long before it was an explicit goal of the university. Bob retired from UCSC in 1994, but continued to travel, carry out research, write, advise students and organize conferences. His influence on an entire generation of students, collaboration with his many colleagues--national and international, generosity with his own time, and modesty regarding his own accomplishments are hallmarks of Bob Garrison's life and career.

# Alumni Kathy Sullivan elected to President's Council of Advisors on Science and Technology

On September 22, 2021, President Biden announced the 30 new members of the President's Council of Advisors on Science and Technology (PCAST). Drawing from the nation's most talented and accomplished individuals, President Biden's PCAST includes 20 elected members of the National Academies of Sciences, Engineering and Medicine, five MacArthur "Genius" Fellows, two former Cabinet secretaries, and two Nobel laureates. Its members include experts in astrophysics and agriculture, biochemistry and computer engineering, ecology and entrepreneurship, immunology and nanotechnology, neuroscience and national security, social science and cybersecurity, and more.

As directed in the President's executive order establishing PCAST, the council includes advisors from outside the federal government who are responsible for advising the President "on matters involving policy affecting science, technology, and innovation, as well as on matters involving scientific and technological information that is needed to inform public policy relating to the economy, worker empowerment, education, energy, the environment, public health, national and homeland security, racial equity and other topic."

In June 2020 Sullivan dove to the Challenger Deep in the Mariana Trench (the deepest part of the Earth's oceans). She made her descent in the Limiting Factor, a two-person submersible designed and built by Triton Submarines, as part of Caladan Oceanic's Ring of Fire Expedition led by investor and explorer Victor Vescovo, who pioleted the submersible.

Kathy Sullivan, who received her undergraduate degree in Earth Sciences in 1973 is a member of the Council of Advisors. She is a former NASA astronaut, and oceanographer who served as Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration (NOAA) during the Obama-Biden administration. Sullivan flew on three Space Shuttle missions, including the mission that deployed the Hubble Space Telescope. She was the first American woman to walk in space, the first woman to dive to the Challenger Deep, and is the first and only person to do both. She has previously served in leadership positions in Ohio's Center of Science and Industry, higher education, the private sector, and the federal government, including as NOAA's chief scientist.

# The Earth and Planetary Sciences Advisory Council

The EPS Advisory Council (EPS-AC) was formed in 2012, providing a forum for accomplished alumni to help EPS achieve networking and fundraising goals. We recently welcomed new EPS-AC members, who have generously agreed to share their time, energy, and expertise on behalf of our community. Despite the pandemic, the full EPS-AC met (virtually) in August 2020. Your EPS-AC co-chairs continue to be Peter Vrolijk and Stefano Mazzoni - please let them know if you have ideas, questions or suggestions: stefano00038@yahoo.com or pvrolijk17@gmail.com

We thank members of the current EPS Advisory Council for help in networking and development! Following are brief bios of current EPS-AC members, including backgrounds and interests.

**Kevin Biddle, B.S. 1973**

I received a BSc degree in Earth Sciences from UCSC in 1973 and then, thanks to a recommendation from Gerry Weber, went to work for the USGS in Menlo Park. I stayed with the Survey for a year and a bit before moving to Rice University in Houston for graduate school. At Rice I acquired a MA degree (1976) working on modern lagoon sediments and a PhD (1979) focused on carbonates in the Dolomite Alps of northern Italy. After Rice, I went to work for Exxon in their Houston research lab in the Basin Analysis group. I stayed with Exxon (now ExxonMobil) for 36 years working in research, exploration, field development, and as an advisor at corporate headquarters. I finished my career as the Exploration Director of ExxonMobil International in London, retiring in 2014. I currently live in Houston and Taos, New Mexico, and am an adjunct professor at Rice University teaching classes that address risk and uncertainty in the subsurface. I also work with a colleague in Poland on natural-gas supply to eastern Europe.

**Jon Erskine, M.S. 1998**

I earned my MS in Earth Sciences from UCSC in 1998 working with Andy Fisher applying borehole geophysics and geostatistics to map a coastal aquifer system in the former Fort Ord area of Monterey, California. From there I became a California Professional Geologist and Certified Hydrogeologist in 2001 while working for Geomatrix Consultants of Oakland in the environmental industry. In 2008, I completely shifted gears and entered the mining and construction industry to work for Graniterock of Watsonville, where I have been ever since.
The move enabled me to return to live in the Santa Cruz area and learn a type of geology career that I previously knew nothing about while applying all the tools I have learned along the way. I find the geology of the Monterey Bay area fascinating and I've had the opportunity to share by leading field trips for UCSC's Geology Club and collaborating on San Andreas Fault hydrogeology research with EPS Professor Emily Brodsky and PhD student Lian Xue (2016). I've worked with numerous talented Slug geologists over the years and value the knowledge, enthusiasm, and professional camaraderie UCSC EPS has provided.

**Richard Gordon, B.A. 1975**

I graduated from UCSC (Stevenson College) in 1975 with a BA in geophysics, which was an individual self-designed major with Rob Coe, Eli Silver, and Bob Garrison as members of my committee. I then obtained an MS (1977) and PhD (1979) in geophysics from Stanford. After a year of post-Ph.D. teaching and research at Stanford, I joined the faculty of Geological Sciences at Northwestern University for 15 years. I have now been at Rice University for 26 years as the Keck Professor of Geophysics. My research interests are in global tectonics with my main tools being

# Advisory Committee Members - continued

**Richard Gordon - continued**
marine geophysics, space geodesy, paleomagnetism, and numerical modeling. Two of my former Ph.D. students have gone on to become fellows of the AGU. I am especially proud of my work with students and colleagues in recognizing and describing diffuse plate boundaries in the world's oceans, especially the Indian Ocean, which I believe fundamentally changed our understanding of how plate tectonics works in the oceans. My main non-science hobby in the past decade has been playing the trumpet---I perform with several bands including the two Rice jazz bands. I am amazed and proud of the achievements of the UCSC EPS department and of my fellow alumni and have been delighted to serve on the Advisory Council.

**James R. Hein, Ph.D. 1973**
I received a Ph.D. in Earth Sciences at UCSC in 1973, as part of the first Ph.D. graduating class (three of us). I was Gary Griggs' first Ph.D. graduate and also worked with Bob Garrison. I sort of changed venues with Eli Silver as he was with the USGS before becoming a professor at UCSC at the same time that I left UCSC for a position at the USGS after teaching the summer and winter quarters at UCSC post-Ph.D. Eli arranged meetings with David Scholl at USGS that resulted in my being hired. I have worked at the USGS for 45 years before retiring in December 2018, but then I was rehired the following day on a half-time appointment to mentor my replacements, write a few more papers, and see my last two Ph.D. students through completion of their work. During much of my career I studied deep-ocean mineral deposits, geochemistry, and paleoceanography, but also worked extensively on land-based deposits that were possible analogs to the marine deposits. I was scientific advisor to the DOS on issues related to deep-ocean mineral deposits and I

**James R. Hein - continued**
was part of their delegation to the International Seabed Authority, who I also worked with for 18 years teaching workshops and seminars. I am past president of the International Marine Minerals Society (twice), and a Fellow of GSA and the Society of Economic Geologists. I also enjoyed teaching Bob Garrison's Advanced Sedimentary Petrology class twice at UCSC through the years, when he was on sabbatical.

**Shengwen Jin, Postdoc 2000**
After obtaining a Ph.D in marine geology with concentration in reflection seismology from Tongji University, Shanghai, China in 1996, I came to UCSC as a postdoc and then was appointed as an assistant researcher in 1999. I moved down to Houston in 2000 and have worked in the oil and gas industry since then. I joined Halliburton Energy Services in 2008 through the acquisition of Screen Imaging Technology, Inc. which I co-founded. Throughout my career in the industry, I have been actively involved in the development of innovative seismic data processing and imaging technologies. Currently I am a Principle Advisor at Halliburton and am responsible for R&D in seismic imaging, modeling and inversion as well as applications of High Performance Computing. I hold several patents and author/co-author many technical publications.

**Christy Kennedy, B.S. 2000 and M.S. 2002**
Christy completed a B.S. in Earth Sciences at UCSC in 2000, is a Senior Water Resources Engineer & Hydrogeologist with Woodard & Curran, and serves as a Board Member of the Groundwater Resources Association of California.

# Advisory Committee Members - continued

**Charles E. Lawson, B.S. 1973**

I graduated with a B.S. from the department in 1973. After a year working for Bechtel, I headed to Princeton for graduate school (recommendations from Casey and Aaron helped), where I received my Ph.D. in 1982. For a couple decades, I was not very good about keeping connections with the department, but the department (and the campus generally) still held a special place in my heart. Finally, in 1995, I got my act together and began to give back to the department, and in the years since, I have tried to increase my connections and my support for the department. My professional interests lie in water resources management. Before retiring from the federal government at the end of 2020, I served as Secretary of the U.S. Section of the International Joint Commission (IJC) for 12 and a half years. The IJC assists the United States and Canada in preventing and resolving disputes involving water bodies along the U.S.-Canada border. The two countries established the IJC under their 1909 Boundary Waters Treaty. Before serving with the IJC, I worked on Water and Environmental topics throughout the Middle East during my 21 years as science and technology advisor in the Department of State. Before my stint at State, I conducted research at the USGS and NASA. My personal interests are all over the map (so to speak).

**Stefano Mazzoni, B.S. 2000 and M.S. 2002**

After receiving my BS (2000) and MS (2002) working with Casey Moore on San Gregorio Fault Zone clay mineralogy, I moved to Houston and worked for four years at ExxonMobil on structural geology research, offshore West Africa, Gulf of Mexico, and offshore California. I joined Oxy in 2006 and worked Middle East projects for a year and half before moving back to California (Bakersfield) where I worked on a variety of projects in the San Joaquin and Ventura Basins. I left Oxy early 2015 when my wife (Chevron geologist) was relocated to the Bay Area. I worked for a small service

**Stefano Mazzoni - continued**

company called NEOS GeoSolutions on global exploration consulting projects. In the summer of 2017 my wife was relocated to Houston so we came back for our second "tour." I have been working as a consulting geologist on a variety of projects with Sanchez Oil & Gas (Gulf Coast New Ventures), BHP (offshore Mexico), and some smaller short-term projects. My interests lie in structural geology, deepwater turbidites, California geology, coordinating field trips, and most important of all, being a father to our eight-year-old daughter.

**Laura K. Stupi, B.S. 1997 and M.S. 2000**

B.S. finished in 1997, MS finished 2000 with Elise Knittle. Professionally, I am interested in materials characterization and the application of scientific instruments to the Earth sciences. I have worked in electron microscopy, engineering geology, and scientific instrumentation. Within instrumentation, I have worked with the environmental, oil and gas, mining, and climate research sectors.

**Kathryn Sullivan, B.S. 1973**

I graduated with a B.S. from the department in 1973 and moved to Nova Scotia to pursue a PhD at Dalhousie University. My work involved bathymetric and geophysical mapping of the Newfoundland Basin (the area bounded by the Grand Banks and Flemish Cap shelf breaks, the Mid-Ocean Canyon and the Southeast Newfoundland Ridge). I also mapped, named and recovered the first rock samples from the Newfoundland Seamounts. After receiving my PhD in 1978, I joined NASA as a Mission Specialist Astronaut. I flew on three space shuttle missions over the course of my fifteen years with the agency. Two of these were multi-disciplinary Earth science missions (STS-41G in 1984 and STS-45 in 1992), and the third was the mission that deployed the Hubble Space Telescope (STS-31 in 1990). On my 1984 mission, I earned the distinction of being the first American woman to walk in space. Following STS-45, I moved to Washington DC to serve as

# Advisory Committee Members - continued

**Kathryn Sullivan - continued**

the Chief Scientist of the National Oceanic and Atmospheric Administration (NOAA). In 1996, I moved to Columbus, Ohio, to run COSI, one of the nation's premier science museums and direct the construction of its new, state-of-the-art facility. From 2006-2011, I served as the inaugural director of the Battelle Center for Science & Technology Policy at The Ohio State University. In 2010, I was asked to return to NOAA as Assistant Secretary for Environmental Observation and Prediction/Deputy Administrator, a position I assumed following Senate confirmation in 2011. I served as Acting NOAA Administrator from 2013-14 and Under Secretary for Oceans and Atmosphere/Administrator from 2014-2017. I was a Navy Reserve oceanographer from 1988 to 2006, retiring with the rank of Captain, and served on the National Science Board from 2006-2010. I'm currently on several corporate and non-profit boards, including Terra Alpha Investments, Accenture Federal Services, International Paper and the National Audubon Society.
See page 22 for recent updates.

**Phil Teas, Ph.D. 1998**

Received a PhD in 1998 in structural geology under Casey Moore. Went on to work for Unocal as a structural geologist supporting global exploration. Transferred to Indonesia expanding to regional geology, tectonics and sideline as a prospecting geologist. Drilled something like 7 wells for Unocal. Later worked for Chevron then became a founding partner at Black Gold Energy serving as chief geologist. Was an integral member of a team that surveyed over 1 million square kilometers of ocean floor looking for oil seeps. BGE became the largest acreage holder in Indonesia and did extensive frontier field work in support of prospecting. Drilled another 8 wells, providing structural interpretation and fluid pressure predictions. Transitioned back into pure seafloor mapping and have been integral in surveying around another 1.5 million square kilometers in the gulf of Mexico, Brazil and west Africa. Interested in 3D visualization of data, geologic field work, and structural geology.

**Michael Underwood, B.S. 1976**

I received a B.S. degree in Earth Sciences in 1976, after having completed a senior thesis on Franciscan rocks near Big Sur under the direction of Bob Garrison and Casey Moore. I worked for a couple of years at the USGS in Menlo Park (Branch of Pacific Marine Geology) before attending graduate school at Cornell University, where Ph.D. research brought me back to the Franciscan in Humboldt County. Beginning in 1982, I toiled as a professor at the University of Missouri-Columbia, and I've been happily retired since 2015. Research over the course of my career has focused on the sedimentology and tectonics of subduction zones, both onshore and offshore, and that work has yielded many opportunities to collaborate with a long list of UCSC graduate students, alumni, and professors. I currently enjoy Professor Adjunct status at New Mexico Tech, with a second home in Angel Fire, NM. I remain engaged in scientific ocean drilling, and I've been an active member of the EPS-AC since its inception.

**Peter Vrolijk, Ph.D. 1987**

PhD with Casey (1982-1987); thesis in Kodiak, Alaska; 24 years with Exxon Production Research Co./ExxonMobil Upstream Research Co. with interests in structural geology and subsurface fluid flow. Professional service to IODP (SSEP) and GSA. Hobbies include ultra-running.

**Lisa White, Ph.D. 1990**

Lisa joined the UC Museum of Paleontology (UC Berkeley) in July 2012 as Director of Education and Outreach. She came to the UCMP after 22 years at San Francisco State University, where she held positions of Professor of Geosciences and Associate Dean of the College of Science and Engineering. She taught undergraduate classes in paleontology, historical geology, and oceanography, and guided research projects with graduate students in Miocene diatoms of the Monterey Formation of CA, and fossil cold seep assemblages in the Franciscan Complex. Lisa completed her BS in Geology at SF State and PhD in Earth Sciences at UCSC, and worked with the USGS in Menlo Park during 1988-1995.

# Update on EPS Development by Andy Fisher

**EPS in 2021**

Another strange year has passed for EPS and the UCSC community. We recently welcomed students back to campus in significant numbers for teaching and other activities, and we are operating with a hybrid mix of mostly in-person (with masks) and online forms. *We can make classroom presentations, run labs, and lead field trips!* This transition has been difficult at times, but it represents important progress, and it is a thrill to be with so many students and colleagues on campus. UCSC has vaccine requirements and so far, this is working to keep in-person classes in session and all of us safe. So, *what does this have to do with EPS Development?* As described below, the pandemic has created substantial challenges for faculty, researchers, and students who teach, learn, and conduct research and engagement activities. We continue to benefit from your generous support.

**EPS Progress and Priorities**

As noted elsewhere in the Fall 2021 Newsletter, especially in the message from the EPS Chair, members of the department are advancing research, securing grants and awards, receiving recognition, and helping students to launch challenging and impactful careers. Our students have demonstrated intellectual rigor, determination, and creativity in managing academic work in the midst of a pandemic. Many seniors are applying for admission to graduate school, and graduate students are applying for fellowships. Some students are completing their studies as planned and on schedule, but for many, additional time will be required. In addition, opportunities to participate in meetings and research activities have been limited – these are foundational experiences. We need to do everything we can to enhance student experiences and promote student success – EPS students deserve every opportunity they have earned.

Many of our students work part-time to support their studies. Living in Santa Cruz is increasingly expensive, and

the return to in-person teaching means a return to town for many. Some businesses have closed and/or reduced hours, and jobs can be difficult to manage under pandemic restrictions. For students who are supported with research grants, access to field sites and labs has been limited – we are getting back towards more "normal" work conditions, but for many students, progress has been slowed or blocked by logistical and economic realities. The highest priority for EPS Development remains support for graduate and undergraduate students as they take courses, conduct research, and complete professional development activities. Please consider contributing to one or more EPS funds that support students, research, teaching, and outreach activities. Contributions of any size make a difference (https://eps.ucsc.edu/support-us/index.html).

**EPS Network Activities**

We plan to hold an EPS network event in New Orleans in association with the Fall AGU meeting. Not as many EPS personnel plan to attend AGU this year as in past years, but we expect to have a significant presence, and we hope that other attendees and/or regional residents will consider coming to the EPS Alumni Reception at the Oceana Grill in New Orleans on December 14th from 6-9pm. We expect that all participants will be vaccinated.

We plan to hold some kind of online/virtual event after the winter holidays, in January (or maybe early February) 2022. The Winter 2020 event we held on Wonder was fun, and the feedback we received was that folks especially appreciated the chance to mix and chat – this will be the focus for our next online event: not much structure, lots of time to schmooze.

# Update on EPS Development by Andy Fisher - continued

**EPS Network Activities - continued**

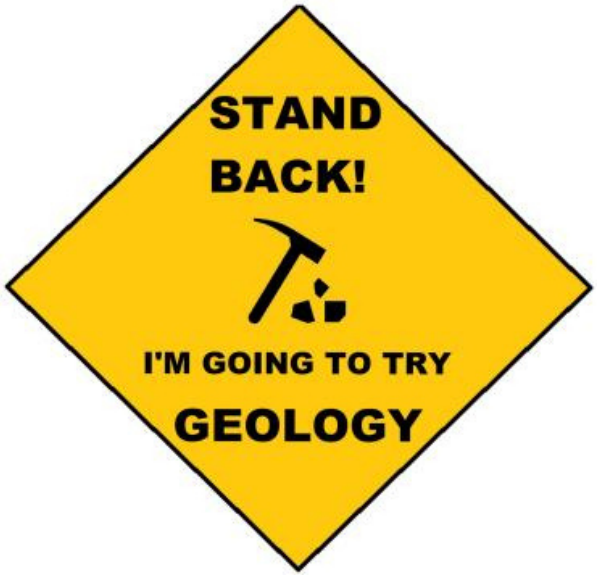
We delayed an EPS reunion originally planned for Spring 2020, with field trips, talks, posters, and time for socializing with food and drink. We are not yet comfortable planning for a Spring 2022 event, and at this time it seems most likely that the next in-person reunion will be in Spring 2023, when pandemic concerns are significantly reduced (*we all hope!*). Please stand by for more information and think about joining friends and family for a trip to Santa Cruz.

We recently had a virtual meeting of the EPS-AC, led by co-chairs Peter Vrolijk and Stefano Mazzoni – please contact them to get involved in networking and development, ask questions, or make suggestions (please note latest email for Peter): stefano00038@yahoo.com, pvrolijk17@gmail.com. The EPS-AC is responsible for selecting members of the Alumni Hall of Fame – your suggestions and nominations are most welcome.

We will all be glad to hear from you with updates, questions, and ideas.

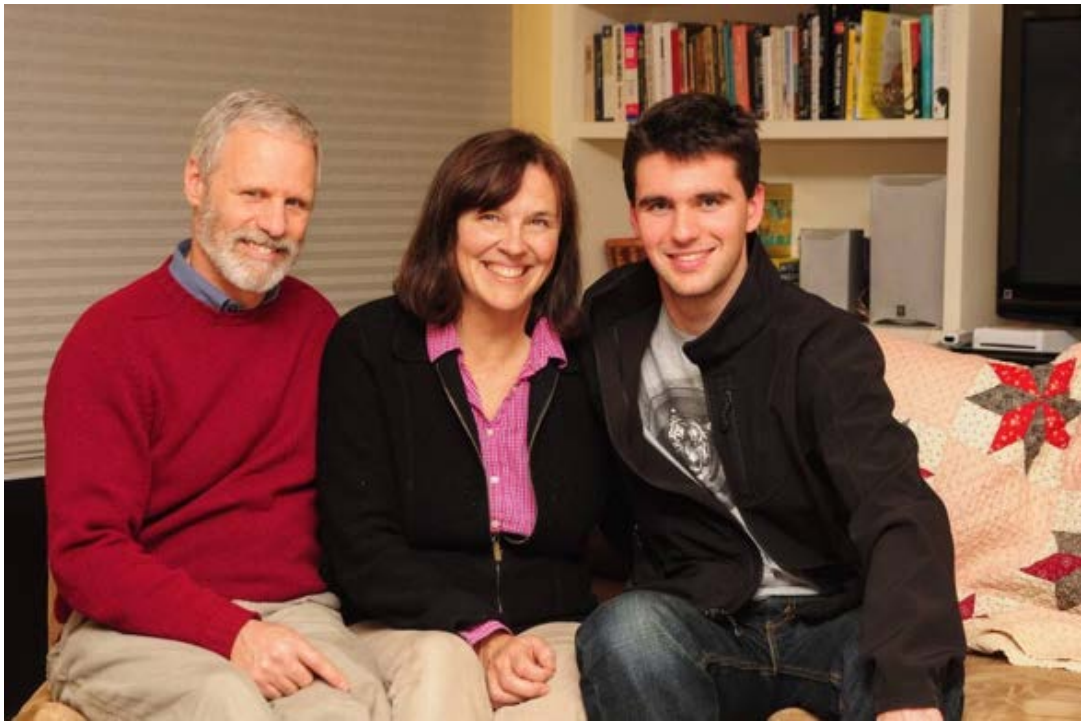
Please stay safe and stay in touch.
(afisher@ucsc.edu)

Field Geology on a field trip to New Idria in Spring 2021



# Legacy gift makes signature experience possible for next generation of Earth Science students

Damon Brown earned his BA in Earth Sciences in 1980 and enjoyed a successful career in consulting, eventually becoming president at EBA Engineering, a civil and environmental engineering firm in Santa Rosa. He, his wife Sarah (also a geologist and writer, authoring 11 geology-themed mystery books under her maiden name, Sarah Andrews), and their son Duncan also shared a love for flying; all three had pilot's licenses. Damon volunteered for Angel Flights, transporting the seriously ill from remote locations to medical facilities.



Damon, Sarah, and Duncan Brown. Photo courtesy of the Santa Rosa Press Democrat

One of their family traditions was an annual summer trip to Wisconsin to attend the Experimental Aircraft Association's fly-in convention. On July 24, 2019, on their way home from the event, their private aircraft crashed just short of a municipal airfield in Nebraska, where they intended to refuel. Tragically, all three perished in the accident.

The Browns, who believed in the value of the department's Summer Field Camp as a transformational experience, left a legacy gift to the Gerald Weber and Susan Holt Fund (https://eps.ucsc.edu/support-us/wh.html), which provides scholarships for Earth Science students who otherwise may not have the financial resources to participate in this iconic experience. More than 170 EPS students have benefited from the Weber-Holt Fund since 1995. Catherine Takata (BS '19, Weber-Holt award recipient) recalls, "This financial encouragement was what I needed to tackle summer field camp with confidence." Takata is now a marine policy advocacy and communications intern with the National Ocean Protection Coalition at Resources Legacy Fund.

This generous gift will help the department's focus on increasing access, equity, and diversity in field camp participation. Field camp helps students build fundamental skills such as teamwork, systematic data collection and observation in complex settings, spatial visualization, and critical thinking. EPS Development is focused on removing financial barriers and enabling every student to participate in life-changing experiences. Alumni giving, either through legacy gifts or annual donations, has a transformative impact on the lives of our students. For more information, please visit https://eps.ucsc.edu/support-us/index.html.

**Earth and Planetary Sciences Department**
**University of California, Santa Cruz**
1156 High Street
E&MS Building, Room A232
Santa Cruz, CA 95064
http://eps.ucsc.edu

## Ways to Give to the Earth and Planetary Sciences Department at UCSC

Your contribution helps to build endowments that have enduring benefits for future generations of EPS students, and provide much-needed immediate support for teaching, research and service.

On the next page we describe current high-priority EPS development goals.

**(1) Please Give Online**
Please visit the EPS web site for information on current funds/endowments and EPS Department priorities: **`http://eps.ucsc.edu/support-us/`**

We recently updated this part of the EPS website. You can read about current development priorities, and after choosing the fund/endowment of your interest, you will be transferred directly to a page where you can enter the amount of your gift and credit card information.
*This is the easiest way to support the EPS Department!*

**(2) Please Give by Check or Credit Card**
Please use the form on the next page to prepare your donation. We list a variety of EPS development options; more information for each of these can be found at the website above.

**(3) Please Call or Email for Information**
We are glad to discuss your interest in supporting EPS at UCSC, and to provide information that may be helpful in directing your contribution to be consistent with your goals.

*Please contact:*
- Andy Fisher (EPS Development Coordinator): 831-459-5598, afisher@ucsc.edu
- Matthew Clapham (Department Chair): 831-459-4644, mclapham@ucsc.edu
- Lisa Stipanovitch (Department Manager): 831-459-4478, lms@ucsc.edu

**(4) Please check with your employer to see if they will match your donation!**

**Please mail to:** UC Santa Cruz, MS: PBSci Development, 1156 High St., Santa Cruz CA 95064

Donor Name(s): _____

Address: _____

Email: _____ Telephone: _____

Gift amount: $_____ Gift designation: _____

Please attach a check payable to the UC Santa Cruz Foundation (with fund/endowment designation written under "Memo"), or enter credit card information:

Credit Card Type: Visa ☐ MC ☐ Discover ☐ AmEx ☐

Credit Card #: _____ Expiration Date (Mo/Yr): _____

Name on Card: _____ Signature: _____

My company will match my gift (company name): _____

## EPS Development Options (updated Spring 2020):

☐ **J. Casey Moore Fund**

The Casey Moore Fund supports current EPS graduate students as they conduct thesis-related research. ***We are close to offering fellowships using interest from this endowment!***

☐ **Zhen and Ren Wu Memorial Award Fund**

The Wu Fund supports EPS graduate students in geophysics as they conduct thesis-related research, with an emphasis on students seeking careers in exploration industries.

☐ **Earth's Environment Fund**

The Earth's Environment Fund supports EPS graduate and undergraduate students conducting research involving water resources, climate change, and Earth's landscapes and aquatic systems.

☐ **Eli Silver Earth and Planetary Science Opportunities Fund**

The Eli Silver Fund supports EPS undergraduate majors and graduate students, contributing to costs for professional development, education, and living expenses.

☐ **Gary Griggs Fund**

The Gary Griggs Fund supports research and professional development for students completing degrees in EPS and ESCI, at both graduate and undergraduate levels.

☐ **Aaron and Elizabeth Waters Fund**

The Waters Fund honors the department's founding chair and his wife, supporting excellence in graduate research with awards for thesis proposals and fellowship support.

☐ **Gerald Weber and Suzanne Holt Fund**

The Weber-Holt Fund supports EPS majors while they participate in summer field camp, an iconic experience that satisfies the "capstone course" requirement applied to all undergraduates at the University of California.

☐ **Support for Undergraduate Research in Geological and Environmental Sciences Fund**

The SURGES Fund supports undergraduate students as they complete research projects, giving students a chance to consider career and graduate school options.

☐ **Holly Day Barnett Fund**

The Holly Day Barnett Fund supports an annual award to an outstanding EPS major with interests in Environmental Earth Sciences.

☐ **EPS Achievement Fund**

This unrestricted endowment generates interest that supports immediate EPS research, education, and development needs, directed flexibly as needed on short notice.

Please see http://eps.ucsc.edu/support-us for more development options

Please mail to: UC Santa Cruz, MS: PBSci Development, 1156 High St., Santa Cruz CA 95064

# Help Us Identify Pictures From the Archives

We found a packet of pictures in the E&PS front office and need help in identifying the people and year they were taken. If you recognize anyone in the following pictures, please let us know.


# Help Us Identify Pictures From the Archives - continued

**1970s**

**David C. Greene, B.S. 1970s**

I have now been teaching structural and environmental geology at Denison University for more than 25 years(!). As an undergraduate at UCSC in the 1970s I had no intention of emulating my professors (it seemed to me that they all worked way too hard!), but in the end I found myself not only following their footsteps but much influenced by what I learned from them. My clearest memories from those years are (a) sitting in what I think may have been one of the first environmental geology courses in the country, taught by a very young Gary Griggs, and (b) a wonderfully rich field-based structural geology course with Othmar Tobisch and Steve Rowland, including early versions of the Bree Creek quadrangle exercises that I have now myself taught to generations of structural geology students. I am retiring from teaching at the end of this year, and can only hope that I, too, have had some influence on the young students who will continue working in the Earth sciences.

**Barry Hecht, B.S. 1970**

As one of the first three UCSC EPS graduates, Barry had an inkling he'd be doing some out of the box geology. He's slowly winding up a 50+-year career with new work in the hydrology and recharge of the sandy soils of the Monterey Bay area, aquatic habitat recovery after episodic sedimentation, and watershed hydrology statewide. Since 1988, he has been the senior principal at Balance Hydrologics, a 35-person consulting firm anchored in field hydrology, where he has hired and worked with quite a slew of Slugs slogging through all sorts of surprising issues in habitat hydrology. During 'summer vacations', he is mapping glacial moraines and the chronology of the Kennicott and McCarthy glaciers in Alaska's Wrangell Saint Elias National Parks.

**Wes Myers (aka Carl Weston Myers), Ph.D 1973**

After graduating from UCSC in 1973, I ricocheted around the U.S. for a few years doing various academic and research jobs before coming to rest at the Los Alamos National Laboratory in northern New Mexico. I worked at LANL for nearly twenty-five years, eleven as leader of the Earth and Environmental Science Division, before retiring in 2005. The LANL work was a fascinating and evolving multidisciplinary mix of projects and programs, most related in one form or another to LANL's national security mission. Since retirement, I've involved myself in two activities: advocating for greater use of underground space for siting critical infrastructure facilities, such as nuclear power plants, and with my wife, Gayla, spending several months each year back at our second home in the Blue Ridge of north Georgia to be closer to kids and grandkids, and to prowl around the roots of the southern Appalachians. UCSC was a great experience: excellent faculty, courses, and fellow grad students, and---of course--- great field trips. Coastal geology, the San Andreas, volcanic terrains, spending one summer as TA for geology field camp, and the experience of coastal California culture in the early 1970s all stand out.

**Kathy Sullivan, B.S. 1973**

Since grad school: 15 years with NASA's astronaut corps; several stints at NOAA, most recently as Administrator from 2013-2017; built and ran a hands-on science museum in Columbus that's frequently ranked as best in the country (COSI - Center of Science & Industry) and stood up a science & tech policy center at Ohio State University. Amid all that, served 18 years as a Navy Reserve oceanographer. Nowadays I serve on a variety of corporate and non-profit boards. Most recent news is President Biden appointing me to PCAST, the President's Council on Science and Technology. I live in Columbus, Ohio.

My best and most important recollection from UCSC is the day I, a freshman language student taking Gary Griggs' Basic Oceanography class, walked up him after class and asked what oceanographers did, beyond lecturing freshman classes. Instead of

**1970s continued**

**Kathy Sullivan - cont.**
sneering at such a laughably dumb question, he gave me a dose of his passion and invited me to come to his lab over the weekend to explore the subject further. As they say, the rest is history.

**Fraser Goff, Ph.D. 1977**
Fraser and wife Cathy divide their time between Los Alamos, NM and Kailua-Kona, HI. After graduation from UCSC, Fraser worked at Los Alamos National Laboratory until 2004 leading a series of projects in geothermal exploration, research and drilling, volcano geochemistry and remote sensing, and environmental geochemistry. After retiring from LANL, Fraser became a geothermal and volcanology consultant, and also worked for the New Mexico State Map program publishing a number of geologic maps. Now mostly retired (2021) Fraser and Cathy lead geologic field trips for other retired scientists and non-scientists to New Mexico's scenic volcanoes. My most vivid memory of my time at UCSC was leading a spring field trip to the Clear Lake volcanic field, California and losing my thesis advisor, Aaron Waters on the back roads around Clear Lake. When we finally "met up" after an hour or so, he gave me a tongue-trashing that I've never forgotten.

**Nicholas (Nick) M. Johnson, B.A. 1977, Ph.D 1994**
I live in San Francisco and am employed with the San Francisco Public Utilities Commission as a hydrogeologist managing two groundwater supply projects in the City's Westside Basin and the basin's extension into San Mateo County. After decades of work as a consultant for both water supply and groundwater remediation, my current position best fulfills a goal I set as a UCSC undergraduate —to work effectively and constructively at the nexus of geology, engineering, and planning. I am grateful to UCSC for being the fertile ground from which I became a lifelong, applied scholar. Fun fact: the two papers on my dissertation in Water Resources Research, one coauthored by Shirley Dreiss, have been cited nearly every year since 1989 for a total of ~230 citations!

**Curtis Obi, B.S. 1979**
I progressed through the UCSC Earth Science BS program scheduled to finish in Spring 1978 (field camp in Bishop and Deep Springs Valley, CA with Leo and Othmar) but needed another year to graduate in 1979, followed by:
4 yrs at USGS in Menlo Park, CA with field work in Brooks Range, AK and Transverse Ranges So., CA.
3 yrs at UMASS Amherst with MS Thesis in Bighorn Mts of WY.
2 yrs at Nevada Test Site working mostly on rad waste site characterization.
2 yrs in So. CA working on haz waste site characterization.
7 yrs in San Francisco working on foundation and environmental projects at industrial, military, and superfund sites.
23 yrs back at Nevada Test Site working on environmental and national security projects.

Now retired in Las Vegas, NV and Bozeman, MT, still active in landsailing, winemaking, and travel/camping/hiking/biking.

**Judy Parrish, Ph.D. 1979**
I'm still semi-retired and living in Idaho. I am actively working on a geology research project with faculty from the universities of Kansas, Utah, Northern Arizona, and Arizona State on the Navajo Sandstone (southern Utah). We've just submitted a big grant proposal to continue the work and involve teachers from Navajo Nation schools. I'm also President of the SEPM (Society for Sedimentary Geology) Foundation, which has allowed me to use expertise that I've developed by serving in various capacities in development and fund-raising. Still flying!

**1970s continued**

**Carole Sakamoto, B.S. 1979**
I graduated from UCSC in 1979 with a double major in Earth Science and Environmental Studies (Natural History). After UCSC, I did a Master's in Geology at the University of Connecticut. At UConn, I ended up focusing on Chemical Oceanography. The Marine Science Institute at UConn had just built a trace metal-clean lab so I did research on Cd distributions. After UConn, I started working at the University of Rhode Island Graduate School of Oceanography on a multidisciplinary multi-ship program studying warm core rings in the Atlantic Ocean. My work involved studying Cu distributions. After the URI project, I got a job at the University of California, Santa Barbara working for Ken Johnson on a project using a new in situ chemical analyzer for measuring silicate and sulfide at hydrothermal vents. It was at UCSB that I started work on developing chemistries for in situ measurements for trace metals and nutrients. I then started working at the Monterey Bay Aquarium Research Institute (MBARI) in 1988 and I have been there for 33 years. I am retiring in November. I have enjoyed a wonderful career at MBARI having opportunities to travel and go on research cruises and work with an amazing group of researchers and engineers. I discovered that I have an affinity for developing chemical instrumentation and methods and MBARI was the best place for me to be. I am very grateful and feel very privileged to have been able to have a career there.

**Bruce Lymburn, B.S. 1979**
After graduating in 1979 with Earth Sciences and Environmental Studies majors, I went to UC Berkeley for law school. The first half of my nearly 40 year legal career was spent in general business, real estate, and construction law, for businesses and as a law firm partner. The last half of my legal career was spent as the general counsel of Clif Bar, the maker of organic energy bars and other great foods and drinks. I retired in 2020. I live in the San Francisco Bay Area, and enjoy golf and travel. We have a second home in Capitola and very much enjoy our frequent visits to Santa Cruz county.

My Earth sciences senior thesis was on the subject of the "Mima Mounds" near the UCSC campus. I suspect Gary Griggs proposed a study of these mounded landforms because he took pity on me, knowing that I was headed to law school, and gave me something "simple and easy." It turns out that the Mima Mounds are one of the most enduring mysteries of geomorphology, one that has completely befuddled geologists and scientists for nearly 200 years. My research uncovered dozens of possible origins of these landforms. So much for "simple and easy"…

**Kenneth Johnson, B.S. 1978**
I graduated from EPS in December 1978 and have had a career that exemplifies the benefits of being flexible! Basic geologic understanding underscores everything!

My PhD research at UC Berkeley was on Debris Flow initiation mechanisms (filed in 1987) and then we entered a 10 year drought! I then pivoted to work in the environmental industry in the Bay Area to use my hydrogeology experience to assist in aquifer protection in the south Bay Area. After a 5-year period teaching engineering geology at UC Berkeley, I have immersed myself in tunnel design and landslide mitigation for a number of major infrastructure projects including leading the geotechnical design for the Central Subway in San Francisco, BART to Silicon Valley Phase 2, and other projects around the nation and world. Most recently, I am working on a project to design a more sustainable conveyance system for the Eastern Bay Area (EBMUD) for their water supply and major landslide mitigation work on the Last Chance Grade on US 101 just south of Crescent City, CA (for Caltrans). Happy to talk with others about the many opportunities for geologists in the

**1970s continued**

**Kenneth Johnson - continued**
current job market, as we need as many as we can get!

Thanks again and hope to see you and lots of slugs in New Orleans in December!

**1980s**

**Darrell Kaufman, B.S. 1982**
I've been a professor at Northern Arizona University since 1998. I filled a joint position between two departments: Geology and Environmental Sciences. It's not a coincidence that at UCSC I double majored in Earth Sciences and Environmental Studies. After graduating in 1982, I worked at the USGS in Anchorage, pursuing my love for Alaska that was ignited at UCSC and that continues to drive my research. Quaternary climate change, as represented by the back-and-forth of glaciers and sea level, became my passion and the focus of my Masters' (University of Washington) and my PhD (University of Colorado). I remember the first time the topics of climate variability and hazards were connected in Gary Griggs' Environmental Geology class, before global warming. When I finished my PhD in 1991, climate change was emerging as a serious concern. The Intergovernmental Panel on Climate Change (IPCC) had just published its first major report, but geoscientists had barely entered into policy-relevant discussions about climate change. The fact that climate always changes seemed to be more of a talking point for those who distrusted the science of climate change than a fundamental contribution to its understanding. Thirty years later, as a lead author on the recently published IPCC's sixth assessment report, I can affirm that the value of the long-term perspective on climate change is now clearly recognized. I'm grateful for the broad view of Earth sciences and its relevance that UCSC afforded me. There's a straight line from there to where I am now.

Darrell Kaufman at Kenai Peninsula for field work

**Paia Levine, B.A. 1983**
Paia has been with the Santa Cruz County Planning Department for 30+ years and is now the Assistant Planning Director, where she is working in land use planning and public policy. Given our physical setting, there is occasional intersection with Earth Science, especially when disaster(s) occur and geologic hazards must be considered in development and re-development decisions. Very fortunately, Jeff Nolan (UCSC, MS 1992) is the County Geologist and a perfect fit for our current situation. We are recovering after the CZU fire of August 2020 in which our community lost over 900 homes at once, in the San Lorenzo Valley and on the North Coast. I recall how Jeff helped me pass my geology licensing exam something like 25 years ago. I was always terrible at structural geology even though I loved the material in theory.

When I left the USGS in the late 1980's, not interested in grad school and clueless as to what to do next, I started working with the County of Santa Cruz doing grading inspection of construction sites. It was a pretty random choice at the time. My work evolved to geology,

**1980s continued**

**Paia Levine - continued**
working with Dave Leslie (UCSC, MS Geology, 1981) at the start, to environmental resource review, through development review, community planning and administration. At some point, there became less field time and more community meetings, housing concerns and budgets. At the end of the day the most satisfying part of the work, regardless of topic, is the public service.

**Jeff Emory, B.S. 1981**
I was an Earth Sciences major at UCSC, graduating in 1981. In the summer of my sophomore year (1979) a friend sent me to help bottle at a local winery, Santa Cruz Mountain Vineyard. The founder, Ken Burnap, and I hit it off and I started working part time. I ended up working more and more at the winery while I finished my degree and moved to full time work after graduating.

What ensued was an old-fashioned apprenticeship, without us ever defining it as such. Ken and I worked together for 25 wonderful years until his retirement in 2004. By then, psychologically ineligible for a “real job”, I took over ownership of the business.
As one who started in this business as a 20-year-old, I feel it is my mission to mentor young people interested in wine making. The mentee I am most proud of is UCSC grad Denis Hoey, who was my assistant winemaker for 10 years and went on to found his own winery, Odonata Wines. For many years we have offered winery internships through the UCSC Agroecology program. One of those interns came to work for us full time after graduating, Rivelin Wetherill. She is now my full time Assistant Winemaker.

I am just completing my 43rd harvest season with Santa Cruz Mountain Vineyard. It seems to be what I'm doing if I grow up. I'm happy to say I have never filled out a job application or resumé, and I've never worn a tie!

*Jeff Emery and Assistant Winemaker, Rivelin Wetherill, at the 49-year-old Cabernet Sauvignon vines at Bates Ranch Vineyard. A site Jeff first worked with in 1979.*

**Chris Obert, B.S. 1982**
After graduating in 1982 I discovered that the job I had lined up evaporated. Instead of taking a minimum wage job at USGS, I instead started servicing cars. Not a big deal, car work had gotten me thru college. I figured that after a couple of years I would pick up the books, and after a quick review get that job.

Boy was I wrong. Got married, bought a house, opened a business, and then another. My specialty started taking me to Italy more than a few times a year. I have made friends all thru out the world, and have even had to go to Argentina a couple of times. Walking on glaciers will never be forgotten. And I have seen the insides of more Italian churches, for the art work, than I can remember.

**1980s continued**

**Chris Obert - continued**

Not to forget an untold amount of museums, manufacturers, concourses, some judging, and viewing some races.

Then there were kids. 10 years later my wife died, and I became a single dad with two businesses. Did the soccer mom thing, got my kids thru school and onto college and lives/careers of their own. Sold one of the businesses in there someplace, met another lady, and lost her too. Somewhere in all of that I built a race car specifically for autocross, and won a few championships.


Now I run a small mail order business, and restore special Italian cars. I am known world wide as a specialist in what I do. I have more work than I expect to get done in my lifetime. One of the ladies I knew as a client back when my first wife was around has become my business, and life, partner.

I still live in Santa Cruz in that same house, it's paid for now. Turns out it's an Italian farmhouse from 1888, it was the second house from the end of town. It now has a marble sink we found in Italy from a farmhouse near Verona that was built about the same time, and that sink has many features seen in sculptures from all over Italy.

If it were not for the COVID, I would have traveled to Iceland, again. We fell in love with the island nation. The geology is fantastic, especially if you like volcanoes, glaciers, and very little tourists. Not too many places where you can stand on two tectonic plates at the same time.

If my clients ask me about my education, I show them my hands and say I am still into oil. I often get asked when I will retire. I tell them I am, and will keep doing this until I either can't remember who I am, or die.

**Kent M. Screechfield, B.S. 1985**

I retired last year after approximately 35 years in the geotechnical consulting business as a Northern California Practice Lead/Manager. I still live in Danville with my wife Elaine, have been married for over 32 years and my two adult children (Claire, 25 and Brett, 27) both live in the Pacific Northwest. I am still involved with the Boy Scouts of America as an Assistant Scoutmaster of my son's old Troop and with Kiwanis International as a District Lieutenant Governor and active member of the Kiwanis Club of the San Ramon Valley. In my spare time I like to hike, camp, bike ride and enjoy a good bottle of wine.

**Patrick Hogan, B.S. 1983**

You can mostly catch up with me on LinkedIn
https://www.linkedin.com/in/phogan/
https://www.facingfuture.earth/arctic
After almost 30 years as a NASA Earth scientist, now back to K-12 teaching.
Google "Patrick Hogan NASA," I was busy.

Probably worth mentioning...
And while I managed NASA Learning Technologies starting in 2002, I designed and managed the creation of the NASA virtual globe open source program, WorldWind, there before Google Earth.

**1980s continued**

**Patrick Hogan - continued**
https://ti.arc.nasa.gov/tech/cas/advanced-exploration-knowledge-networks/world-wind/news/
https://www.wired.com/2005/03/around-the-world-in-80-clicks/. And am concerned for life in the Universe.

The dominant of our species, the classic warlords of yore, who have essentially decided the progression of our history, are quite alive and well today, be it Wall Street, or their lapdogs in Congress, or the rest of the clowns running this joint, the Putins, Xinpings, Erdogans, Bolsonaros, and the rest.

Our time left here is short and the big U will be safe. Life is self-correcting, it either supports and sustains life, or over-consumes the substrate, and takes itself out. The terrifying horror of this creature's worst element, must end, and gratefully before it can extend the rape and pillage.

Dearly loved my time at UCSC, the most beautiful campus in the world! Go Slugs!!!!!

**Ray Wells, Ph.D, 1982**
Sally and I are slowly coming out of COVID hibernation in Portland, Oregon. We live in an old house on a hill with a big garden. Sally has been growing vegetables for the local food bank and dahlias for the house. I spent most of the year getting ready for the GSA annual meeting, which was held in Portland this week. We now have a group of 8 USGS geologists in the Portland office who organized several field trips and topical sessions and presented lots of new work on the Cascadia convergent margin. The meeting was a success, although USGS scientists (even those in Portland) were required to attend virtually. As a retiree, I have been working with vintners and soil scientists on the terroir of Oregon's famous Willamette Valley viticultural areas. We are looking forward to being able to travel and do some tasting in the upcoming year.

**Matt Kondolf, M.S. 1980s**
Coming from a geology program on the east coast, my master's degree in Earth Sciences in Gary Griggs' lab was a life-changing experience. Instead of measuring change in mm per thousand years (the Bubnoff unit favored by Bob Garrison), on the active California coast, I could see coastal terraces that had popped out of the ocean only centuries ago. Most influential, I was around for the January 1982 floods, mudflows, and landslides. I spent a lot of time in the field right after this storm and could see the massive quantities of material that had been displaced in a matter of minutes or hours.

The experience made me something of a catastrophist and instilled a healthy skepticism of the annual 'bankfull' flow as the universal determinant of river channel form

*Love Creek mud flow, 1982 in Santa Cruz Mountains*

**1980s continued**

**Matt Kondolf - continued**

as was then widely accepted and taught by Luna Leopold who, with Bob Curry, put me onto a master's thesis on the Carmel River. Armed with my experiential knowledge of active geomorphic processes, I returned to the east coast for my PhD., though I did most of my field work (on salmonid spawning gravels) along the western cordillera. Since then as a professor in the Department of Landscape Architecture and Environmental Planning at Berkeley, I have continued teaching Leopold's hydrology class. My teaching style followed the Griggs model of slides backed up by simple, clear diagrams on the blackboard (remember those?), and field trips – lots of field trips and field exercises. My research has been mostly farther up the river system, looking at issues such as the sediment starvation due to sediment trapping by dams and from sand mining in riverbeds, but increasingly I find myself dealing with problems in the domain of Griggs, along the coast where lack of sediment causes accelerated erosion, such as the ongoing disappearing act of the Mekong Delta.

Mark Kondolf

My time at UCSC was formative, not only because of the great faculty and opportunities to work with them on compelling projects, but also to be part of such an amazing group of grad students: supportive, enthusiastic, and with a healthy sense of humor. I made many life-long friends at UCSC, with whom I've continued to work and play.

**1990s**

**Gary Fogel, B.A. in Biology with minor in Earth Sciences, 1991**

Gary Fogel completed his Ph.D. in biology in 1998 from UCLA. He currently serves as CEO of Natural Selection, Inc., a machine learning company in San Diego. He is an IEEE Fellow and was recognized as one of the Top 100 AI Leaders in Drug Discovery and Advanced Healthcare by Deep Knowledge Analytics in 2018. Gary also serves as adjunct faculty at San Diego State University assisting with the Computational Science Research Center and teaching an introductory course in aerospace engineering. He is an AIAA Associate Fellow largely for his efforts in K-12 and college STEM education. Having maintained an interest in aeromodelling throughout his life, Gary has established over 10 world records and over 60 national records for model airplanes and is a Fellow and Leader Member of the Academy of Model Aeronautics. He enjoys writing about the history of aviation in the west, and coauthored a biography of pioneering glider pilot John Montgomery titled "Quest for Flight" with Craig

**1980s continued**

**Gary Fogel - continued**
Harwood, another UCSC Earth Sciences alum. (https://www.oupress.com/books/11130036/quest-for-flight) His latest book "Sky Rider" traces the history of pioneering balloonist Park Van Tassel, who called the bay area his home. (https://unmpress.com/books/sky-rider/9780826362827) Gary remembers trips led by Leo Laporte to Rowland's Reef to study early Cambrian fossils with other paleo students, making sure to always pack a Hawaiian shirt for the group photo on the top of the reef. Gary also remembers Gary Griggs' fantastic coastal geology course – thanks Gary! Go slugs!

**1990s**

**Mark Murphy, B.S. 1993**
My odyssey totally reflects my geological education at UCSC. I came to UCSC after growing up on the San Francisco Peninsula, and as a kid, hiking and exploring the redwood creeks of the Santa Cruz Mountains. In particular, this included San Francisquito Creek and what is now Jasper Ridge Biological Preserve, a classic Franciscan Complex, accretionary mélange. Thus began a long love affair with rocks and water.

I intended to study hydrology and geomorphology at UCSC but was quickly won over to petrology, working for Ken and Maryellen Cameron on their research. My first job after graduation was at Lawrence Berkeley Lab, where I worked with both Ian Carmichael and Paul Witherspoon, two giants in, respectively, petrology and hydrology. It seemed that volcanoes had won after I followed that passion to Johns Hopkins, acquiring a doctorate focused on the emplacement of volcanic vent domes, something going on in real time at Mount Saint Helens. Financial support for finishing my degree came from UCSC alumnus and Los Alamos National Lab (late) staff member, Jamie Gardner.

I continued my interest in fluid mechanics and lava at Pacific Northwest National Lab (Battelle), now partnered with Steve Self and George Walker in work on the emplacement of long lava flows, particularly units of the Columbia River Basalt. Much of this work benefitted from the research of UCSC Earth Science founding member Aaron Waters.

As the century turned, my research in petrology began to dwindle and my love of water returned. I was now living in Arizona after a temporary teaching job at ASU and working in environmental consulting. At Battelle, I had worked with a legend in stream ecology and fly fishing (which always seemed terribly unfair), Bert Cummings. Bert's development of the continuum model for stream evolution provided me with a starting point as I helped Pima County in Tucson manage a 5.5-million-dollar EPA research grant on the systems ecology of effluent-dependent streams in the arid West, something I continue to investigate.

After this, I was fortunate to get a place on the Obama-era EPA team providing scientific support for the Clean Water Rule, an attempt to use watershed connectivity as a basis for the definition of streams and wetlands covered by the Clean Water Act. Despite recent setbacks by the last Administration, science is returning to this debate and I have continued to investigate watershed connectivity in arid lands focused on the Santa Cruz and San Pedro Rivers in southeastern Arizona.

Just this year, I kicked off a job helping the city of Twentynine Palms in the Mojave Desert find a place to recharge their wastewater plant effluent. It turns out that the best place is just up gradient from the Oasis of Mara, the pre-contact site of residence for the Serrano and Chemehuevi and the location of the (more than) twentynine palms. This has continued my post-UCSC friendship with the remarkable Becca Lawton, who has written about the site in her wonderful book of hydro-essays, The Oasis This Time.

**1990s continued**

**Mark Murphy - continued**
I now pursue these affairs from a small, burnt-adobe house above the Rillito River in Tucson, a bit of a hike from the redwood creeks of my college days but philosophically, quite close. What I learned at UCSC was to be intellectually nimble and to try to give back to society the gifts you have received.

**Tracy Connell Hancock, M.S. 1993** (former student of Dr. Shirley Dreiss)
Tracy is the Director of Knowledge Management and Communications (KMC) with the USDA Forest Service, Research & Development branch. She oversees national program areas in science communications and delivery; patents and technology transfer, history; research publications, data quality and archive; information resources management; web services; and the Natural Inquirer STEM education program. In 2020, Tracy served as a Senior Policy Advisor with the Executive Office of the President, Office of Science and Technology Policy (OSTP) as part of the White House Leadership Development Program Fellowship. She led the President's Management Agenda Lab-to-Market Cross-Agency Priority Goal and co-chaired the National Science and Technology Council Lab-to-Market Subcommittee. While at OSTP, Tracy supported the development of Executive Order 13955 Establishing the One Trillion Trees Interagency Council and Executive Order 13956 Modernizing America's Water Resource Management and Water Infrastructure. She also led interagency teams in developing a National Emerging Contaminants Research Initiative for drinking water in response to the National Defense Authorization Act of 2020, Section 7342. Tracy is married with a daughter (Meghan who is a recent college graduate, Parsons School of Design, BA 2020). Tracy splits her time between Richmond, VA and Lewes, DE.

**Joshua Caulkins, B.S. 1998**
I love hearing about old friends and colleagues in the newsletters, and I appreciate being asked to contribute. Here goes:

I am currently the Director of the Center for Teaching and Learning Excellence at Embry-Riddle Aeronautical University in Prescott, Arizona, where I support all teaching-related initiatives and programs at the institution. I love working with faculty, staff, and flight instructors to promote evidence-based teaching practices, something I have been doing since the start of my career as an Educational Development professional in 2009. I moved with my family to the Prescott area from the Phoenix area back in May 2021, where I was working as an Assistant Director embedded within the School of Life Sciences at Arizona State University (2018-2021), and before that from the University of Rhode Island, Kingston, where I served as an Assistant Director for Faculty Development at the Center for the Advancement of Teaching and Learning (among other positions) from 2011 to 2018. The geology of the Prescott area is amazing, along with plenty of outdoor activities I like to enjoy with family, friends, colleagues, and dogs: kayaking, hiking, biking, and running.

**2000s**

**Louis Arighi, B.S. 2001**
Louis has continued his career in environmental consulting, working primarily in Silicon Valley supporting commercial and residential redevelopment projects over contaminated groundwater. As a Senior Manager at Elevate Environmental Consulting, he wears many hats, including senior geologist, health and safety manager, and site characterization expert. While the pandemic has been a challenge in many ways, he does at least spend less time commuting from his home in Santa Cruz over the hill these days.

**2000s continued**

**David Millar, B.S. 2004**
I live in Boulder, CO with my wife Kirsten and identical twin sons, Anders and Martin (age 21 months). I started my career in environmental consulting thanks to my Earth Sciences degree, and then transitioned to the electric power industry driven by concerns over climate change. I went to Duke in 2011 and received a masters in energy economics and policy. I now consult with electric utilities to help them plan their transitions to clean energy using my company's analytical software. I'd just say UCSC is a very special place, and to be able to do your undergraduate studies amongst the redwoods and beaches is just such a special privilege. And studying Earth Sciences is such a unique way to experience the incredible natural wonders throughout California, so take as many field classes as possible!

**Brooke Crowley, M.S. 2005, M.A. 2008, Ph.D. 2009**
I graduated from UCSC in 2009, but I wasn't an EPS student at that time. I completed my MS with the department in 2005 and then subsequently moved over to Anthro and then on to EEB for my MA and PhD, respectively. But throughout that time, I continued to work with Paul Koch, and honestly, I still think of EPS as my home while I was at UCSC.

Anyway, here's a little bit about me. I moved to Cincinnati in 2011 and began an Assistant Professorship at the University of Cincinnati. I have a joint appointment here (in Geology and Anthro) which is really nice given my rather eclectic and cross-disciplinary background. I have enjoyed my time in Cincinnati, and I'm actually rather amazed that I have been here 10 years. I was promoted to Full Professor this year, so I guess I've used that time productively. I think of Santa Cruz frequently and am sad that I wasn't able to come to the alumni event in May 2020. I was really looking forward to that, and hope that there will be another opportunity in the future. I did really appreciate the virtual alumni event in lieu of the normal Thirsty Bear Mayhem last December, and would advocate for another event like that in the future. It was way easier to have a conversation with other people, and certainly logistically less challenging than getting to San Francisco.

**2010s**

**Darren Tollstrup, Ph.D. 2009 and**
**Travis A. O'Brien, Ph.D 2011**
Darren Tollstrup (Ph.D. '09 w/ Jim Gill) and Travis O'Brien (Ph.D. '11 w/ Lisa Sloan and Patrick Chuang)--who met in 2005 via the EPS department and later married in 2013--recently moved to Bloomington, Indiana where Travis started a faculty position in the Indiana University Bloomington Department of Earth and Atmospheric Sciences. They have enjoyed living there since Fall 2019. Travis continues to do research on weather and climate, he now teaches classes on those topics, and he advises a research group consisting of multiple undergrads, grads, and postdocs. Darren recently became the Sales Lead for the Americas in ThermoFisher Scientific's Inorganic Mass Spectrometry division. He directly supervises a team responsible for sales of mass spectrometers in the US, and he manages sales via a large number of corporate partners in Canada and South America. His job either involves working from home or traveling to customer sites, which simplified the decision to move out to Indiana. They recently were telling friends in the IU EAS department about their fond memories of working in the White Mountains as cooks for Hilde Schwartz's 2009 summer field class.

**Jake Kramarz, B.S. 2010**
I graduated from UCSC in 2010, with a Bachelor's of Science in Earth and Planetary Sciences: Environmental Geology. After graduation, I taught at High Trails Outdoor Science School in the San Bernardino Mountains for one school year. I spent the next summer working as a Wilderness Leader at Camp Tawonga before spending a couple years in Los Angeles working

**2010s continued**

**Jake Krantz - continued**

at a farm-to-table cafe. Before starting grad school, my girlfriend (now wife) and I WWOOF'ed at Mohala Farm, on the North Shore of Oahu. I then spent a year and a half at the Colorado School of Mines, getting my Masters of Science in Hydrology. I now live in Oakland, and work for a small hydrologic consulting firm, Clearwater Hydrology. We specialize in design & permitting of creek/stream restoration and stabilization projects in Bay Area watersheds. My wife and I got married 3 years ago (today!) at Walker Creek Ranch in west Marin.

I was recently recounting my time at UCSC, when a group of students were protesting the cutting down of a few redwood trees that had to be removed to build the new Biomedical Sciences building. The students had climbed up into the trees, and I remember seeing about 20 sheriff's vehicles parked along McLaughlin Drive on that day. Needless to say, the protesting students didn't win that battle...

**Lauren Clack, B.S. 2011**

Lauren Clack here, I graduated in 2011 and quickly began moving around the country with a 6-month sabbatical traveling Africa the following year. When I returned stateside I moved to Denver, CO where I fell in love with the mountains and like-minded people here. Not that you have to put this in if you don't want to, but I make a point to let people know I had a lot of trouble finding a job for a few years. I was pretty burnt out due to school and didn't know about networking while in college, so I felt very unprepared for the real world when trying to adult for the first time. However, I have since gotten into I.T. (due to my personal background having grown up building computers with my dad) and then Salesforce which led me down the road to discovering my true love for data analysis. Now I work at IBM with my dream job of being a lead business insights analyst and AI consultant, where I get to build very fun proofs of concept, tell stories to help people understand the importance of data and data quality, and guide people to cloud computing and business understanding. I'm the happiest I've ever been in my life and very grateful for my work and personal fortunes that have come my way.

**Michael (Mikey) Nayak, Ph.D 2016**

Hard to believe it's been five years since I graduated UCSC. Since 2016, I've worked as the Principal Investigator of the DOTS and LANDIT telescopes (deployed to the South Pole in Summer 2018 for LANDIT). I was also Chief of the Research Section for the Department of Defense's largest telescope in Maui, Hawaii. In 2019, I graduated from the USAF Test Pilot School. Since 2020, I've been involved in flying and flight testing the F-16, T-38, and most recently, initial cadre for the eT-7A, the newest aircraft in the Air Force fleet.

Michael (Mikey) Nayak

**2010s continued**

**Andrew Kruger, B.S. 2016**
Greetings Slugs! Since graduating with my B.S. in 2016. I have been living in Los Angeles, working for the Jet Propulsion Laboratory. I am currently supporting two projects, as a spacecraft sequencing engineer for the upcoming Psyche Mission (launching August 2022!), and as a member of the surface operations planning team for the Perseverance rover. My education from UCSC EPS was instrumental in getting me to this point in my career, and I am eternally grateful for the amazing department you all contribute to! One of my favorite memories from the Geomorphology course was debating whether falling tree root throw contributed to more soil transport downslope than burrowing ground squirrels.

**Weston Hustace, B.S. 2017**
Since graduating in '17 as an Ocean Sciences concentration, I took a turn into the ecology world-working briefly under a CA Dept. of Fish & Wildlife project sampling salmon fisheries in the Monterey Bay, and interning with The Marine Mammal Center, in animal stranding and research. I was hired on as staff with TMMC, coordinating volunteer rescue and rehab as well as supporting small scientific projects and whale disentanglement efforts.
Two years later, I've relocated to pursue a M.S. degree in Geomatics Engineering at Oregon State! I've just started classes and research assistant duties, while exploring coastal/hydro remote sensing topics for my thesis work. I miss the EPS field labs and the department meetings with Woodstock's pizza! But glad to have plenty of hiking trails in Corvallis that remind me of UCSC.

**Tina Marie To, B.S. 2018**
After a year in shelters, hotels, and temporary housing due to the CZU fires, we moved to Connecticut near family. I finished my first year of law school online and am taking the semester off to get settled in our new home. I'm hoping to work in renewable energy law & policy.

**John Stapke, B.S. 2018**
I thought I'd share my career path since graduating from the EPS department in 2018 and touch on my exciting opportunity to work in Yosemite this winter!

In spring of 2018, I was fortunate enough to get a recommendation from Slawek Tulaczyk to submit a resume and ultimately interview at Cotton, Shires, and Associates (CSA), a local and well-respected geotechnical consulting firm based out of Los Gatos. I was pleased to accept an offer from CSA shortly before graduating UCSC at the end of spring 2018.

I took the month of July off (in hindsight wasn't long enough…) and started work in August two months after graduation. At first, I had a hard time adjusting to the commute over the 17, acclimating to an office cubicle when I wasn't doing work in the field and learning the ins and outs of geotechnical consulting. It took a year or so to adjust and feel comfortable working in geotech. Overtime, I begun to slowly find my feet and became confident enough to start applying the knowledge I gained from both the EPS department and my year of training at CSA to solve complex geotechnical problems.

Since starting at CSA, I've mapped landslides and fault trenches, and have used field monitoring instrumentation such as piezometers and inclinometers to analyze areas prone to settlement and slope instability. I've downhole logged test pits up to 20' deep (shored of course!) through active landslides locating basal rupture surfaces and characterizing slide material to provide geotechnical engineers with necessary subsurface information for slope stabilization measures.

Recently, my work as turned coastal. We've been using drone-based photogrammetry to assess the efficacy of revetment (rip rap) in slowing the effects of marine erosion on sea cliffs that support coastal infrastructure. Currently, I am working on a seawall repair in Pismo

**2010s continued**

**John Stapke - continued**

Beach where marine erosion has created a sea cave 27 feet wide under our client's house! Many of my favorite classes in undergrad, like Oceanography, Coasts in Crisis, and Coastal Geology taught by Gary Griggs, prepared me for this type of work!

I was fortunate enough to be accepted into a 5-month internship program this winter researching rockfall in Yosemite Valley as a geomorphology assistant to the park geologist. During my interview for the position, I expressed my interest in cyclic thermal stressing of granitic exfoliation sheets, a topic I first learned about in undergrad from Noah Finnegan in Geomorphology.

EART 109 in New Idria, Spring 2021

**Jim Tait, Ph.D 1995**

James F Tait passed away on April 6, 2021 in New Haven, Connecticut at 70 years of age. He will be missed by friends, family, faculty and students of Southern Connecticut State University. Jim was a native of the Pacific Palisades along the coast of California. He attended the University of California at Santa Cruz where he received a Bachelors in Psychology and Masters and Doctorate in Earth Sciences in 1995.

Jim joined the Southern Connecticut State University faculty in 1997 and was promoted to Professor of Marine and Environmental Sciences. His expertise and research in Coastal Processes contributed extensively to the understanding of beach erosion along the Connecticut Shoreline, impacting regulations and regional design strategies. Jim was a co-founder and co-coordinator of the Werth Center for Coastal and Marine Studies. He engaged undergraduate and graduate students in his courses and in field-based research focusing on environmental problem solving. Jim believed that students are the hope for the future of the climate crisis. Many of his students have gone on to graduate studies, and careers in science and environmental law.

Jim Tait with students on a research outing on Long Island Sound

**Mel Beeson, Ph.D. 1973**

Melvin Beeson passed away on April 15, 2021. Melvin attended the University of Oregon and obtained his Bachelors and Masters Degrees in Geology. In 1973 he obtained his PhD in Geology from the University of California at Santa Cruz and started working for the United States Geological Survey in Menlo Park, California – a position he loved and held for approximately 30 years.
As a volcanologist, he made many trips to the Hawaiian islands to remote places that vacationers never see, including extensive work on the island of Molokai.

Memory of Mel from Priscilla Grew: At the time Mel was getting his degree, Mel and I shared a grad student office at Berkeley in the fall of 1964 and we studied for our PhD orals together. I will never forget the afternoon when he returned to our office after his orals and told us he had failed. He was very calm about it all, and acted as though he had expected to fail (I would have run straight home sobbing). He was a good man, a wonderful, resilient person. I am so glad Dale encouraged him to get his PhD. Mel was devoted to USGS and a faithful volunteer after retirement.

Mel volunteering at USGS after his retirement

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