

# Earth & Planetary Sciences at UC Santa Cruz



Fall 2019





## Chair's welcome



### Table of Contents

- p.2 Chair's Welcome
- p.4 Department News
- p.5 GEODES
- p.6 Environmental Sciences
- p.7 Reunion 2020 / EPS-AC
- p.8 Hall of Fame
- p.10 Slugs in the Field
- p.14 Casey Moore Fund Report
- p.15 Fire & Ice
- p.17 Awards & Degrees
- p.21 From the Archives
- p.22 Margaret Zimmer
- p.24 Eli Silver
- p.27 Peter Vrolijk
- p.30 Development Update
- p.33 Alumni News
- p.37 Donor Acknowledgement

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Greetings All,

We have much to catch up on since the last newsletter. To start, during the summer, the campus leadership underwent significant turnover with the departures of the Chancellor, George Blumenthal, and Executive Vice Chancellor (EVC), Marlene Tromp. The new Chancellor, Cynthia Larive, formerly the Provost and Executive Vice-Chancellor at UC Riverside, arrived in July and immediately appointed Laurie Kletzer, Dean of Graduate Studies, as interim EVC. The latter directly impacted EPS as Quentin Williams was appointed interim Dean of Graduate Studies. He joins a number of other EPS faculty in various administrative roles across campus including Paul Koch, who just started a second 5-year term as Dean of the Physical Biological Sciences, and Elise Knittle who, after 3 years, will continue chairing Applied Math and Statistics. Anecdotally, over the ~ 3 decades I've been here it seems that EPS faculty are called upon for administrative leadership roles at a far higher rate than other programs. EPS also welcomed another new faculty member, Professor Heather Savage, who arrived in July. Heather, formerly a professor at Columbia University, is a structural geologist who primarily studies the dynamics/mechanics of fault zones, their stability/instability, based mainly on observational constraints and models. She is in the process of setting up a high pressure rock mechanics laboratory. EPS faculty continue to be recognized for their outstanding scientific achievements. Emily Brodsky received multiple honors this past year. She was chosen to give the annual Beno Gutenberg Lecture at the AGU Fall Meeting in recognition of her novel contributions to seismology. She was also chosen as the 2019 recipient of the GSA's George P. Woollard Award for outstanding contributions to geology through the geophysical methods, and elected a fellow of the Geological Society of America. Francis Nimmo was honored with the Royal Astronomical Society's 2019 Harold Jeffreys Lectureship which is given annually by a "distinguished and eloquent speaker on a topic in geophysics". And finally, Andy Fisher was just elected fellow of the American Association for the Advancement of Science, an honor bestowed upon members by their peers in recognition of meritorious efforts to advance science or its applications. Congratulations to all! We also quietly celebrated the successful launch of EPS's new Environmental Sciences major (<https://esci.ucsc.edu/index.html>). The core faculty for the major are primarily from two departments, Earth and

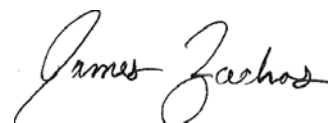
## Chair's welcome (cont'd)

Planetary Sciences and Ocean Sciences. Faculty from other departments such as Microbiology and Environmental Toxicology, Ecology and Evolutionary Biology, and Environmental Studies are contributing courses as well. The first year offering included new foundation classes ESCI 100A “Intro to Environmental Sciences” and ESCI 100B, “Environmental Processes”. About a dozen current students have already declared the major and we anticipate that number to grow quickly: over 70 freshmen attended the ESCI major orientation meeting in September.

At the June commencement ceremony EPS honored 55 graduates. The commencement speaker was Dr. Peter Vrolijk who earned his Ph.D. in 1987 with Casey Moore and spent a good part of his career as a Senior Researcher with the Upstream Division of Exxon Mobil. He also held a number of academic appointments including with New Mexico Inst. of Mining and Technology and Woods Hole Oceanographic Inst. Peter has also served with distinction on the EPS Advisory Committee and Alumni council since 2012, helping to organize our

fund-raising efforts and playing a key role in the establishment of two of the department's largest endowments. To honor the achievements of our Alumni, in 2018 EPS established a department “Hall of Fame”. The 2019 class of inductees includes: Gerald Weber, Ph.D. (UCSC Ph.D 1980); Margaret Rusmore, Ph.D., (UCSC B.S. 1980), Cathryn Newton, Ph.D. (UCSC Ph.D.1983), and Fred Phillips, Ph.D. (UCSC B.A. 1976). Congratulations!

Finally, we will be back at the Thirsty Bear in San Francisco during AGU this year (December 10, 2019 from 6-8:30 pm) and we’ve also been busy planning for the EPS Alumni Reunion event to be held the weekend of **May 1-3, 2020**. The reunion committee, chaired by Eli Silver, has planned a full schedule of events including lectures, tours, and field trips, geologic and otherwise, along with social activities. Given the initial responses of Alumni this promises to be one of our larger reunions. We look forward to seeing many you!



Jim Zachos

**We hope to see you in San Francisco for our  
19th Annual UCSC EPS Alumni Event at 2019 AGU!**

**Tuesday, December 10, 2019**

**from 6:00pm - 8:30pm**

**Thirsty Bear, 661 Howard Street,  
San Francisco, 94105**



Thanks to generous donation pledges to the EPS General Fund by some of our EPS Alumni Council members, we are able to afford to continue the tradition of our annual alumni event!

**Go Slugs, You Rock!!**

## Department News



Emily Brodsky



Xinting Yu



Francis Nimmo



[www.facebook.com/  
UcscEPS](http://www.facebook.com/UcscEPS)

**Prof. Emily Brodsky** became a Fellow of the Geological Society of America and was also awarded their George P. Woollard award.

**Prof. Emily Brodsky** was chosen by the American Geophysical Union to give the annual Beno Gutenberg lecture.

**Prof. Andy Fisher** was elected as a American Association for the Advancement of Science (AAAS) Fellow

**Prof. Francis Nimmo** received the 2019 Harold Jeffreys lectureship from the Royal Astronomical Society.

**Dr. Xinting Yu** was awarded a 51 Pegasi fellowship by the Heising-Simons foundation.

**Dr. Adina Paytan** was awarded a grant from NSF to bring GEOPATHS to our department. GEOPATHS is a national initiative that is attempting to broaden participation and improve student success in geosciences.

**Prof. Xi Zhang** was awarded the Greeley early career award in the AGU Planetary Sciences section

Alumni **Wes Hildreth** and **Judy Fierstien** received the 2019 GSA Florence Bascom Geologic Mapping Award

**Prof Casey Moore** will feature as one of the AGU "Giants of Plate Tectonics" at 5:30pm on Tuesday 10th December.

**Dr. Adina Paytan** received the 2019 A.G. Huntsman Award from the Royal Society of Canada





**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.**

Dear EPS community,

It's been a great year for GEODES (Geoscientists Encouraging Openness and Diversity in the Earth Sciences)! We are a grad student-run group focused on building community among EPS faculty and students, and breaking down barriers to inclusion of underrepresented groups in Earth Sciences. Early last spring, we did our first fundraising drive, through UCSC's Giving Day. We were both thrilled and deeply humbled to receive \$10,800 from 81 alumni, faculty, and current students! From the bottoms of our hearts, thank you! These funds, along with financial backing from the EPS department and donations from Woodstock's Pizza and Lagunitas Brewing, ensure the continued viability of GEODES by providing ongoing support for future events, and enabling growth in new directions.

Over the last year, we have hosted ten events, including workshops on inclusive teaching practices, racial diversity in the Earth sciences, work-life balance, and Imposter Syndrome; a mental health brown bag; a student research symposium; quarterly pizza dinners; an end-of year reflection and goal-setting event; and our ever-popular career panel. We look forward to hosting more events that bring the community together to discuss important topics and learn new ways to engage with each other. As always, we welcome any and all feedback! Just email us at [ucscgeodes@gmail.com](mailto:ucscgeodes@gmail.com), or visit our website at <http://ucscgeodes.wixsite.com/home> for updates and resources.

Love,  
GEODES



EPS grads and undergrads during the first GEODES camping trip

# New Environmental Sciences Major Update - Patrick Chuang

Beginning in the 2018-19 academic year, Earth and Planetary Sciences began a brand new undergraduate major in Environmental Sciences <https://esci.ucsc.edu/>. The major is a collaboration with Ocean Sciences, and has a completely separate set of requirements from the Earth Sciences major, including new core classes. The goal of the major is to teach students how to apply the tools of math, physics and chemistry to environmental problems such as water resources, air quality, oceanography, and climate. The core classes have a strong emphasis on quantitative skills, including statistics and data analysis, while expanded offerings in hydrology, aquatic chemistry, oceanography, air pollution, and climate are now available as electives. Both Ocean Sciences and EPS were given new faculty positions to support Environmental Sciences, and the new hires include Claudie Beaulieu (climate variability and change), Jerome Fiechter (physical oceanography), Mathis Hain (biogeochemical cycles), and Margaret Zimmer (hydrology). While the major is in its infancy (we expect about a dozen graduates in Spring 2020), we have received considerable interest from incoming frosh this year and expect rapid growth in our majors over the next 5 years. Graduates will be well-prepared for careers in a wide range of fields, including environmental consulting, air and water management agencies, environmental compliance, and pollution remediation. The Program Director, Patrick Chuang ([pchuang@ucsc.edu](mailto:pchuang@ucsc.edu)), welcomes input from any alumni who have suggestions, internship opportunities, connections in either the public or private sector, or advice on this new major.



The inaugural Environmental Sciences intake, inside and out.

## Save the Date - EPS Alumni Reunion 2020!

UCSC Earth & Planetary Sciences is holding an Alumni Reunion the weekend of **May 1-3, 2020**. We have begun planning a fun and illuminating set of events, including field trips, presentations, and plenty of time to mingle and talk to old and new friends, and enjoy local Santa Cruz food and libations. You can find current information and sign-up forms at this page on our website (<https://eps.ucsc.edu/about/reunion20>) or by emailing Eli Silver ([esilver@ucsc.edu](mailto:esilver@ucsc.edu)) or Amy Kornberg ([amylkorn@ucsc.edu](mailto:amylkorn@ucsc.edu)).



## The Earth and Planetary Sciences Alumni Council (EPS-AC)

The EPS Alumni 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. New members who have joined the EPS-AC in the last year include these exceptional individuals: Phil Teas (PhD, 1998), Kathy Sullivan (BS, 1973), Christy Kennedy (BS, 2000; MS, 2002), Mike McGroder (BS, 1980), James Hein (PhD, 1973), and Lisa White (PhD, 1990). The EPS Department also extends deep appreciation to these former EPS-AC members who have recently completed their service: Gerry Weber, Nancy Ann Budden, and Krystle Catalli. 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](mailto:stefano00038@yahoo.com), [pvrolijk@comcast.net](mailto:pvrolijk@comcast.net).

On September 15, 2019 Stefano Mazzoni hosted a small get together of Banana Slugs at Rudyard's Pub in Houston. Joining him were Adam Heffernan, Lisa Hawkins, Kenneth Fowler and Deb Carlo. Due to a scheduling oversight, the event conflicted with the annual SEG meeting which kept attendance low. Nonetheless, it was a great opportunity to catch up with old friends and make some new connections. There will be another event for Slugs in Houston in 2020, likely coinciding with the national AAPG meeting in June (for info please reach out to Stefano Mazzoni - [stefano00038@yahoo.com](mailto:stefano00038@yahoo.com)).



# Alumni Hall of Fame

2019



The UCSC Earth and Planetary Sciences Alumni Council created an Alumni Hall of Fame in 2018 to honor the achievements of our fellow undergraduate and graduate alumni. The members of the Alumni Council wish to recognize our alumni colleagues annually for their contributions and achievements built off the Santa Cruz experience.

Recipients of this year's award include Margaret Rusmore (B.S. 1980), Cathryn Newton (Ph.D. 1983), Gerry Weber (Ph.D. 1980) and Fred Phillips (B.A. 1976). We know that many more of our alumni who are worthy of this recognition. **Suggestions for nominations in future years are welcome and should be forwarded to Peter Vrolijk (pvrolijk17@gmail.com) or Stefano Mazzoni (stefano00038@yahoo.com) for consideration in next year's award.** Following is a brief description from each recipient about how her or his Santa Cruz education influenced their subsequent careers.

## Margaret Rusmore

The Earth and Planetary Science department shaped the foundation of my career so it is hard to pick a single factor. Having mulled it over though, I think two factors caused me to join EPS (defecting from chemistry) and propelled my career - first, the buzz of excitement over earth science and the sense of discovery that permeated the department was infectious and reminded me why I wanted to be a scientist -- and second -- the department made me feel, even in my very first class, that I was welcome to join in the discovery and could make valuable contributions to the field. So, thank you all, and especially those faculty and students who shared the old applied science "bunker" in the redwoods in the late 70's.



Photo by Robert Rusmore Bogue



## Hall of Fame (cont.)

**Fred Phillips:**

I arrived at UCSC in 1972, just seven years after the campus opened. At that time, UCSC was one of the most difficult campuses of the UC System to which gain admission. It was an exciting era of world upheaval, revolutionary thought, and drugs and nudity, too. The revolution included earth science: plate tectonics was so new that none of our textbooks even mentioned it. The faculty of the Board of Earth Science (as it was then termed) were also mostly young and dynamic. Ken Cameron, Gary Griggs, Jim Gill, Casey Moore, and Bob Garrison had particularly large influences on me. More than anything else, I came away with a sense that earth science was exciting and dynamic and that there were wonderful things to discover if one only had the gumption to dive in head first. The remarkable thing about that perspective was that it proved to be true! In the course of my career I've worked on many problems: use of environmental tracers to understand groundwater flow systems and groundwater recharge, the hydrodynamics of desert vadose zones, how the earth actually generates runoff, the systematics of the production of cosmogenic nuclides, the glacial history of the earth, quantification of rates and dates in geomorphology, conceptual models for extensional tectonics, and quite a few others. A big part of

the reason I embarked on such a wide path was the perspective I took away from the Earth Science program at UCSC: that the Earth forms some kind of unified system and that the grasp of broad but physically based principles would enable me to solve the important problems. It was a great start to a long career that is still barreling along.

**Jerry Weber**

Jerry Weber has had an outsized influence on generations of UCSC students. While the Alumni Hall of Fame is intended to recognize alumni who have used their Santa Cruz experience to pursue full and influential careers and lives, Jerry is unique in that he applied his Santa Cruz experience to benefit subsequent decades of students, perhaps more students than a handful of full-time faculty.

For this reason, we think that it is fitting to welcome Jerry into the Hall of Fame for using his Santa Cruz experience to influence a vast number of contemporary and later students.

In recognition of Jerry's contributions, we invite readers to share with us your experiences with Jerry. Any response we receive will be compiled in a future newsletter article.

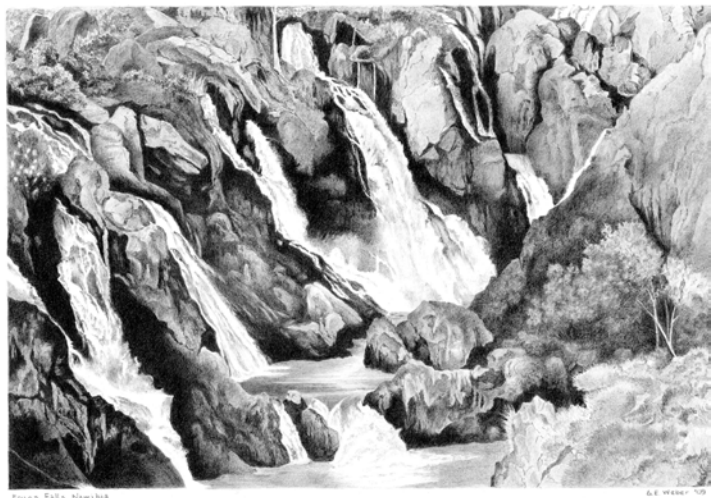
November 7, 2019

Peter Vrolijk

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Chuck Lawson

[chalawson@verizon.net](mailto:chalawson@verizon.net)



Artwork by Jerry Weber



# Slugs in the Field (and elsewhere)





## Slugs in the Field (and elsewhere)



Students from Tanta University in Egypt on a field trip in 2018 led by UCSC Alum Prof. Ahmed El Shistawy (M.S. 1985, Ph.D. 1990), who is standing at the back of the group and wearing a white baseball cap. Note the prominence of female students on this field trip, which was to study limestones in the Abu Rawash area just to the north of the Pyramids.

### Our Grads in the community

Two UCSC grad students, Gavin Piccione and Graham Edwards, the “Geologic Gents”, present a monthly Rockin’ Pop-Up rock talk at the Natural History Museum in Santa Cruz (every fourth Saturday of the month). They also presented a special session on selenology (the geology of the Moon) to celebrate the 50th anniversary of the first moon landing.

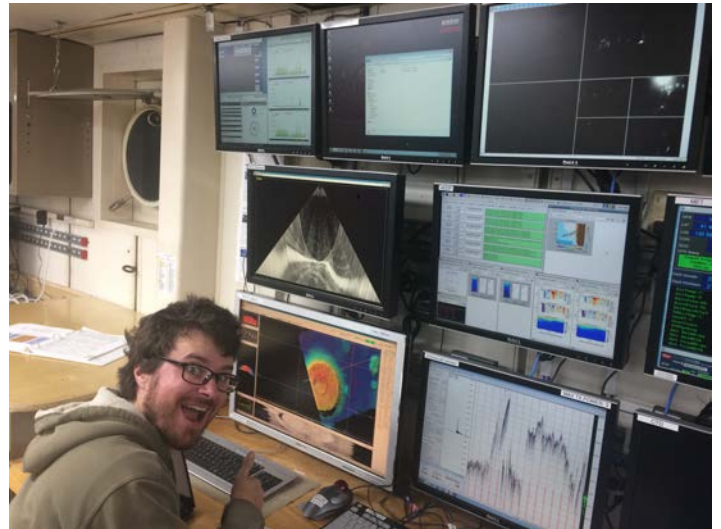




## Slugs in the Field (and elsewhere)



Grad student Kelian Dascher-Cousineau and Profs. Brodsky and Blackburn examining glacial polish, Yosemite



Grad student Neil Foley finds a seamount in the Mendocino Fracture Zone (R.V. Revelle).



Examining the Ridgecrest (Mw 6.4) earthquake surface rupture



Equipment for monitoring droplet emissions in a power station cooling tower



# Slugs in the Field (and elsewhere)



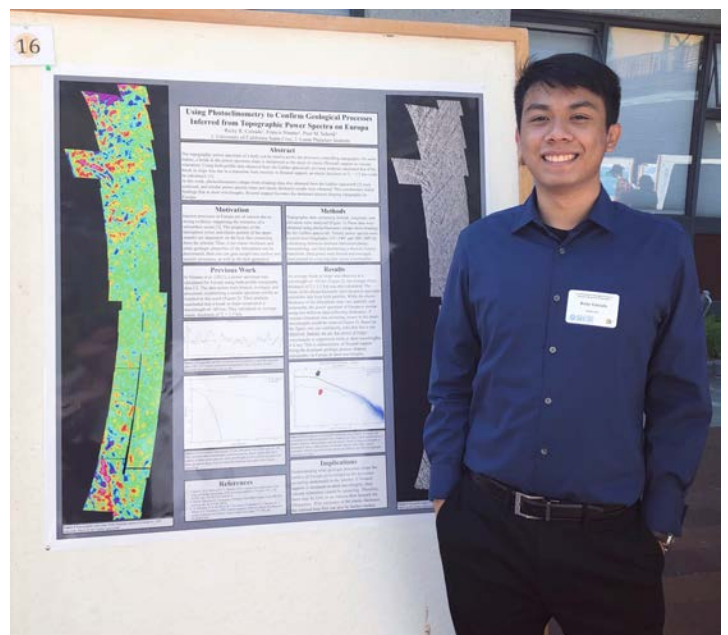
Prof. Schwartz with seismometer,  
Alaska



Death Valley (Structural Geology Field Trip)



Don't lick the rocks! Graduate student Jason  
Ott.



Not all Slugs work in the field . . .  
Undergraduate Ricky Calzada presenting his  
work on Europa.

## J. Casey Moore Fund Report

**The Casey Moore Fund supports graduate student research.  
The 2018 awardee was Kelian Dascher-Cousineau**



Faults such as the San Andreas are iconic in the landscape. Sag ponds, shutter ridges and linear valleys have long been documented and tied to the presence of faults such as this one. Underlying these features is a halo of fractures and comminuted rock extending up to a kilometer in width, known as damage zones. With support from the J. Casey Moore Fund, I set out to tighten the relationship between damage zones and the landscape. Disentangling the long term effect of motion along faults, fault damage, and landscape evolution is complicated. A variety of tools are necessary to assess this system. Three major components are at the core of my research: landscape evolution models, remote sensing using high-resolution topography, and a ground-truth expedition. Iterating between numerical simulations of landscapes and topography data along the San Andreas fault, I gathered geomorphic metrics that characterize the topography. These metrics, I hypothesized, would correlate with fault damage based on model results and theoretical arguments. The fund provided the support for me to test these predictions, specifically, in the form of a three-week road trip up and down the San Andreas.

To the North, I worked along the Gualala River which runs straight as an arrow along the San Andreas, Fort Ross, and Point Reyes. To the south, we stopped at Carrizo Plains, the Big Bend, Leona Valley, Little Rock, the Devil's Punchbowl, Wrightwood and Mill Creek. Lots to see in little time! Throughout, I carefully collected hundreds of measurements of fault damage, recording fracture density, rock strength and observations of the interplay of the fault and the landscape. This preliminary data demonstrates a good correlation between remote measurements to the ground truth data that I collected. Thus, I build toward the possibility of detecting fault damage on a large scale. What's next? These observations pave the way towards asking questions about the faulting process itself. Specifically, we hope to use remote measurements, calibrated to the ground truth data, to observe lateral heterogeneity along the fault. Are there sections of the San Andreas that are more damaged than others, and why? We expect that these measurements to extend our characterization of hazard beyond the paleoseismic record



# Fire & Ice

Ricky Garza-Giron

In 2015 I came to the Earth and Planetary Sciences Department of UCSC to work on my PhD with Professor Emily Brodsky. I have a background in geophysics engineering from the School of Engineering of the National Autonomous University of Mexico (UNAM). My main line of research is volcano seismology and I focus on questions such as: What happens to volcanoes when they are erupting? What happens to volcanoes when they are not erupting? Are there patterns in the data that suggest that all volcanoes behave alike? Or is it that, much like humans, volcanoes might share a common way of being, but when you look at each one of them individually they behave totally different? Are they predictable in any sense? How well can we characterize the anatomy of a volcano? As elemental as these types of questions may seem, their answers are much more intricate and quite difficult to find.

When I first got here, Professor Brodsky knew that I was interested in learning advanced level statistical seismology, so she came to me and asked: "Are you good at counting? Counting as in 1,2,3?" It didn't sound very advanced to me, but I went along and we talked about counting the number of aftershocks produced by earthquakes in the presumably warmer crust of an active volcano and comparing it to the number of aftershocks that would follow an earthquake of the same magnitude in a non-volcanic region. So counting begun and counting got, well, very complicated. We worked with Dr. Stephanie Prejean from the Alaska Volcano Observatory (AVO) exploring the massive data set of earthquakes in all the volcanoes in Alaska and the Aleutian Islands. We developed codes to analyze the space-time clustering of earthquakes in these volcanoes but it turned out that as exciting and impressive as the AVO data set was, it was not enough for our study. Sigh. However, days after, we

contacted the Japan Meteorological Agency (JMA) and we were able to get their data and performed our study in all the active volcanoes in Japan. We found that, counter-intuitively, earthquakes on volcanoes do not cluster in mainshock-aftershock sequences more or less than they do in other non-volcanic regions, suggesting a common mechanism for the triggering of earthquakes in the shallow crust. After this, it was suggested to me that as a seismologist it would be good to actually work with wiggles (we called them waveforms). To this end, I started another project with Professor Brodsky and Dr. Matt Haney, also from AVO, studying the earthquakes that occurred during a large volcanic eruption in Okmok Caldera located in the Aleutian Islands. One of the questions that scientists and the general public ask once a volcanic eruption is ongoing is: when is it going to end? To us, it made sense that once a volcano is losing pressure the conduit used by the fluids as a pathway to the surface would collapse, breaking the rocks surrounding it, hence causing many earthquakes. We have been tracking this indicator by doing template matching, a technique that aims to find new signals based on the similarity they hold with the ones that had already been observed. Think



Working crew & helicopter in Mt Redoubt, Alaska (the author is on the right)

## Fire & Ice (cont.)

of the smartphone apps that find your favorite song, you press the button, the app gets the waveforms of the song, and then it looks for the best match in a data base.

Instead of songs, we use the waveforms of observed earthquakes to find many more earthquakes in the noisy eruptive seismic data. The data that I used is collected by monitoring agencies and academic institutions throughout many years.

In the summer of 2018, I got the opportunity to contribute by doing field work in Mount Spurr and Mount Redoubt, two colossal active volcanoes in the Cook Inlet region of Alaska. It really felt like finally being part of the Major Leagues of geophysics hanging out with some of the world experts in volcanic instrumentation. We got along well and in the summer of 2019 I was invited by AVO's geophysicist Max Kauffman once again to do field work. This time we traversed the Aleutian Islands by boat with an onboard helicopter changing the old analog seismic stations to digital instruments to be able to have better data quality from these volcanoes. This opportunity was prime not only because of what I learned and the people I met, but also because I got to see Okmok Caldera, my area of study. This was a dream come true and reinforced my belief that a geophysicist should not only be exposed to computers and books, but also it is significantly important to go out in the field and see things with your

own eyes. Going to Okmok changed my way of thinking about it.

A great thing about our department is the diversity of disciplines that our faculty are interested in and the collaborations that are established when there is a common interest among people. Because of my background as a geophysics engineer, I was very interested in the research that Professor Slawek Tulaczyk conducts in Antarctica. His group had been using airborne TEM (Transient Electromagnetism), in collaboration with the University of Aarhus using an instrument called SkyTEM, to be able to get geoelectric images that can help understand the structure underneath the surface of frozen lakes and glaciers. I found it fascinating, and after expressing my interest Professor Tulaczyk agreed on working with me on a project that uses this method to be able to make estimates of geothermal heat-flux along the coast of the McMurdo Dry Valleys. The method consists of flying a transmitter coil hanging from a helicopter, through which pulses of currents of the order of 100 Ampere travel around, creating a magnetic field that propagates into the ground and induces eddy currents in conductive materials, which in turn induce a secondary magnetic field that travels back and is measured in a receiver coil. The result is a colorful image of the differences in resistivity in the sub-surface which can help us know the thickness of ice and permafrost. The goal is to use the variations in the later to get constraints of the changes of geothermal heat-flux. In November and December of 2018, I traveled down to Antarctica with Professor Tulaczyk and his collaborators to be part of the acquisition of the new SkyTEM data set. Soon we will start having answers about the variability of geothermal heat-flux in this Antarctic region and will hopefully be able to understand more about its effect on ice-flow dynamics and thus on global climate models!



Helping microbiologist Jill Mikucki drill through ice, Dry Valleys, Antarctica



## Undergraduate Awards

Association for Women Geoscientists (AWG)

Outstanding Student Award:

**Kallee Bareket-Shavit**

Kathryn D. Sullivan Research Impact Award in Earth  
and Marine Sciences:

**Christopher Causbrook**

Kathryn D. Sullivan Undergraduate Research Award:

**Paul Colosi**

Dean's Undergraduate Thesis Award:

**Elizabeth Langdon-Lassagne**

Chancellor's Undergraduate Research Award:

**Elizabeth Langdon-Lassagne**

Koret Undergraduate Research Scholarship:

**Flor Vanessa Maciel**

Crown College Research Project Fund:

**Flor Vanessa Maciel**

Gunderson Family Research Award in Coastal  
Sustainability:

**Anthony Mazzini**

Eli Silver Earth and Planetary Science Opportunities  
Fund Undergraduate Award:

**Esther Munoz**

Woods Hole Institute of Oceanography Internship:

**Briana Prado**

Holly Day Barnett Scholarship:

**Shannon McClish**

National Weather Service Internship in Monterey:

**Sylvan Ransom**

Argonne National Lab Internship in the  
Department of Energy SULI Program:

**Sylvan Ransom**

Stanford Undergraduate Research in Geosciences  
Experience (SURGE) Scholar:

**Omar Rosales-Cortez**

NSF Graduate Research Fellowship Program:

**David Small**

Dr. Earl H. Myers & Ethel M. Myers  
Oceanographic & Marine Biology Trust Award  
(AKA Myers Trust Award):

**Laurel Teague**

Friends of the Seymour Center Student Research  
and Education Award:

**Laurel Teague**

PBSCI Future Leaders in Coastal Science Award:

**Maya Montalvo**

**Loren Tolley**

Weber-Holt Grants:

**Kallee Bareket-Shavit**

**Carly Cheap**

**Stefani Himes**

**Perla Richards**

**Madeline Salazar**

**Catherine Takata**

**Lena Tokmakoff**



# Undergraduate Degrees

Oscar Alvarado  
 Tori Andrade  
 Soleil Andrews  
 Kallee Bareket-Shavit\*\*  
 Victor Bautista  
 Owen Book  
 Paige Borges  
 Leah Browne  
 Marnie Bryant  
 Ricky Calzada\*  
 Elizabeth Cameron  
 Dante A. Capone\*\*  
 Brendan Liam Chapman  
 Carly Cheap  
 Megan Cheng  
 Christopher Dory\*\*  
 Trevor Edwards  
 Nicholas Federici  
 Filomena Fuchs  
 Joseph Emmanuel Gutierrez  
 Brendan Harrison  
 Nanae Hayashi  
 Stefani Himes\*\*  
 Crystal Ho  
 Jessica Huynh  
 Kyle Kim  
 Jade Kluge  
 Benjamin Knowlton  
 Gita Kushwaha\*  
 Hector Leal\*  
 Jonathan Lopez-Baeza  
 Noah Lyman  
 Flor Maciel  
 Lezhi Mao  
 Natalie Marquardt\*  
 Cormac McCarthy

Shannon McClish\*\*  
 Brodie Miller  
 Esther Muñoz  
 Noemi Ortega  
 Jeramy Ott\*  
 Denise Payan  
 Jennifer Perez  
 Sergio Perez  
 Sandra Ramos Hernandez  
 Jennifer Rangel  
 Sylvan Ransom  
 Sara Ray  
 Perla Richards  
 Arista Regalia  
 Omar Rosales-Cortez\*  
 Zafar Rustamkulov  
 Madeline Salazar  
 Juliana Simon  
 Skyler Strange  
 Jonathan Swanson  
 Laurel Teague  
 Lena Tokmakoff  
 Redmond Walton

*\*Candidate for Honors in the Major*

*\*\*Candidate for Highest Honors in the Major*





## Graduate Awards

Chancellor's Dissertation Year Fellowship:

**Carver Bierson**

Dr. Earl H. Myers and Ethel M. Myers Oceanographic &  
Marine Biology Trust Award (Myers Trust Award):

**Andi Greene**

Earth's Environment Fund Award:

**Will Chapman**

Eli Silver Earth and Planetary Science Opportunities Fund  
Graduate Award:

**Adrienne Ricker**

J. Casey Moore Fund Award:

**Kelian Dascher-Cousineau**

Zhen and Ren Wu Memorial Fund Award in Geophysics:

**Em Schnorr**

Natural Sciences and Engineering Research Council of  
Canada (NSERC) 2-Year Scholarship:

**Kelian Dascher-Cousineau**

ARCS Foundations Fellowship:

**Heather Shaddox**

Kathryn D. Sullivan Research Impact Award in Earth and  
Marine Sciences:

**Amanda Donaldson**

Phi Beta Kappa Norall Fellowship:

**Araceli Serrano**

PBSCI Future Leaders in Coastal Sciences Award:

**Andi Greene**

NASA Earth and Space Science Fellowship:

**Nick Zube**

Graduate Student Association Travel Grant:

**Andi Greene**

EPS Department Outstanding TA Award (student voted):

**Kellen Martin - 1st place**

**Ricky Garza Giron - 2nd Place**

National Science Foundation Graduate Research  
Fellowship (NSF GRFP):

**Andi Greene**

**Zack Kaufman**

Aaron and Elizabeth Waters Award:

**Graham Edwards**

**Heather Shaddox**



# Graduate Degrees

## GRADUATE DEGREES

### **Barcheck, Grace**

PhD (Fall 2018)

Basal seismicity of the Whillans Ice Plain, West Antarctica: Insights into multi-scale basal heterogeneity, stick-slip sliding, and ice stream basal processes.

### **DeJarnatt, Benjamin**

MS (Spring 2019)

Depth-profile laser ablation split-stream ICP-MS analysis of metamorphic zircon rims from the Orocopia Schist: Implications for the chronology of erosion and underplating during flat-slab subduction

### **Edwards, Joel**

PhD (Fall 2018)

Outer forearc dynamics offshore Costa Rica from 3D seismic imagings

### **Harper, Dustin**

PhD (Fall 2018)

The coupling of climate and carbon cycle during the late Paleocene and early Eocene on long and short timescales

### **Killam, Daniel**

PhD (Fall 2018)

The When, How and Why of Bivalve Shell Growth: Sclerochronology as a Tool to Understand Physiology in Jurassic and Future Oceans

### **Martinez Fernandez, Ana**

PhD (Fall 2018)

Effects of ocean acidification on corals and benthic foraminifera: insights from field studies

### **Nereson, Alex**

PhD (Fall 2018)

History and mechanisms of slow landslide movement at Oak Ridge earth flow, California

### **Rhode, Andrea**

MS (Winter 2019)

Evaluating Shallow Slip Extent in Large Megathrust Earthquakes by Analyzing P and Pdiff Coda Arrivals for Water Reverberations

### **Taylor, Stephanie**

PhD (Fall 2018)

Experimental Study of Naturalistic Granular Flow Rheology

### **Vennari, Cara**

PhD (Spring 2019)

Understanding Stability and Cycling of Volatiles in the Mantle with High Pressure Experiments

### **White, Sarah**

PhD (Summer 2019)

Tropical Pacific climate and El Niño strength over the past five million years





## From the Archives



Benedetta Treves is on the left with the shotgun (an Italian scientist who spent some time in Alaska and Santa Cruz learning about subduction processes that she was applying to work in the Appenines), Tim Byrne, Casey Moore, Jim Sample, and Peter Vrolijk.



Jerry Weber spreads the gospel, July 1983.  
Carl Platt at far left.



Charles Richter (seated) and Hiroo Kanamori (standing) at the dedication of the Richter Lab.



Fieldwork, Mono Lake.

## Margaret Zimmer's Wetland Research



The health of California coasts and near-shore environments is in an increasingly perilous state due to the inundation of land-based pollution. Estuaries and salt marshes, situated at the

land-sea interface, are particularly vulnerable to these water quality issues. Our ability to set local-to state-level regulations to mitigate the impacts of land-based pollution on our coastal waters critically hinges on accurate identification and characterization of pollutant sources. While extensive work has gone into understanding coastal nutrient loading from rivers and adjacent lands, which has informed best management practice efforts to reduce pollution into rivers, there is still a substantial gap in our understanding of pollution coming from groundwater. Groundwater is poorly understood for two major reasons: 1) Observations and quantification of groundwater inputs are difficult and the common discipline-specific methodologies are challenging to compare across ecosystem types and 2) The role of groundwater is often overlooked in nutrient cycling in coastal field studies and modeling simulations because marine and riverine inputs



Figure 1. EPS undergraduate students Maya Montalvo (left) and Loren Tolley-Mann (right) bringing equipment to field site for groundwater well installations. Photo credit: Andi Greene



Figure 2. NITRATES research team members discussing installation plans at one of the salt marsh field sites.

are conventionally thought to dominate mass fluxes to estuaries. This lack of information prevents us from not only quantifying the impacts of groundwater inputs, but also from understanding the potential of groundwater systems to mitigate terrestrial nutrient loading. Across-disciplinary, multi-institutional collaborative effort lead by EPS Assistant Professor Margaret Zimmer is seeking to quantify the fate and transport of nutrients, specifically nitrate, along groundwater flowpaths en route to Elkhorn Slough, an ecologically important estuary in Monterey Bay. The NITRATES (NItrate TRansport And Transformations in Elkhorn Slough) research group is funded through California SeaGrant and consists of a team of undergraduate



## Wetlands (cont.)

and graduate EPS students, including Andi Greene (MS), Emilio Grande (PhD), Maya Montalvo (BS), and Loren Tolley-Mann (BS). The co-PIs on this project include Drs. Erin Seybold (Kansas Geological Survey; University of Kansas), Anna Braswell (CU Boulder), Corianne Tatariw (University of Alabama), and Ate Visser (Lawrence Livermore National Lab; Figure 1). The NITRATES research team had their first field season in summer 2019, where they began characterizing the hydrology, pedology, and biogeochemistry of representative salt marsh systems at Elkhorn Slough. Through a targeted, field-based approach, the team sought to mechanistically understand how surface water-groundwater interactions at this land-sea interface influence the export and retention of terrestrially-derived nitrate.

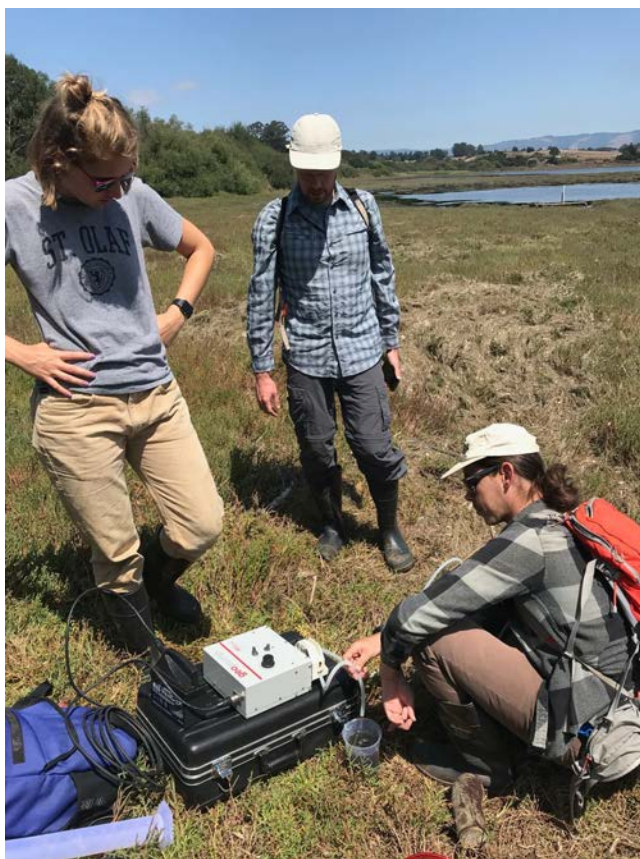


Figure 3. PhD student Emilio Grande (right) pumping pore water samples at the field site with co-PIs Drs. Erin Seybold and Ate Visser

These efforts included in depth soil characterization, installation of a boardwalk as well as nested wells and piezometers, and deployment of redox sondes across these salt marsh systems (Figures 1, 2, and 4). Coupled with these installations, the research team has been conducting denitrification incubation experiments on sediment cores as well as periodic (~monthly) sampling of surface water and groundwater to analyze concentrations of major solutes, including nitrate.

Graduate student Emilio Grande, MS student Andi Greene, Dr. Ate Visser, and Dr. Margaret Zimmer current and future plans include sampling subsurface water for age dating as well as high resolution sampling campaigns in order to capture hydrologic and biogeochemical variability in these systems across tidal cycles. Through these collaborative efforts, the research team seeks to quantify the fate of nitrate in groundwater systems and disseminate the project data and interpretation with local-, regional-, and state-level water quality stakeholder agencies. The anticipated results will help inform total mean daily load regulation efforts for nitrate currently being discussed locally.



Figure 4. EPS graduate students (left to right) Andi Greene, Emilio Grande, Will Chapman, and Galen Gorski.

## Eli Silver

Emeritus Eli Silver has been in our department since 1973. His research focuses on global tectonics and marine geophysics

In previous issues of the newsletter, notably Rob Coe's article last year, the history of the department has been very capably discussed. In this article I'll focus on how one marine geologist has been able to thrive at an institution without major ships.

My first view of the UCSC campus was in 1969. I had just attended the first GSA Penrose conference at Asilomar, near Monterey, and Bill Normark suggested we go north to visit Gary Griggs in Santa Cruz. Gary was a very gracious host and showed us around the campus, including his great office in Nat Sci II. He pointed out, sadly, that the department was moving to Applied Sciences soon, where there was more room to expand, but where the office space was nowhere near as attractive.

The following year, I completed my postdoc and was offered a job at the USGS in Menlo Park. In my third year at the GS I wrote a note to Bob Garrison, offering to teach a grad seminar once a week, since I was living in Santa Cruz and commuting. Bob wrote back right away, offering me a temporary half time position for 6 months if I would co-teach an oceanography course with my then wife Mary Silver, as well as a grad seminar. That sounded like fun so I accepted. I then sat in on seminars as potential faculty applicants came through giving their talks. When it came time to decide on which person to offer the job to, I was completely surprised when Leo Laporte came by and offered me the position! That was the second (and last) time I was offered a job without applying. Things have gotten harder now.

Commuting to Menlo Park and back made for an 11-hour day, so I looked forward to the more relaxed life of not having to commute. It turned out that with the combination of preparing lectures, writing grant

proposals and papers, teaching and mentoring grad students, and doing the usual admin jobs – I was working more than 11 hours a day and at least one day on the weekend. On the other hand, most of what I did was what I chose to do. The department always let me choose what I

wanted to teach and how to teach it, and NSF was happy to fund my research, as long as I competed well for funding.

One day, not long after arriving in Santa Cruz, I was leaning back, perusing the map of the world, and I became fascinated by the complex pattern of islands in eastern Indonesia. After digging a bit, I focused on the strange behavior of the Molucca Sea. I discussed this with Casey Moore and we decided to submit a proposal to do some geophysical work in the area, work similar to what I had done for my thesis. This is one of the great things of being a faculty member – you can do any research you want, as long as you can find appropriate funding.

As seen from how I was hired, things were much more free-wheeling in the '60's and '70's than they are now. It was great for getting hired, however ship time all resided in the institutions that had ships. I had benefitted from that as a post-doc by getting ship time for a great project offshore Washington without having had to write a proposal. Now the shoe was on the other foot, and Scripps informed me that I needed to include the cost of the ship in my grant proposal (meaning certain death of the proposal), since I was no longer part of the ship-owning institution. Fortunately, thanks





## Eli Silver (cont.)

to a change in NSF policy and in Scripps personnel, by the time we submitted our proposal ship time was being given to successful grant proponents, not simply to anyone at the institution who wanted free time. Timing is everything.

The second hurdle we needed to surmount was the NSF system. They had set up a committee of scientists to screen proposals for marine geology and geophysics in Indonesia. Lo and behold, all the funding went to the members of that committee, leaving nothing for people like us. Fortunately I had a guardian angel at Scripps (George Shor) who contacted NSF and said that there was a physical oceanography cruise working in the Molucca Sea. If they would give us a couple days of ship time and some travel funds, we could carry out the work we had proposed. NSF agreed and we had our foot in the door. The work turned out to be successful and exciting, and I continued getting funding for that work for another 7-8 years, expanding to a much wider part of the eastern Indonesian collision system. (Casey, on the other hand, didn't continue with Indonesian work, but instead had many amazing field seasons in Alaska and began a long, very successful career in scientific ocean drilling).

For the next 25 years we continued work in the western Pacific, including funding for marine geophysics, ROV submersible observations, Ocean Drilling, onshore geology, and GPS geodesy in both Indonesia and Papua New Guinea. The work included a broad range of students, colleagues and post-docs, most of whom performed the key studies and made outstanding scientific breakthroughs. During much of this period we also worked in Central America, mostly Costa Rica but also major studies offshore Panama and Nicaragua. The work also involved a lot of seismic observations, including two 3D seismic cruises, ALVIN diving, heat flow, Ocean Drilling, swath bathymetry, and onshore observations. Again, the work involved a number of colleagues, grad students and post-docs who made a number of incredible discoveries.

About 20 years ago, Don Potts and I were approached by Bill Pickles of Livermore National Labs, who said he had funding for students to do remote sensing, especially in Geothermal environments. That began a program of study using hyperspectral data imaging of the Long Valley caldera. Through Bill's contacts and fund-raising we had additional projects in Dixie Valley and (with



Founding E&PS Faculty  
back row (l-r))

Al Smith, Rob Coe, Eli Silver, Ken Cameron, Gary Griggs, and Jim Gill

front row (l-r)

Othmar Tobisch, Aaron Waters, Bob Garrison, Caesy Moore, and Léo Laporte

## Eli Silver (cont.)

the addition of airborne LiDAR) the Humboldt Range, Nevada. We also carried out a CO<sub>2</sub> sequestration study in Montana.

From about 2003 to 2015 I taught a course on remote sensing. It turned out to be an ideal course for students, because in addition to learning the concepts and techniques of the subject, they were able to download data from almost anywhere on Earth and carry out interpretation of a topic they were interested in. In this and everything else I taught over 43 years as a faculty member, my teaching and research were very closely related. My primary interest was in tectonics, and I taught that for many years. My primary tools were geophysical, and I taught applied geophysics for years as well. For a while, Casey and I co-taught a course in reflection seismology, which we both greatly enjoyed. After getting into remote sensing, teaching a course in that made sense. Over the years I've taught intro level courses, upper division courses, and graduate courses and have

enjoyed all of them. It's been a privilege to work with so many excellent students over the years and I've been fortunate to be in a department with so many outstanding faculty. In earlier years I greatly benefitted from the department's focus on basic structure, stratigraphy, petrology, field geology and geophysics. I worried initially that the expansion to planetary would dilute the program, but found the new faculty quite outstanding and even mentored a student who carried out a thesis on Martian geology, using remote sensing techniques.

Near the end of 2015, my cardiologist informed me that my heart murmur was approaching the stage where something needed to be done to repair the tear in my mitral valve. I decided that it was a good time to retire and elected to have robotic surgery, as it seemed analogous to marine geophysics, with the use of high resolution optical and sonic imagery and ROVs doing the surgery. That turned out great and I seem to have been given more years to enjoy doing the things I love.



Huon Terraces, showing uplift collision of New Britain Arc with continent.



## Peter Vrolijk's 2019 Commencement Address

**Peter Vrolijk is a scientist from New Mexico Tech and is retired from ExxonMobil Upstream Research Company. Dr. Vrolijk received his PhD from the University of California, Santa Cruz (UCSC) in 1987 studying fluid flow and earthquake processes in subduction zones.**



This kind of presentation is a challenge for me because I have never done a formal presentation in this kind of setting, but I will draw on my experience of giving technical presentations, sometimes to non-Earth scientists, and informal discussions I have had with students, to help us through the next few minutes. In the past weeks I contemplated what the topic of today's discussion should be and tried on a number of different topics. I thought back to commencement addresses during my graduation ceremonies, including my last one 32 years ago when I sat in your seats, and I realized that I have no trace of any memory of either one that I attended. That placed an important constraint on today's topic because I realized that most of you will have no recollection of my comments a year from now, a month from now, a week from now, much less a half hour from now. But I hope to lodge some small ideas into the back of some of your minds that you might rediscover in the future.

The problem is that the greatest temptation in giving this address is that I, the speaker, want to provide you the benefit of my experience and wisdom as you begin

your careers. This temptation is likely rooted in ancient human traditions of narrative discourse, of conveying across the generations the essential elements of being an Earth scientist through narrative stories, of binding a community of Earth scientists through a common history that we all share. In these realizations, I found the subject of my presentation. I would like to talk to you today about the community of Earth Science that you enter into today and the different roles that each of us play in that community and that presumably you will adopt as you move through your career.

Let me start with the roles. First, I need to define experience as a means of acquiring wisdom. Wisdom is something we all try to achieve, yet is difficult to obtain. It is hard to have wisdom without the experience of successes and failures, and experiences are only valuable with the benefit of some knowledge. Right now, at the completion of your degrees you are brimming with knowledge, and you have likely gained some measure of experience and perhaps some wisdom. But at the moment you enjoy an abundance of knowledge and a deficit of experience and wisdom that you will acquire through the application of that knowledge. At this point many of you will only partly comprehend the value of experience and wisdom because without these qualities at your disposal, it is hard to understand how they may benefit each of you. I spent much of my career working in a research lab in the petroleum industry, and in that environment, there is a high premium placed on 'experience.' When I started that job, I rebelled against the notion that 'experience' is so valuable. How can there be progress when processes are rooted in the past? Why are empirical 'rules of thumb' considered more valuable than a careful, analytical evaluation of the processes underlying the problem being addressed? I really didn't like the emphasis placed on experience over quantitative thought and so, too, some of you may now be rejecting my comments as irrelevant.

## Peter Vrolijk cont.

It took me many years to reconcile this idea of the value of experience and wisdom, and I could only do so once I had accumulated some experience myself. I realized that I had achieved a reconciliation after a discussion many years ago with some Univ. of New Hampshire students. It was an informal discussion about career prospects in the Earth Sciences, and I made the spontaneous description of them as young thoroughbreds, nostrils flaring, full of energy and strength, fearless in their desire to test their strength, and ready to tear off at great speed with the wealth of knowledge they had acquired. However, they lacked any inherent understanding of which direction to race off in. I said that they would benefit from the wisdom of experienced colleagues who could help guide them in the directions they could apply that courage and strength. Combining experience, wisdom, and fearlessness to address tough problems in new ways with new perspectives, unencumbered by too much history of the past – "we tried this before and it didn't work" syndrome – great new insights and discoveries could be achieved. After a moment of reflection, one of the students admitted that no one had ever said something so inspiring to them before. At the time I spoke these words from my heart so I was taken aback by the student's comment, but later I came to understand that I had achieved an insight into how youthful knowledge and energy and aged experience and wisdom could be fruitfully combined.

And so, I fully believe that the future holds tremendous potential for each of you. Although today is celebrated as the completion of your degrees, an accomplishment that is worthy of celebration, I think it is more inviting to think of today as the start of something new – the start of a career where each of you will affect the world around you. Some of you probably already have plans for the next step that you will pursue, but some of you have great uncertainty in how you can achieve this. While that uncertainty may weigh heavily on you, I am here to help give you the confidence that you can prevail.

None of you can do this alone, though. Your first steps may require the assistance of wisdom that an experienced scientist can offer to complement your knowledge and curiosity. And thus, I welcome you into the community of Earth Scientists, one of many communities that you will belong to, but one that for many of you will be a crucial component of your lives that defines who you are. Belonging to a community means that you will benefit from the strengths and solidarity of that community. But it also comes with an obligation to contribute to the community. A community will only thrive when its members contribute more than they take out of the community. At first it might seem hard to understand how you can offer a contribution to the community, and at first it might seem that your contributions are insignificant (they won't be), but never lose track of that obligation because opportunities to contribute will present themselves in some unexpected ways.

Let me give you an example of how concrete this idea of an Earth Science community actually is. A couple of years ago my wife and I moved to Colorado, and not long after that I met our neighbors across the road. My neighbor asked if I knew Chuck Kiven, who he had worked with in the 1990's. I did know Chuck and had subsequently worked closely with him on some projects, and my neighbor and I instantly had a point of connection. A couple of months ago another neighbor held a get-together and invited a geologist from USGS. I was telling





## Peter Vrolijk cont.

him this story about Chuck and my neighbor, and this guy revealed that he was Chuck's cousin! The point of this story is to illustrate that we can be a very tight-knit community, one that already extends beyond the Santa Cruz campus, and that great intellectual as well as personal benefit comes from this community. A strong foundation within the Earth Science community can also serve as a stepping-off point for involvement in other communities. I have expanded my involvement in new communities in the last couple of years, but I suspect that many of you will come to this much sooner in your lives. I now devote considerable time to a nature conservancy organization, a group that helps promote and maintain wilderness character in two wilderness areas in Colorado. I work with people who are committed to this simply stated goal, although the paths to the goal are complex, and my colleagues come from backgrounds in aerospace engineering, geography, economics, and many other areas. We all bring different skills to the problems we face, but in that diversity comes incredible strength and resilience. I use the strength of my personal foundation in the Earth Science community to strengthen my contributions to the Wilderness preservation community.

Today we come here to celebrate the achievement of your degrees, but this point marks the start of challenges and further achievements yet to come. At first you might rely on the community of Earth Scientists you now belong to, in part by drawing on the wisdom and experience of those who have come before you who can help direct your energies and enthusiasm into the most productive avenues. Many of you will benefit from this community, and many of you will strengthen the community further through your actions and involvement. And some of you will use this community to establish yourself in other communities, sometimes new communities that may not yet exist. But through this community involvement, I assure you that you will find opportunities to pursue a satisfying and fulfilling career.

Congratulations to each of you for completing the most intensive periods in your lives for acquiring knowledge. That journey continues, but you have completed a very



Benedetta Treves is on the left with the shotgun (an Italian scientist who spent some time in Alaska and Santa Cruz learning about subduction processes that she was applying to work in the Appenines), Tim Byrne, Casey Moore, Jim Sample, and Peter Vrolijk.

special times in your lives in undertaking your degrees. I hope for each of you that you have developed a love for pursuing knowledge that will continue every day in your lives. With your experience came the attainment of skills, but the pace of acquiring skills will accelerate as you move into a period in your career where you begin to put that knowledge to use. Lastly, and this is the part that nobody teaches you, you must put considerable effort into developing the state of mind you bring to the challenges of applying your knowledge and skills because the attitude that you bring to work everyday defines who you are as an individual. There will be times when conditions make you question the use of your knowledge and skills. Your path through those bumpy stretches depends on the attitude you bring to those challenges. I am grateful to have had a career where I could apply and expand my knowledge and skills and to enjoy almost every day I spent in that career, but there were also periods of professional and personal turbulence that required me to develop an attitude to get through different job and life challenges. Working within the community of Earth scientists and appealing to the wisdom of those who have experienced tough conditions will help you find peace and fulfillment in your pursuits.

Good luck on your journey, and God speed.

## Update on Development by Andy Fisher

**EPS at UCSC is having a Reunion in May 2020**

The last EPS reunion held at UCSC was in Spring 2015. That was a fun and informative weekend of events, great to see old friends, schmooze over posters and talks, enjoy good food and drink, and explore classic Santa Cruz field settings. We are now planning for another reunion at UCSC in Spring 2020, over the weekend of Friday to Sunday 5/1/20 to 5/3/20. We have a draft plan for Reunion 2020 at the EPS website:

<https://eps.ucsc.edu/about/reunion20/index.html>. There will be some field trips for subgroups (Saturday AM, 5/2/20, sign up soon to reserve your space!), and more activities running from Friday afternoon through Sunday morning. This reunion is for you, and we hope you will be part of it

please scroll down and choose a link). Last year, EPS distributed the first graduate fellowship support based on internal generation of funds from dedicated endowments. Your contributions to EPS funds generate big rewards, helping current students and future generations to gain skills and experience and launch successful careers (<https://eps.ucsc.edu/support-us/index.html>).

**The EPS-AC has new Members**

The EPS Advisory Committee (EPS-AC) was formed in 2012, providing a forum for accomplished alumni, who completed a variety of degrees across broad range of disciplines, 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. New members who have joined the EPS-AC in the last year include these exceptional individuals: Phil Teas (PhD, 1998), Kathy Sullivan (BS, 1973), Christy Kennedy (BS, 2000; MS, 2002), Mike McGroder (BS, 1980), James Hein (PhD, 1973), and Lisa White (PhD, 1990). The EPS Department also extends deep appreciation to these former EPS-AC members who have recently completed their service: Gerry Weber, Nancy Ann Budden, and Krystle Catalli. 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](mailto:stefano00038@yahoo.com), [pvrolijk@comcast.net](mailto:pvrolijk@comcast.net).

Other EPS Department and Alumni accomplishments are highlighted elsewhere in this newsletter, and at our website (<https://eps.ucsc.edu/>). We hope to see you at AGU, regional meetings, and/or the EPS 2020 Reunion. Please stay in touch.  
Andy Fisher ([afisher@ucsc.edu](mailto:afisher@ucsc.edu))

## UCSC Earth and Planetary Sciences Reunion 2020



**May 1st-3rd, 2020**

We have planned a fun and illuminating set of events for the weekend, including field trips, presentations, and plenty of time to mingle and talk to old and new friends, and to enjoy local Santa Cruz food and libations.

For more information and a full schedule for the weekend, visit <https://eps.ucsc.edu/about/reunion20/index.html>

**EPS Fellowships and awards are making a difference.** The creation and endowment of dedicated EPS funds is highly impactful, with more and stronger support of our young colleagues (both undergraduate and graduate students) with each passing year. During the last academic year, EPS funds were used to recognize excellence for six graduate students and 11 undergraduate students. Other outstanding students secured funding from within and beyond UCSC (you can find a complete listing at: <https://eps.ucsc.edu/about/honors-awards/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 help 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:*

- Jim Zachos (Department Chair): 831-459-4644, [jzachos@ucsc.edu](mailto:jzachos@ucsc.edu)
- Andy Fisher (EPS Development Coordinator): 831-459-5598, [afisher@ucsc.edu](mailto:afisher@ucsc.edu)
- Grace Caslavka (Department Manager): 831-459-4478, [gcaslavk@ucsc.edu](mailto:gcaslavk@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



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Name on Card: \_\_\_\_\_ Signature: \_\_\_\_\_

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**EPS Development Options (updated Summer 2018):**☐ **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.

☐ **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.

☐ **Earth and Planetary Sciences Special Needs 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 optionsPlease mail to: UC Santa Cruz, MS: PBSci Development, 1156 High St., Santa Cruz CA 95064



**1979****Genevieve Fire-Halvorsen**, Earth Sci, B.S.

gsfire@sbcglobal.net

Still working as a civil engineer for the City of Mountain View, CA and also taking-on occasional consulting work in the field of stormwater quality compliance. Both our kids have also gone into engineering, one as a transportation manager and the other in bio-mechanical engineering. Favorite Geoslug memory: Hanging-out with Jeff Mount and the gang at field camp near Bishop. Also, spending so many hours in the lab, with Conrad vanBruggen.

**1982****Ray Wells**, PhD

raywells747@gmail.com

After I retired from the USGS in 2016, Sally and I moved to Portland, Oregon, where I am a Research Associate in the Geology Department at Portland State University. I've apparently failed retirement; I will be returning to the USGS this fall, on temporary assignment. I'll be mapping the geology around a Bureau of Reclamation dam west of Portland, which sits astride a major fault forming the boundary between the Coast Range and Willamette Valley. This is an outgrowth of a just completed USGS project to map 51 7.5' quadrangles around Portland to better understand its neotectonic setting and earthquake hazards.

**1984****Parke Snavely**, PhD

Having worked in various leadership and technical roles in Research, Exploration and Development over the previous 36 years, I retired from ExxonMobil in 2017. I am currently working as Principal Geoscientist at Basin Systems Geoscience in Houston, most recently consulting on the exploration and development potential of the Baltic Basin in Poland. Claire continues to work as a geologist and GIS Manager at Phase Engineering in Houston. Our older daughter, Allison, is living in Denver and will be married in May. Rachel, our youngest, has recently begun a career as an Environmental Scientist

with the EPA in Dallas. During my time at UCSC I recall most fondly the close-knit graduate community and small, but technically diverse, and very supportive geoscience faculty. I also enjoyed witnessing, and being involved in, the Board's early commitment to field-based training as part of the undergraduate program. Throughout my career it was rewarding to observe the pipeline of outstanding UCSC graduates coming on board at ExxonMobil - and being so successful: Biddle, McGroder, Ehman, Vrolik, Schapiro, etc. It served as a reminder of the ongoing technical excellence of the Earth Sciences program.

**James N. Falls**, B.S., radio-tuber@att.net

I'm still slugging it out in the woods of NW CA after 24 years with the CA Geologic Survey's Forest and Watershed Geology Program. I was promoted to middle management for a few years, then returned to the field where I'm at my best. As a result, I have helped the face of forestry in NW CA for the better, and have a series of geologic maps with my name on them. Three more in the Mad River and Van Duzen River drainages are on the way. Redwood Creek -

<https://www.conservation.ca.gov/cgs/Pages/Program-FWGP/redwood.aspx>.

Mattole River -

<https://www.conservation.ca.gov/cgs/Pages/Program-FWGP/mattole.aspx>.

Owl Creek -

[https://www.conservation.ca.gov/cgs/Documents/MS\\_066-40123e8-OwlCreek24k-CGS-Ls-Gm-GI-201806-web.pdf](https://www.conservation.ca.gov/cgs/Documents/MS_066-40123e8-OwlCreek24k-CGS-Ls-Gm-GI-201806-web.pdf)

Iaqua Buttes 7.5 Minute Quad -

[https://www.conservation.ca.gov/cgs/Documents/MS\\_065-40123f8-IaquaButtes24k-CGS-Ls-Gm-GI-201806-web.pdf](https://www.conservation.ca.gov/cgs/Documents/MS_065-40123f8-IaquaButtes24k-CGS-Ls-Gm-GI-201806-web.pdf).

**James N. Falls (cont.)**

My wife and I adopted a girl from China 17 years ago and she's a High School Senior about to jump off into the world of Biology, or Veterinary Medicine, or Business, or.....! Favorite Geoslug memory: Geology Field Camp in Big Pine/Owens Valley 1984. Get up and on the road half hour before sunrise. Watch the sun come up over the mountains, birds and lizards everywhere. Head back in the silent afternoon before the heat really hit. Smell of sagebrush, geology like taffy on the maps we developed. It's been so long since I've visited Santa Cruz. I hope The Saturn Cafe is still there! I miss their "Mud Pie."

**1991****Fred Hochstaedter, PhD**

I've been lucky to stay on the central coast and teach geology and oceanography for twenty years at Monterey Peninsula College. Looking forward to going to Wyoming this summer to see Yellowstone again and the rocks of the Bighorn Basin for the first time. In preparation, I've re-read John McPhee's *Rising From the Plains*, a book I first read while I was in grad school. It's aged well--like coming home to all the reasons I got into geology in the first place.

**1995****James Tait, Ph.D., taitj1@southernct.edu**

Co-Founded the Werth Center for Coastal and Marine Studies. Features undergraduates working as collaborators in faculty research. Oriented towards local/regional coastal and marine environmental problems. The coastal lab focuses on the impacts of large storms on the Connecticut coast and building resilience in anticipation of the next hurricane. Students are employed as research assistants and so their experiences and research accomplishments go under the Professional portion of their resumes. Students also are designated as Werth Center Fellows.

Am starting to write in anticipation of my next career. Working on a memoir called "How I Became an Oceanographer". First chapter is called "The Girl in the Red Ferrari". The second chapter is called "The Pursuit of Truth in the Company of Friends" and I'm sure one can guess what that chapter is about. The third chapter is called "The Stars Above Laredo" and details the year I spent in Mexico and Central America traveling with said Girl in a '61 Volkswagen camper. Favorite Geoslug memory: working on my MS and PhD with Gary Griggs and Field Camp at Poleta Folds with Gerry Weber. Have a home on the beach ten meters above mean sea level...

**Ahmed El Shistawy, Ph.D.**

Now a professor at Tanta University, Egypt (see photo on p.11)

**1997****Celina Hernandez, B.S.**

Geologist at Regional Water Board, SF Bay Region in Oakland, CA. I'm sharing my life with Joe Shoop (Cowell 1997). Favorite Geoslug memory: so many. 1997 summer field with Gerry Weber. The best experience. I am grateful for my time in ES. It made my college experience remarkable. Staff and peers took care of each other.

**1998****Shannon Wong, B.S. Earth Science,**  
shannonette@gmail.com

MS Geology, 8.5 years: environmental consultant, 8 years: high school physics teacher mapping marine terraces.

**2001****Louis Arighi, B.S. in Earth Sciences,**  
lmarighi@gmail.com

Started as a Manager/Geologist with a newly started environmental consulting firm, Elevate Environmental Consultants, in Mountain View, CA



**Louis Arighi (cont.)**

2019 marks 1 year since I moved back to Santa Cruz, and I am enjoying coming full circle back to where I spent my college years. I will never forget Ken Cameron joking in his Intro to Field Methods course that faults never turned more than 17 degrees, and being shocked a week later that we had all taken him seriously, and had some very strange maps of fault lines to show him.

**2004**

**Greg Martin, B.S.** - Earth Science/Environmental Geology, geomarty@hotmail.com

I work as a geologist providing engineering and environmental geology support for a variety of projects throughout the Pacific Northwest. I am licensed in California, Oregon and Washington. This fall I am completing my MS in Geology at Portland State University, where my research in the Active Tectonics and Seismology lab focuses on the tectonic geomorphology and structural geology of the Rocky Ledge fault, Shasta County, CA. I live outside of Portland, Oregon with my wife Liz and our 2.5 year old daughter Elliana, who loves rocks. Favorite Geoslug memory: The camaraderie of early morning weekend field trips...

**2007**

**Samantha Hansen, PhD** shansen@geo.ua.edu

I was recently awarded an endowed professorship at the University of Alabama, and I've just put in my dossier to apply for full professor. Family is all doing very well. Favorite Geoslug memory: Oh, there are so many...the cocktail parties were always great fun!

**2010**

**Elena Amador, B.S.**

Following a 2 year postdoc at Caltech, I now have a permanent position at JPL having joined the MSL Science Operations Team. I split my time between coordinating science operations for MSL as a liaison between the scientists and engineers, and continuing with

research projects, primarily focused on understanding early Mars surface conditions using spectroscopic datasets and field-work in Mars analog environments. My husband (also a geologist) and I welcomed our very own geo-baby this year, Catalina Hazel Amador-French. My favorite EPS memories were all the fantastic field-trips. I particularly enjoyed Noah Finnegan's geomorphology class.

**2011**

**Rosalie Bossler (Schubert), B.S.**

I earned a Masters from Fresno State in 2017 (my advisor was Santa Cruz alum Chris Pluhar), moved to Washington DC, and began consulting for Tetra Tech. I also got married! My husband, Andrew Bossler, is a Lieutenant in the US Navy. Favorite Geoslug memory: summer field camp costume day. I still look at those goofy pictures of us and laugh.

**Lauren Schurmeier, B.S.** in Earth Science, planetary science concentration.

I finished my PhD researching Saturn's moon Titan at the University of Illinois at Chicago in 2018. I am currently using my geospatial skills working at a great artificial intelligence mapping startup, CrowdAI. I plan to start a postdoc studying Titan at the University of Hawaii at Manoa in January. I married a banana slug (Astrophysics Dept.) this year! Favorite Geoslug memory: listening to dinosaur themed songs at the start of every dinosaur lecture.

**2012**

**David Benjamin O'Connor, MS**

After four years as a Hydrologist for the Bureau of Reclamation, in October '18 I changed positions to Lead Hydrologist with NOAA's California Nevada River Forecast Center (CNRFC). Favorite Geoslug memory: The redwoods

**2012 (cont.)****Alison Stonehouse, B.S.,**

alison.marie.franco@gmail.com

Starting second year of graduate school at California State University Northridge studying sediment transportation processes in New Zealand.

**2014****Marcel Peliks, B.S. Earth Sciences**

Hey all! Since graduation I've taken on a number of jobs both in and out of the geology field, I worked as a snowboard instructor for a season, at the USGS Cascades Volcano Observatory helping deploy instrumentation throughout the Cascade Range, then I worked at a geotechnical company in Los Gatos mostly concentrating on consulting type work for slope stability issues, now I am in my second year of graduate school at Moss Landing Marine Laboratories. I'm pursuing a M.S. degree and my focus is seafloor mapping and sediment transport in the Monterey Canyon. I'm excited to graduate and get back to working, geology has been a really fun career so far. Hope everyone is doing well!

**2016****Andrew Kruger, B.S. in Earth Science, Planetary Concentration**

I now work at the NASA Jet Propulsion Laboratory as a Mission Operations Engineer for the Hayabusa2 Mission (JAXA asteroid sample return), Juno Mission (Jupiter Orbiter), and the Goldstone Solar System Radar project (Earth-based radar tracking of asteroids). For these missions, I coordinate and schedule their use of the Deep Space Network for ground contact and/or science observations. One of my favorite memories from Earth and Planetary Sci was learning about Sir Ralph Bagnold, the desert explorer who came up with the first empirical formulas to describe Aeolian transport out of his own curiosity.





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