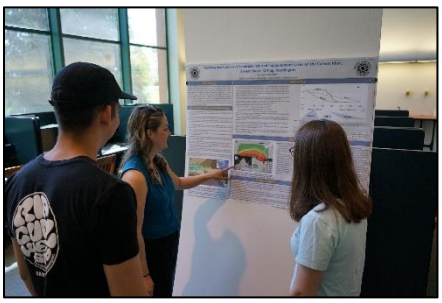


PLU Department of Geosciences!

2018 Newsletter

CONGRATULATIONS TO OUR SENIORS! LEARN MORE ON PAGE 8!

IN THIS ISSUE

Our fifth newsletter!

We just finished capstone season here in Rieke Science Center and as you can imagine – it has been hectic! Read more about this year's topics on page 8!

In this newsletter, we share some of the exciting student activities that make our program distinctive. Learn about study away in Namibia (p. 3), presenting at GSA (p. 5), and summer research (p. 6).

Speaking of GSA – it was wonderful to see some of you at GSA in Seattle in October 2017! Check out page 4 for a glimpse of our alumni event!

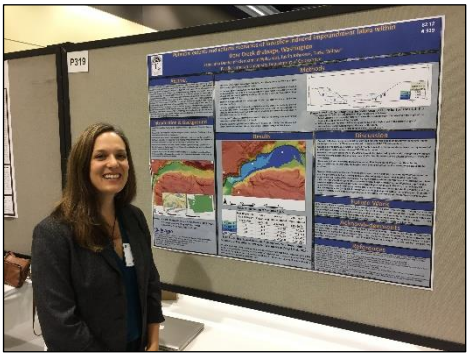
Speaking of alumni – our newsletter editor sends thanks to the research alumni who made the trip to Mt. Rainier in July 2017. The event was possible through a generous gift from Carol Quigg, PLU Regent, which also supported the establishment of a center for Glacier Research at PLU (GRAPL!). More details on the research center in a future issue! For now, check out our alums in the photo at right!

We're *so* fortunate to have financial support from donors such as Carol Quigg, the Nothsteins (p. 6), and the Murdock Trust (p. 7). Donors and charitable trusts make our work possible!

Are you interested in supporting our program? We welcome a donation to the Brian Lowes Endowed Field Geology Fund! See page 10 for more info.

Finally – thanks to our readers! We appreciate your interest! Stay in touch! Follow us on Facebook for news, opportunities, and updates: @PLUGeosciences

Join the PLU Geosciences and Earth Sciences Alumni Facebook group to keep in touch with faculty and alums from the department: https://www.facebook.com/groups/6083949218O/



PLU at GSA!

We had quite a showing of current and past Geosciences students at GSA 2017 in Seattle last October!

Pages 4- 5

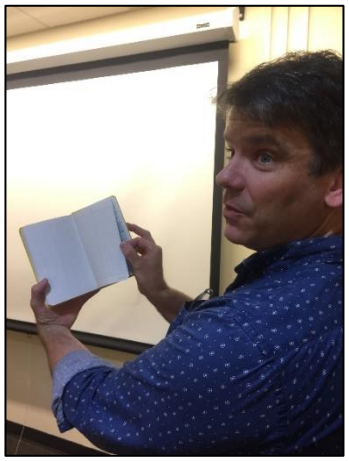
Research with Dr. Wilcox!

Studying landslides in Washington State!

Page 6

FACULTY PROFILES

Dr. Peter Davis

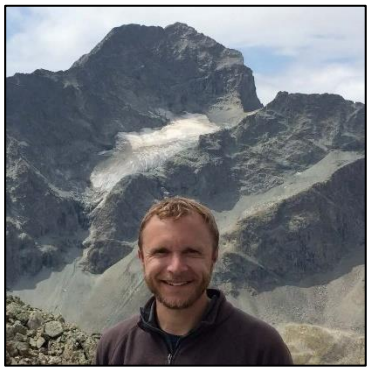


Peter is department chair and the proud father of Oliver! This spring, Peter taught the department's gateway to a great major GEOS 201, and GEOS 345 Tectonic Petrology. In his research, he continues to develop a project that redefines the tectonic story of subduction and collision preserved in rocks in the southern Cascades. The results of student-faculty research and capstones on this project has produced a GSA poster and talk that will lead to a larger collaborative project with other institutions.

Dr. Claire Todd

Claire was site director for PLU's study away program in Oxford, England last fall. Traveling with students to London (above), Stonehenge and the Jurassic Coast were among the highlights! This spring she enjoyed teaching Environmental Studies 350 – Environmental Methods of Investigation! She looks forward to another exciting season of student-faculty research on Mount Rainier this summer.

Dr. Alex Lechler



Alex has kept busy the past year teaching our Geological Principles and Earthquakes & Volcanoes classes; Geology of the National Parks to PLU first years (trying to win as many over to the Geosciences dark side as possible); and our upper-division Sed/Strat course in which students get to conspicuously march across Foss field with wooden crosses, aka Jacob staffs.

Alex looks forward to another summer of research with PLU undergraduates, returning to the Palouse of eastern WA to continue digging into loess piles to reconstruct the climate history of the region during the last ice age. Some of this work was presented at the annual Geological Society of America meeting held in Seattle in October 2017, and Alex is happy to report a publication on the Palouse work has been recently accepted for publication in Quaternary Research so will be coming out soon! When not at PLU, Alex keeps busy planning international travel with his girlfriend Alison (a UW prof in Geology) - a spectacular trip to Italy this past summer 2017 and a planned return to New Zealand sometime in the coming year!

Dr. Rose McKenney

Rose is taught GEOS 104 Conservation of Natural Resources this spring, after teaching Geomorphology in the fall! She also taught the Environmental Studies capstone sequence this year!

Dr. Jill Whitman

For Jill, the highlight of being at PLU continues to be interacting with students. She taught Marine Geology and Oceanography this year, enjoying the opportunity to get students excited about the 70% of Earth that is covered by water! She serves as chair of the Environmental Studies program, and has the opportunity to interact with students and faculty from disciplines across the university. Outside of PLU, she is excited to be a grandmother to Sophie (15 mos) and to spend time with her family in Washington and Maine.

Dr. Tarka Wilcox

Tarka teaches introductory classes on Geological Hazards and Environmental Conservation, and covers upper division topics like Hydrogeology, GIS and Field Mapping. Summer research with undergraduate students focuses on using advanced imaging techniques to measure changes in landslide deposits through time and potentially forecast likely slides in the future (p. 6!). He chairs the PLU Sustainability Committee, providing students with information and opportunities related to improving sustainable practices on campus. He is also involved with projects funded by the United States Trade and Development Agency that provide geological characterizations for hydropower projects throughout Sub-Saharan Africa (p. 7!).

Study Away in Namibia!

By Connal Boyd, '18

Of the many opportunities I have been afforded by attending PLU, studying away in Windhoek, Namibia was one of the most rewarding experiences I have had by far. Going beyond the incredible exposure to diverse cultures and peoples that any study away program provides, studying away in Namibia allowed me to interact with geology in environments I had never encountered before. Windhoek is located in the foothills of three mountain ranges at the country's geographic center and offers intriguing igneous and metamorphic rock formations (Figure 1). While traveling in southern Namibia, I had the opportunity to visit part of the Namib Desert, one of the oldest deserts on the planet, which showcases awe-inspiring dunes and ephemeral lakes (Figure 2). Standing just before dawn at the summit of a 1000 foot sand dune that has been shaped by millions of years of erosion and geologic movement was one of the most breathtaking moments of my life.

Figure 1 - Panorama at Daan Viljoen Nature Reserve, Windhoek, Namibia, January 2017

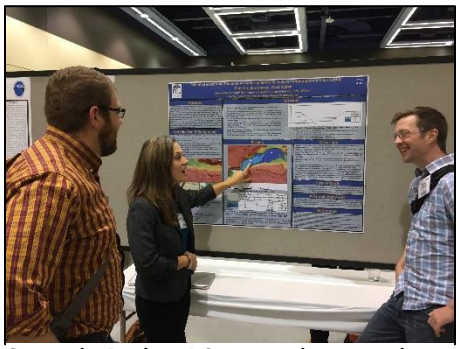
Later in the trip, while on our way back to Windhoek, we stopped by a petrified forest outside of Khorixas in the north of Namibia. This petrified forest was made up of ancient coniferous trees that were washed into the area from the north by floods millions of years ago. Scattered around the petrified forest, accompanying these 280 million year old trees, were specimens of *Welwitschia mirabilis*. This native Namibian plant thrives in the dry conditions of the Namib desert and can live to over 1500 years old! It was truly remarkable witnessing the interaction between geosphere and biosphere at this petrified forest (Figure 3)! My experience studying away in Namibia enabled me to further expand my understanding of geoscience around the world, and gain new insights into the dynamic systems at work on our planet.

Figure 2 – PLU Group Climbing Big Daddy Sand Dune at Dawn, Sossuvlei, Namibia, March 2017

Figure 3 – Petrified Tree and* Welwitschia mirabilis *near Khorixas, Namibia, March 2017

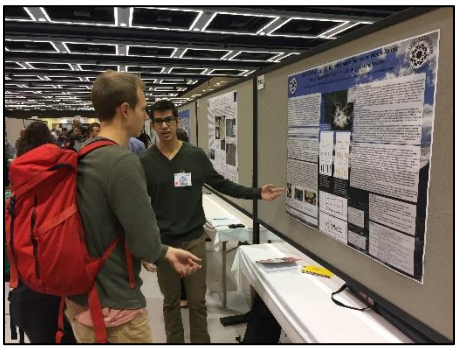
PLU at GSA Seattle, 2017!

Image credit: Bill Cronin

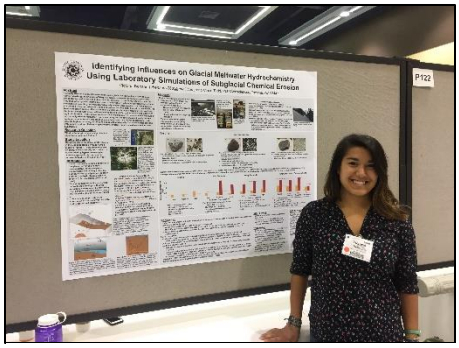


Samantha Denham '18 presents her research to Dr. Tarka Wilcox and Ryan Ransavage '13!

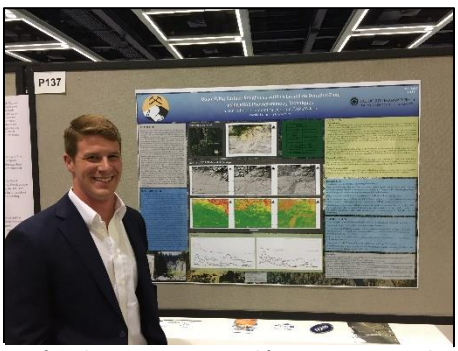
Tarka and GEOS students past and present gathered at our Alumni event Monday night!



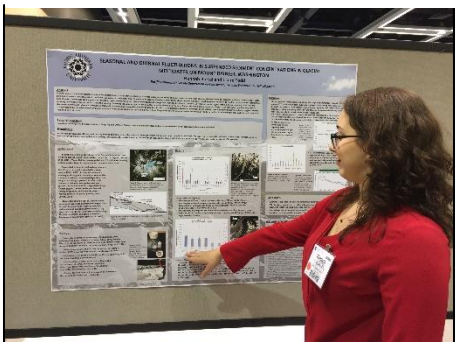
Alex Yannello '19 presents his summer research about glacial meltwater chemistry on Mt. Rainier!



Victoria Benson '17 presents her senior capstone research about chemical weathering on Mt. Rainier!



Justin Johnsen '18 presents his summer research using drones to map landslide risk!

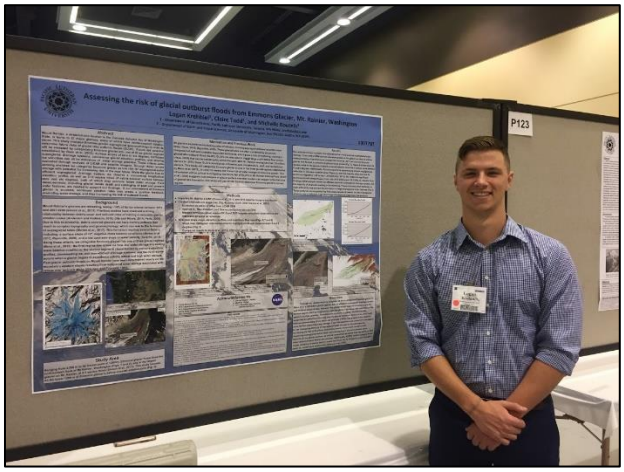


Hannah Bortel '18 presents her summer research about sediment transport on Mt. Rainier!

Presenting at GSA as an undergraduate!

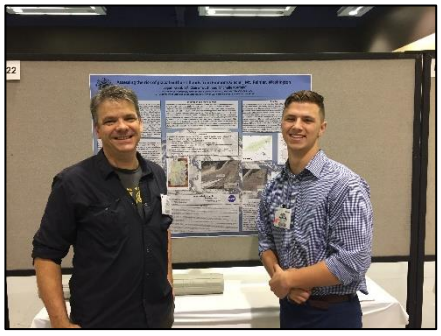
By Logan Krehbiel, '19

When Claire told us that we would be attending GSA after completing our summer research, I had no clue what to expect. When the beginning of August came, and our field season came to an end, I did not realize how much preparation it would take to share my work with hundreds of other professionals. From rephrasing sentences, reworking figures, to completly scrapping some portions of the project, a ton of revisions and work went in to making sure we had a polished product to present at GSA. All the stress and last minute work only made attending GSA an even more fulfilling experience when we finally arrived.



As soon as my poster was hung on the wall, I was immediately grateful for every last drop of criticism, and each deadline I was forced to face before attending. It was because of this effort that I was able to stand, confident and proud, in front of my product and share it with those who chose to stop by. While the presentation day was exhausting and overwhelming, it was an amazing opportunity to meet with professionals ranging from fellow undergraduate students, graduate students, and professionals in the field. Each individual that viewed my work was able to offer compelling insights into revisions that could be made, ideas for future work, and even just fun and interesting ideas to bounce off of one another. Attending GSA was the single best way I have experienced to put yourself out there and prove your worth to yourself and others as a young professional. While it is a stressful and intimidating experience, it was likewise rewarding and empowering.

GSA 2017
22-25 October
Seattle, Washington, USA



PLU ALUMS IN GRADUATE SCHOOL AND AT GSA SEATTLE, 2017!

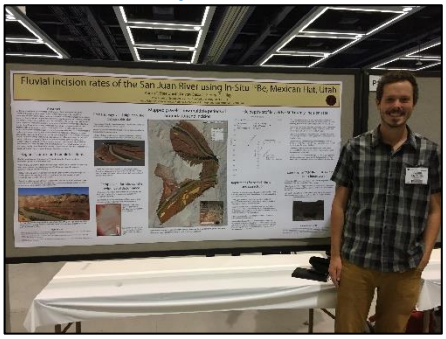
Kristiana Lapo '14

Western Washington University
Timing and Paleoclimatic Significance of Quaternary Glaciation in the Three-Fingered Jack Region, Oregon High Cascades

Adriana Cranston '16

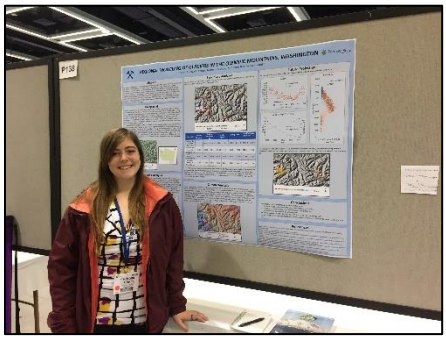
Western Washington University
Long-term Hydroacoustic and Video Investigations of Submarine Volcanic Eruption Dynamics at NW Rota-1 and West Mata

Aaron Steelquist '14



Stanford University
Fluvial Incision Rates of the San Juan River Using in-situ Be-10, Mexican Hat, Utah

Christina Gray '16



Portland State University
Regional Modeling of Glaciers in the Olympic Mountains, Washington

Allie Jo Koester '13

Boston College
Rapid Thinning of the Laurentide Ice Sheet at Mt. Washington, NH during the Bolling Warming, Constrained by Analysis of Cosmogenic C-14, and Be-10.

Summer Research in Geosciences!

By Samantha Denham '18

During the summer of 2017, I had the honor of participating in PLU's Natural Sciences Summer Undergraduate Research Program as a paid student researcher. I spent 10 weeks as part of a small team using cutting-edge drone technology to map landslides in the Pacific Northwest.

To explore the areas of interest, we spent several days performing map reconnaissance using Google Earth Pro. We then travelled to each location, finally deciding on a landslide on the Deer Creek River drainage in Skagit County, WA. The Deer Creek site is approximately 11 kilometers upstream from the town of Oso, WA placing the town at direct risk of flooding in the event of a large outburst event. To access this site we mountain biked 5 miles, and then hiked 300 feet down into the river canyon to the base of the landslide. We spent three days biking in and hiking around this landslide precisely marking locations with a GPS. We flew the drone the last day taking high-resolution images we later used to create 3-D images of the area. From my research, I was able to create different scenarios to predict the potential size and volume of the flooding created upstream if a landslide dam were to occur on the Deer Creek River drainage.

This research experience was incredible and the pinnacle of my college education. My skills and knowledge were pushed farther than I thought was possible, and through this experience I gained confidence in my ability to be a geologist. I have acquired skills and research techniques I can carry into a career in geology. This summer was a glimpse into what a career in research could be like, and has solidified my desire to continue my education in the geosciences through graduate school. Additionally, I had the honor of presenting the results of my research alongside professional geologists at the annual meeting of the Geological Society of America in October of 2017. [*ed. note: see page 4!]*

My summer research has continued into my senior year and is the foundation of my Capstone project. I'm now using slope stability software to predict potential locations of landslides and the size of a landslide dam for that area. These predictions can be useful to rescue and emergency personnel in areas prone to landslides that could cause flooding both up and downstream. It's empowering to know the research we performed this summer has the potential to impact real lives and can help to bring awareness to the natural hazards in the area in which we live.

New equipment in Geosciences!

Through the generous financial support of Dr. Don and Mrs. Naomi Nothstein, we have purchased a handheld analyzer that uses a laser to measure the composition of materials across the periodic table. Our students will be able to use this instrument in the classroom and in the field to analyze rocks for classes and research! We are thrilled to have this new capacity and opportunity to collaborate within our division. We sincerely thank the Nothsteins for their support!

News from Professor Emeritus Duncan Foley!

Duncan has been continuing his work on Yellowstone. He has co-authored, with colleagues from New Zealand and Wyoming, a paper for the Geothermal Resources Council annual meeting in October, 2017, and has had a paper published in the journal Geothermics (2017) and another paper published in the Journal of Volcanology and Geothermal Research (2018). An additional paper, about unusual geyser deposits, is in the final stages of preparation. This Yellowstone research project was funded in part by a grant from the Expeditions Council of the National Geographic Society.

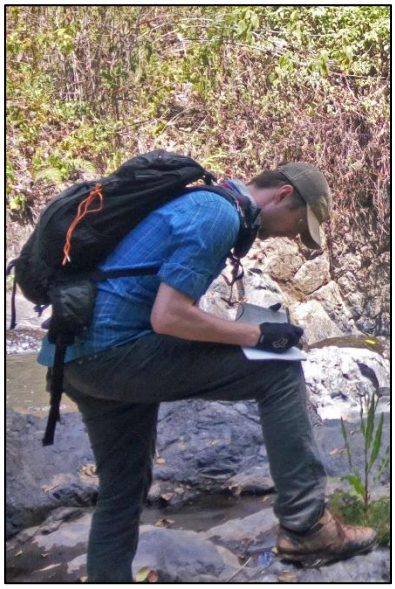
perfectlightcamera.com

Duncan has continued to talk with community groups about preparing for earthquakes. He has given this talk to the Learning is Forever group at PLU, and at a retirement community in Bellevue.

In 2017, Duncan also participated in leading two tours to Yellowstone. One was for Betchart Expeditions, who specialize in science-related tours, and included seeing the geology of the Snake River Plain, and the solar eclipse from the Tetons! The other trip he co-led was for the Geothermal Resources Council, and emphasized the geology of Yellowstone's hydrothermal systems.

2017 eclipse photographed by Duncan in the Tetons!

2018 is looking to be a busy year as well. Duncan has been invited back to Yellowstone to participate for the third year in a Park Service training session for commercial guides. Last year there was an audience of about 350 participants for the session. He also will be returning to the park for a second year to give three talks and lead a field trip in conjunction with a week-long photography workshop (shameless plug: http://www.perfectlightcamera.com/category/yellowstone-symposium/)



Research update from Dr. Wilcox!

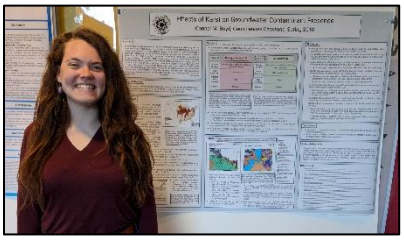
The development of sustainable energy throughout Sub-Saharan Africa is a pressing issue as the population of the continent is set to almost quadruple before the end of the century, to a likely total of almost 4 billion by 2100 (up from one billion today; according to the UN). The US Trade and Development Agency (USTDA) has earmarked an initial commitment of $20 million for the immediate development of renewable energy projects. USTDA works with public and private partners to connect African companies with US providers that want to help develop power plants owned by local interests. During an initial visit to central Kenya in February 2018, Dr. Wilcox visited 5 proposed sites, providing geological characterizations and seismic hazard assessments to a Nairobi-based developer. The next project site he plans to visit is in Cote D'Ivoire.

In addition to his research in Africa, Dr. Wilcox received a three-year grant from the Murdock Charitable Trust to engage undergraduates in summer research. The proposed work uses drones carrying high-precision cameras and GPS equipment to create high-resolution three-dimensional maps of landslide prone areas in western Washington state, including the site of the fatal 2014 Oso Landslide. The work will focus on issues related to how rivers respond to these mass-wasting events, as well as how sudden changes in channel locations may actually trigger new slides. An exciting aspect of this work is the collaboration with Dr. Renzhi Cao in computer sciences, who is an expert in Machine Learning (or "A.I."). Drs. Cao and Wilcox are working collaboratively to advise computer science Capstone students on a project that uses AI to help select appropriate drone photos for data processing in a fraction of the time it takes humans to do the same work, making it easier to get back out into the field for more studies!

STUDENT CAPSTONE PRESENTATIONS MAY 12TH, 2018!

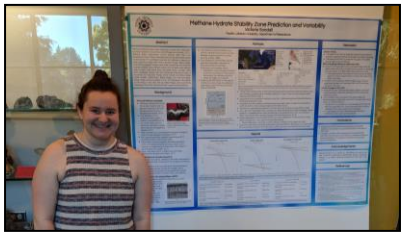
In our second year of poster-format presentations, we held our final poster session on Saturday, May 12th, in the lobby of Rieke Science Center. It was a high-energy event, with each faculty member rotating through every student's poster – students gave their poster presentations six times! Family and friends showed up, and there were abundant snacks! It was a wonderful celebration of our seniors' research! Here are this year's capstone projects! We are so proud!!

Photos courtesy of Sam Altenberger.



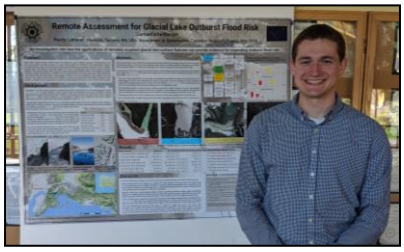
Connal Boyd

Effects of Karst on Groundwater Contaminant Presence



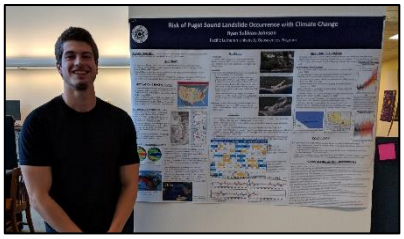
Victoria Sondall

Methane Hydrate Stability Zone Prediction and Variability



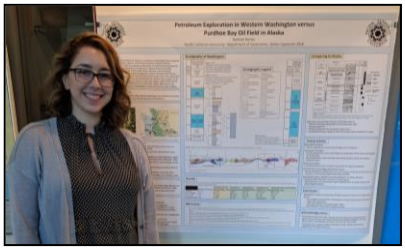
Sam Altenberger

Remote Assessment for Glacial Lake Outburst Flood Risk



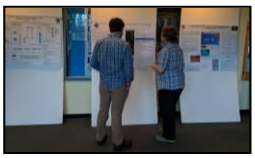
Ryan Sullivan-Johnson

Risk of Puget Sound Landslide Occurrence with Climate Change

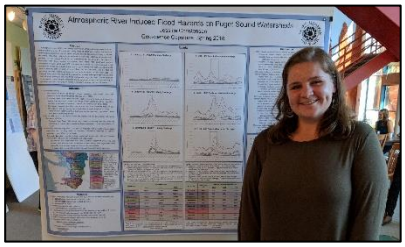


Hannah Bortel

Petroleum Exploration in Western Washington

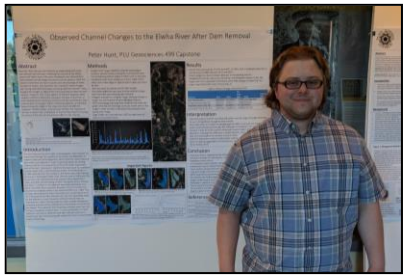


Two Peters in plaid!



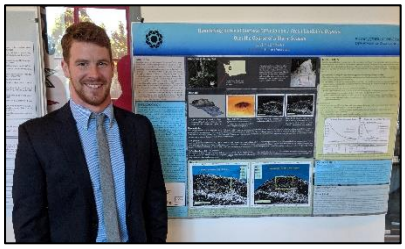
Jessica Christensen

Atmospheric River Induced Flood Hazards on Puget Sound Watersheds



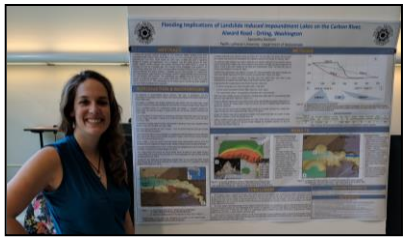
Peter Hunt

Observed Channel Changes to the Elwha River after Dam Removal



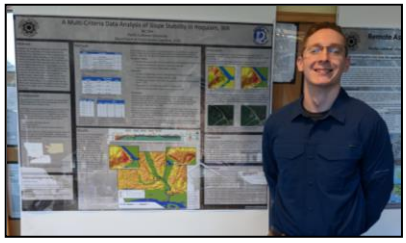
Justin Johnsen

Quantifying Rates of Surface Diffusion on a Fresh Landslide Deposit



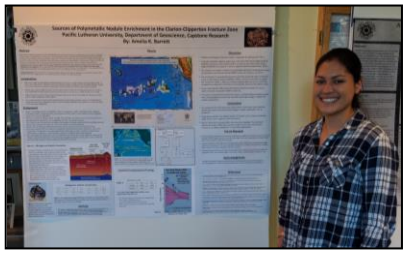
Samantha Denham

Flooding Implications of Landslide Induced Impoundment Lakes



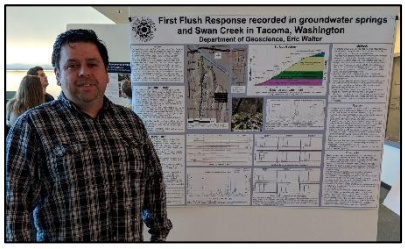
Nic Dier

A Multi-Criteria Data Analysis of Slope Stability in Hoquiam, WA



Millie Barrett

Sources of Polymetallic Nodule Enrichment in the Clarion-Clipperton Fracture Zone



Eric Walter

First Flush Response recorded in groundwater springs and Swan Creek in Tacoma, WA

ALUMNI NEWS! *Thanks for sending updates!*

Katie Anderson '17

"I'm mid-way through an AmeriCorps term at a nonprofit in Missoula, Montana, as part of the Energy Corps program. After graduation, I spent my summer at Sky Ranch Lutheran Camp in Fort Collins, CO, with Victoria Benson ('17)! We both continued working at the camp into the fall for retreat hosting and abundant work projects. Now, I'm serving at Home ReSource, a nonprofit building materials reuse center, in support of its work with local K-12 schools. My position includes leading a Zero Waste Ambassador Program (ZWAP!) for local 5th grade classes- 33 this spring! - and working with the Missoula County Public School District to write a plan for the district to achieve Zero Waste to support community goals. The local paper, the *Missoulian*, wrote an article about ZWAP!" Katie will head to Dartmouth in fall to begin a MS Degree!

Riley Swanson '15

"After finishing my undergraduate degree I felt completely burned out. I knew that I was not ready for graduate school. I was warned countless times that the longer that I waited, that the harder it would be to go back to school. After three years out, I can see that that advice is not completely off base. It already feels like a big hurdle to jump back into the academic world. I have definitely enjoyed my time away from school, but I now know that it is something that I really want to do. In my gap year, that turned into three…, I experienced a lot of things that leave me with no regrets.

I was able to indulge in international travel; I traveled to South East Asia with Isaac Moening-Swanson ('15) for 7 weeks, visiting Thailand, Cambodia, and Vietnam. I squeezed in a winter Europe trip and visit Budapest, Vienna, and Prague with my family.

I have also been able to pursue my passions for outdoor recreation during my time after college. In Pagosa Springs, Colorado, I have been working seasonal positions as a ski instructor, raft guide, and mountain bike guide. After three years of working what I thought was my dream job, I slowly realized that I could not maintain this work for the rest of my life. The lack of full-time work made it hard to maintain. I found myself working as an electrician's assistant and eventually a substitute teacher to fill the off seasons. During these times, I knew that I wanted to get back into the field of geology.

I then started applying to graduate schools and eventually chose Northern Arizona University in Flagstaff. I will be starting this fall to get my Masters of Science in Geology."

Michael Vermeulen '12

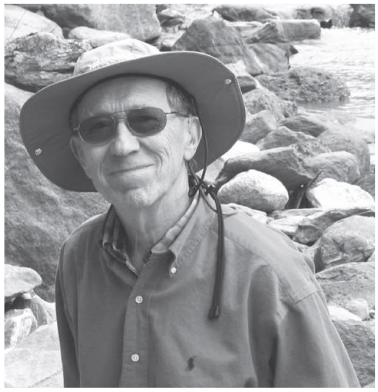
"In 2017 I finished my second year as an environmental educator at the Cuyahoga Valley Environmental Education Center and moved to Portland, OR to start graduate school. It's been great being back in the PNW, but Cleveland was great! I'm a MS student and TA in the Environmental Science and Management department [at Portland State University]. My research focuses on investigating neighborhood biodiversity and habitat connectivity. This spring/summer I am surveying bird populations in three Portland neighborhoods and investigating the relationships between local land use and conservation practices."

Darcie Booth '17 will begin an Environmental Policy and Management Master's program at the University of Denver next month!

Megan Kjelland '13 will begin graduate school at Central Washington University in September!

Give to the Brian Lowes Endowed Field Geology Fund!

Geosciences Department founder Dr. Brian Lowes retired in May 2009 after 41 years on the faculty. The Brian Lowes Endowed Field Geology Fund has been established to recognize his long career and countless contributions to our program. Brian was devoted to getting his students out into the field to experience geology first hand. We continue to honor Dr. Lowes and retired Geosciences faculty Dr. Steve Benham and Dr. Duncan Foley with a fund that supports student-faculty research in field-related projects. We hope you will support Geosciences students by making a donation to this fund.



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We welcome your gift to the Brian Lowes Fund

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2018 Newsletter

Geosciences Department!

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