

# Down to Earth

Department of Geology and Geophysics  
University of Utah



## Notes from the Chair

Quite an exciting year! After 3 years of being chair of Geology and Geophysics, I took a 6 month administrative leave from July through December 2019. Paul Jewell did a great job in my absence. We welcomed a new group of graduate students into the program in the Fall, and had an exciting fall slate of speakers. A Fall semester highlight was Barb Nash's lecture on mineralogy at our Open House.

I had expected spring semester to be a bit daunting, and there were rumbles of COVID-19 in Asia, then Europe, and then here in USA. All was relatively normal until early March when we took our Spring semester break. But then we learned that school would close for two extra days –the 16th and 17th of March we were to prepare to begin teaching all classes at the university online beginning 18th of March. At 7 am on the 18th, all of Salt Lake woke up to the largest earthquake in the valley since settlement by the Mormons in 1847, a magnitude 5.7 with the epicenter just south of the airport. We got an extra day reprieve from beginning our on-line teaching! By Friday of that week all offices were sealed and most remained sealed well into the summer. For those of you with fond memories of the Browning Building – it was the last building on campus to be certified “safe” to enter after the earthquake.

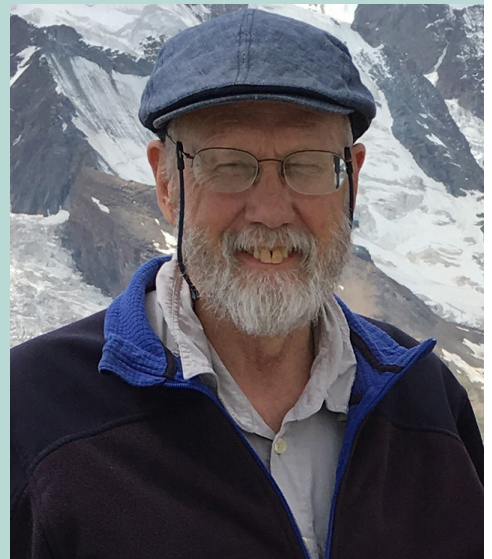
So, the second part of Spring 2020 was a challenge that faculty, staff, and students all rose to meet. And meet it well we did – we discovered resources within ourselves that we did not know we had. All the staff had to work from home, as did the faculty who also had to adjust to on-line teaching. Labs were quickly shut down and only in early June could we begin to open them up. The office staff somehow managed to pay bills, reimburse travel, file student graduation paperwork, write letters, and award the scholarships. A huge “shout-out” to Shanna Futral, Michelle Tuitupou, Steve Rondina, Thea Hatfield, Wil Mace, Alan Rigby, Quintin Sahratian, Cindi Meyer, Kayleigh Kirkpatrick, and Paul Eubanks. We also thank the Dean's staff as well! Working with the Dean's office has been a pleasure – this cataclysmic change also meant that the university needed leadership in safety training. Dean Butt and Wil Mace quickly came up with procedures that became university-wide standard procedures for lab, field, and campus safety.

It immediately became clear that another daunting challenge had to be met – field camp! How to do this “virtually!” Again, students, staff, and faculty worked together to make this an experience of a lifetime. What is field camp, but an experience where you have a few weeks to use all that you know to solve an unfamiliar problem? Bill Johnson led the students to study an environmental water quality project – data that he had collected in Ecuador at an artisanal gold deposit that was heavily contaminated with mercury. Then Casey Duncan, a PhD student working with Margie Chan on Earth-Mars analogies, took the students to Mars for another two weeks of mapping a very unfamiliar landscape using remote imagery techniques quite different than they expected to use when taking campus-based field methods. Throughout this period, it has been a pleasure working with students, faculty, and staff when the common good is put to the fore.

We have had three retirements announced in the closing days of the term – John Bowman, Erich Petersen, and John Bartley are retiring after a combined 114 years of service to the department! How we will miss them! This will greatly affect our teaching and research programs, for each of them contributed greatly to the department in so many ways.

Summer has been very unusual – most years the faculty head to all corners of our round Earth, but this year university travel restrictions kept everyone in Salt Lake City. No travel at all from March through May, and then June through August travel only within the state of Utah for university business. This doesn't mean no one was working – we still had to prepare how to continue to teach both field and lab courses very much in the “on-line” mode. So besides learning the tricks of the “on-line” trade, we also spent time working on getting teaching materials ready and available. High resolution photography to produce 3-D models was an exciting project spear-headed by John Bowman, Sarah Lambart, and Margie Chan; working with staff members Steve Rondina, Wil Mace, and Quintin Sahratian; and with graduate students Nick Hebdon and Josh Marquardt. We hope this resource will be part of a larger global teaching resource, as well as for our own students.

Dr. Thure Cerling



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**Front Cover:**

- \*Creating digital outcrops for Reactive Earth and Wasatch in the Field
- \*Dr. Pete Lippert's study of avian behavior
- \*Twin dinosaurs during 2019 U Rock the Earth
- \*GG Students studying marble slabs in FASB

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THE UNIVERSITY OF UTAH DEPARTMENT OF GEOLOGY AND GEOPHYSICS PRESENTS

# Virtual Alumni Social

**Thursday, November 19, 2020**

**Social: 3 - 4 PM MST**

**Lecture: 4 - 5 PM MST**

Alumni **and friends**, please join us for our annual alumni social, which we are hosting virtually on Zoom. The first hour will include breakout rooms by discipline and/or by decades. The second hour will feature a presentation by alumnus Dr. Naomi Levin as part of our Distinguished Lecture Series. Please plan on joining us for a brief hello!

Visit [earth.utah.edu](http://earth.utah.edu) for details (including Zoom links).



*L-R:*  
*Barrett Johnson*  
*Mo Holt*  
*(current President)*  
*Gabby St. Pierre*  
*(co-founder)*  
*Jory Lerback*  
*(co-founder)*

### Student Involvement - Inclusive Earth

Heading into its fifth year, Inclusive Earth is a student-run organization that welcomes students, staff, and faculty to community building events. “We believe that a sense of community increases a sense of belonging and sparks curiosity-driven science as well as facilitate creative ideas and collaborations,” says current President, Mo Holt. The group encourages members to talk about current events such as the coronavirus pandemic, Black Lives Matter, and multiple international travel ban Executive Orders, and how these events impact our communities on personal and scientific levels. In particular, the group focuses on how equity and issues preventing inclusion manifest in places of work. This summer, Inclusive Earth hosted a virtual seminar presented by the Adaway Group followed by weekly follow-up discussions to develop a broader understanding of how racism and gender-influenced racism adversely affects the campus climate, the potential recruitment of diverse talent, and the creativity (and productivity) of those who are marginalized.

*To get involved with Inclusive Earth, please email [inclusive-earth@utah.edu](mailto:inclusive-earth@utah.edu)*

### Outreach Fellows

Peter Maxeiner - Master's (Geology) & Riley Finnegan - PhD Candidate (Geophysics)

The 2019-2020 academic year was the initiation of the Chuck and Cathy Williamson Science Communications Fellowship. Founded by Chuck Williamson, a University of Utah alum, the goals of the fellowship are to initiate an outreach geoscience communications program that reaches a diverse audience, provide U of U Geology and Geophysics students with science communications experience and to engage youth in the Earth Sciences.

During the year, geology graduate students, Riley Finnegan and Philip-Peter Maxeiner, with help and guidance from Laura Meyer, the College of Mines and Earth Sciences Outreach Coordinator, partnered with local schools and teachers to provide learning opportunities for young students. Throughout the year, Riley and Peter worked most closely with Bryant Middle School, a STEM focused school for grades seven and eight, which has a partnership with the Salt Lake Center for Science Education and is only a few blocks from the university. Working with 7th grade science teacher



Lucas Matelich, among others, Riley and Peter visited Bryant weekly, bringing experiential learning opportunities into the classroom. Activities included using Jell-O to learn about layers of the Earth, Froot Loops to learn about stratigraphy, and the local Gilgal Sculpture garden to learn about the processes of weathering.

Riley and Peter greatly enjoyed the chance to learn with local students. It is their hope that the Fellowship will continue to grow and will foster further relationships between the U of U and local schools, help give young learners an appreciation for the planet and show them that they can be Earth Scientists.

*Congratulations to the new fellows for the 2020-2021 Academic Year:*  
*Sam Lopez, Hannah Hartley, Brenden Femal (advised by Dr. Holly Godsey).*

## A Moderate Reminder that Utah is Earthquake Country

Rebecca Sumison - U of U  
Seismograph Stations

Before March 18, 2020, most Northern Utah residents could probably say they had never felt a moderate earthquake. But that changed when a magnitude 5.7 earthquake struck near Magna, Utah early that morning.

While residents comprehended that they just experienced an earthquake, the University of Utah Seismograph Stations (UUSS) was actively working to solidify the earthquake location and magnitude, post the data to the internet, and send out a press release.

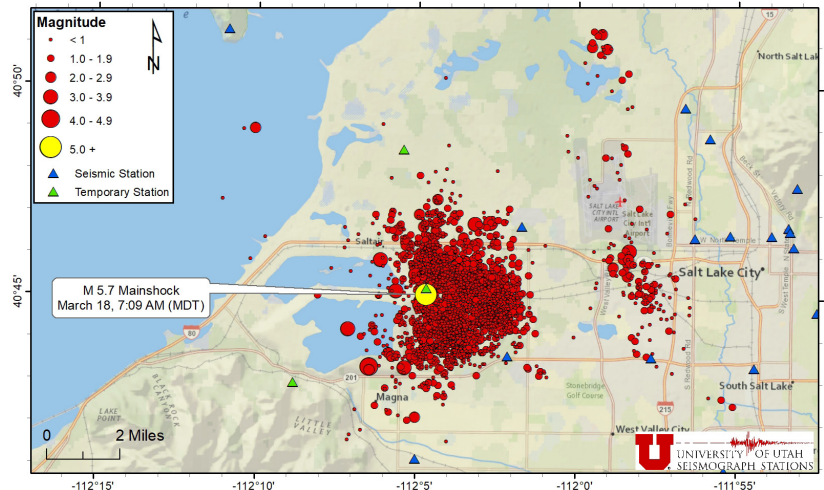
It was an exciting day and following weeks for UUSS. The M5.7 was designated the mainshock of the Magna sequence and was followed by several aftershocks, many of which were felt throughout the Salt Lake Valley. As aftershocks occurred over the next weeks and months, attention returned again and again to the UUSS and the data they provided.

UUSS staff and students were swamped with work. The website was closely monitored and updated, analysts worked tirelessly in locating the numerous aftershocks, moment tensor solutions and other metrics were calculated, and technicians deployed hundreds of temporary seismograph stations to take full advantage of the wealth of incoming data.

The M5.7 was the largest earthquake to occur in Utah since a magnitude 5.9 earthquake in 1992 in south-western Utah near St. George. The earthquake occurred on the Wasatch Fault System. Before March 18, the area experienced six magnitude 3.0 or larger earthquakes since 1962, the largest being the magnitude 5.2 on September 5, 1962.

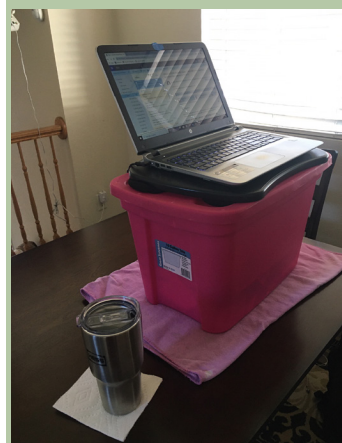
## Recent seismicity near Magna, Utah

March 18 - June 24 (11AM MDT), 2020



## Work From Home Set-Up

Since we moved to virtual modalities in March, we asked our department folks to share their work spaces. Here are some creative ideas including school space for kids, a makeshift standing desk, and a couple of dogs.





*Satellite view of Bonneville basin (aka Great Salt Lake Desert)*



*L-R: Jory Lerback, Jeremiah Bernau, Evan Kipnis, Dr. Brenda Bowen, Mark Radwin*

## **Sustainability and Leadership**

Mark Radwin - Master's (Geology)

The opportunity to work with Dr. Brenda Bowen, Global Change and Sustainability Center (GCSC) Director, has provided great insight into the leadership perspective of sustainability. Together we have been doing research with satellites to monitor the surface deposits of the Bonneville basin (aka the Great Salt Lake Desert), which is the largest source of dust in Utah and is heavily influenced by anthropogenic activities (brine extraction for halite and potash, motorsport recreation, military testing, and remediation techniques). At its heart, the issues facing the Bonneville basin are embedded with sustainability. As a scientific community, we are curious how the basin will evolve through time, affect air quality, impact snowpack melt processes and agriculture (due to dust deposition), and be affected by land use. Dr. Bowen's passion, experience, and colleagues demonstrate how important it is to ask questions about the future of our surrounding landscapes.

## **Dual Undergraduate Degree Program**

Dr. Fan-Chi Lin

The University of Utah's College of Mines and Earth Sciences has just signed a dual degree agreement with the College of Science at National Taiwan University. The dual degree offers a unique international exchange opportunity for undergraduate students in the Departments of Atmospheric Sciences and Geology and Geophysics at both institutions to obtain dual Bachelor's degrees after spending at least one year visiting the other university and satisfying graduation requirements of both universities.



*The National Taiwan University campus, with Taipei's high-rises and mountains in the backdrop.*

*Photo courtesy of NTU at <https://oia.ntu.edu.tw/prospective-students>*

## From Countertops to Immersive, Accessible Education and Outreach

Carl Beno - PhD Candidate (Geology)

The striking rock slab displays that line the hallways of the Fredrick Albert Sutton Building (FASB) make our home of Geology and Geophysics (GG) one of the most unique geoscience education buildings in the country, if not the world. The slab displays contribute to the inspiring learning environment that draws in students from across the university. The displays are the centerpiece of many U of U and community outreach events held in the building, including the annual GG Open House. These cut and polished rock slabs, typically used for kitchen countertops, come in a dazzling array of rock types from all over the world. However, many of the local stone vendors who supply the slabs have little to no geologic information on the particular origins and therefore the stories that these countertop materials tell. Our faculty and students have been investigating the origins and geologic history of the display rock slabs through an upper division “Countertop Geology” course, dedicated to teaching students lab techniques (e.g., optical microscopy, electron microprobe geochemistry, and mass spectrometry) using samples from the rock slabs. The results capture multiple scales of study, from the global tectonic context down to chemical grain-scale of microns. Faculty have leveraged the teaching potential of these slabs in most of our core courses, to create interactive outcrop-scale exercises and to teach specific geologic concepts in an inviting and accessible environment.

This pedagogical model, developed by our GG faculty, uniquely positions us to address current challenges in geoscience education related to accessibility and remote learning. An online repository contains the data of >50 rock/slab displays (i.e., slab location and geologic setting, photomicrographs, geochemical and mineralogic data, relevant publications, and more). Armed with this new datasets, our faculty will improve and strengthen existing exercises and develop new activities for the core curriculum. Students in future iterations of the Countertop Geology course will continue to generate data and elucidate new ways of reading these rocks. The future of both in-person and virtual learning via our Sutton Building displays is bright, and many geoscience departments globally are interested in using and emulating our integrative display resources!

*Carl served as a university TA for the Countertop Geology special topics course under Dr. Marjorie Chan.*



## Student Focus

### Fossil Website Returns After Long Hiatus

Zackery Wistort - PhD Candidate (Geology)

From Cambrian-age Jellyfish to Topaz and rare Red Beryl, the state of Utah is home to a vast assortment of fossils and minerals! Our Department of Geology and Geophysics houses its collection in the Fredrick Albert Sutton Building (FASB). Many of the specimens are mounted on the walls or in display cases all around the building.

Quintin Sahratian, rock prep manager for the department, curates these rare and wonderful specimens. He has spent a great deal of time maintaining and organizing the materials as they are a significant departmental resource for teaching. They are also a record of noted localities to find geological specimens. Unless one is taking a geology class at the university or working in FASB, these specimens are somewhat inaccessible. With this in mind, a website was brought out of hiatus to display some of the material in virtual form. The webpage showcases some of the materials which have been gathered by professors, graduate students, and local rock hounders for nearly 100 years!

The website is organized by geological formation, all within Utah. Some favorites in the fossil collection are the 520-million-year-old jellyfish, collected by our own Rich Jarrard and Susan Halgadahl (GG Faculty)! Carbonized jellyfish from the Cambrian-aged Marjum Formation of the House Range are very rare fossils indeed. Although jellyfish have been around for hundreds of millions of years, these animals are very rare to find. This is because jellyfish lack hard body parts, like shells, teeth, and bones which typically fossilize more easily than soft body parts and tissues. To fossilize jellyfish, it must be buried in sediment quickly so that scavenging animals and bacteria do not have a chance to gobble it up.

An updated version of the website went live in February to showcase more rare items in our collection. These fossils and minerals, however, only scratch the surface of the many drawers of fossils, minerals, and rocks. Moving forward, we plan to continue to update the website with images from the extensive collection, adding geologic maps and detailed rock descriptions of significant Utah formations, and uploading legacy curation notes detailing the human history which led to the U of U collection.





Remember that geology is all around you. Some of these cool fossils can be found right here in the foothills of the Wasatch!

UofU Fossil and Mineral Collection:  
<https://fossil.utah.edu/>

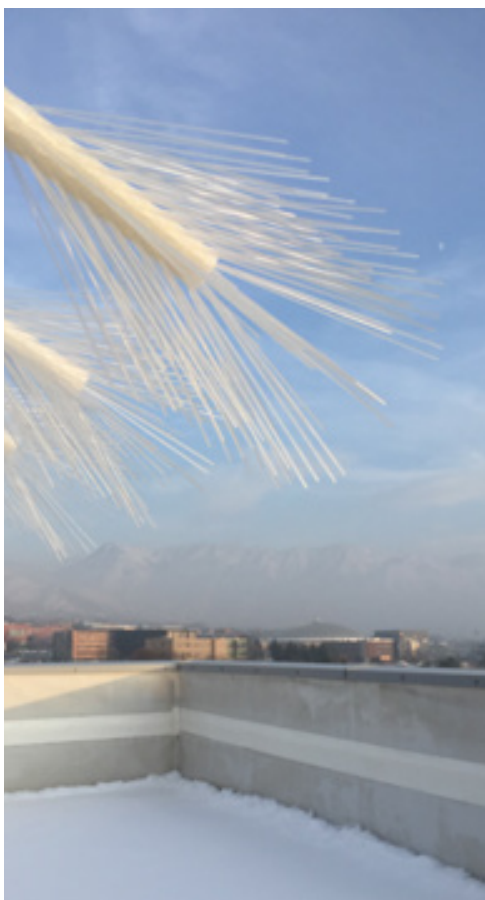


## Bahama's Ecological Wonders

Students and faculty from the department had the opportunity to take a field trip to the Bahamas. Professors Cari Johnson, Brenda Bowen, and Kathleen Ritterbush were able to guide and instruct students on modern carbonate processes in action. The crew visited limestone outcrops on the island as well as reefs and shoals off shore. Graduate student Hannah Hartley recalled, "One of the neatest things we saw were oolitic shoals, mobile islands composed entirely of tiny round carbonate grains [called] ooids, at Joulter's Cay. I've seen oolitic limestones, and I've learned specifically about that location even before the class, but to stand in the middle of the process and see how the waves rolled the ooids around was incredible." Many students expressed appreciation of observing processes in action. Casey Duncan, also a graduate student, explains how seeing modern environments changed his view of what he sees in rocks. "Exploring the ecosystems and environments that form the carbonate rocks allowed me to gain a greater appreciation for the complexity and interconnectedness within these systems."

*The Department is grateful to many kind donors and alumni who helped support this tremendous field experience! We especially acknowledge Orogen Energy, who provided a generous 1:1 match for the first \$15k in donations.*



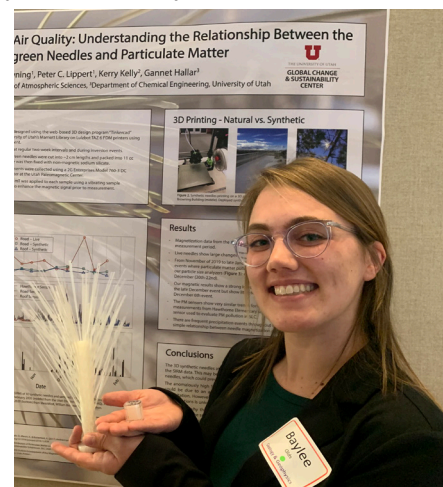


*The deployed 3D synthetic needles on top of the WBB Building.*

## Synthetic Needles Capture Pollution Data

Baylee Olds - Undergraduate (Geoscience-Environmental Geoscience)

The magnetization of evergreen needles might be a low-cost, high-density measurement of harmful particulate pollution in the air we breathe. I helped test this idea with Professor Peter Lippert and PhD candidate Grant Rea-Downing during my senior year at the U of U. Since August 2019, I 3D-printed, deployed, and collected synthetic and natural pine needles from two on-campus locations and measured their magnetic properties in the Utah Paleomagnetic Center. I presented our preliminary findings at the 2020 Global Change and Sustainability Center's Research Symposium. I am incredibly proud to be a part of this project, especially as it investigates the impact of fossil fuel combustion on air quality and the health of individuals living along the Wasatch Front. As a U of U Air Quality Scholar this year, I also worked with other student scholars from across campus to research the social and public health implications of poor air quality. We promoted public education and community awareness of Salt Lake Valley air quality issues in partnership with the Utah Museum of Fine Arts. I find communicating my research findings to the community to be the most challenging aspect of my research, but this public education, now more than ever, is the most critical part of our work if we are to build a more healthy and sustainable future.



## Groundwater Dating Methods

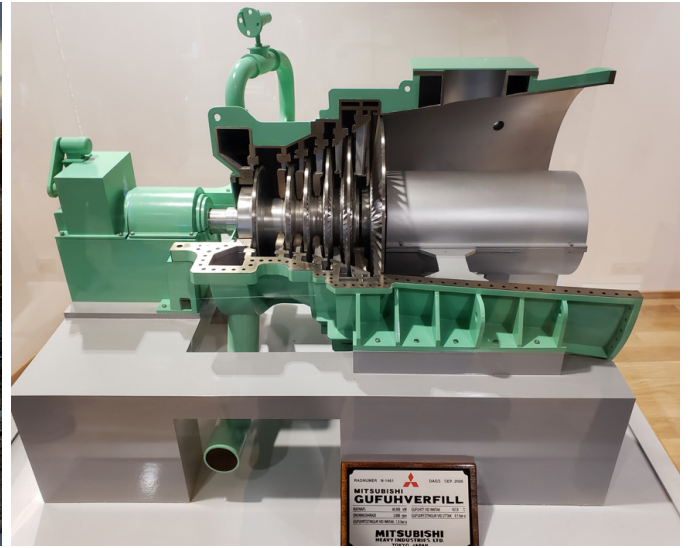
Dr. Kip Solomon

More than 99% of unfrozen fresh water on Earth is in the ground and the largest use of freshwater is agriculture. As our population approaches 8 billion and as agricultural production in humid areas asymptotically approaches a maximum, the world will increasingly turn to groundwater in arid and semi-arid regions for agriculture expansion. But can the desert sustainably “blossom as a rose?” Professor Kip Solomon and graduate student Eric Humphrey hope to shed light on this question as part of an NSF-funded project to determine the mean and distribution of the age of groundwater that discharges into the Middle Loop River in the Sand Hills of Nebraska. The Sand Hills are located in the general recharge area of the massive High Plains (Ogallala) Aquifer. Previous studies conducted by Professor Solomon and his colleagues at North Carolina State University have utilized groundwater dating methods developed at the University of Utah to show that groundwater discharging into streams is much older than predicted by groundwater flow models. By collecting samples from 30cm below the streambed and by utilizing a seepage meter, they have mapped the flow-weighted transit time distribution over a 100km stream reach. Remarkably, the mean age of groundwater discharge increases from about 60 to 6,000 years in the downstream direction and emphasize the importance of understanding early Holocene climate discharge was recharging this groundwater system.





*Hotspring*



*A geothermal turbine with cross-cut to see the inner workings*



*Skogafoss waterfall (glacially fed)*

## **Iceland's Renewable Energy**

Travis Parsons - Undergraduate (Geoscience-Geology)

In December 2019, I took a 60-hour intensive course at Reykjavik University's Iceland School of Energy. The course focused on renewable energy innovation and sustainability. Iceland is unique in that ~90% of their energy consumption is from renewable resources. Through a combination of classroom teaching and field study, we covered the geology of Iceland, engineering of geothermal and hydroelectric power and bio-fuels, energy economics, and sustainability. Trips to a geothermal plant, a hydroelectric plant, and a rapeseed bio-fuel farm and production facility helped students engage with experts to get first-hand instruction on how these facilities work and how they can be improved. We also made several hikes to hot springs and geysers, through the backcountry and black sand coast, and on a glacier, to not only enjoy the natural beauty of Iceland, but to gain a better understanding of how nature can be used responsibly and how to protect it. I recommend this experience to anyone interested in geology, engineering, and sustainability, especially as Utah explores geothermal prospects in the state.



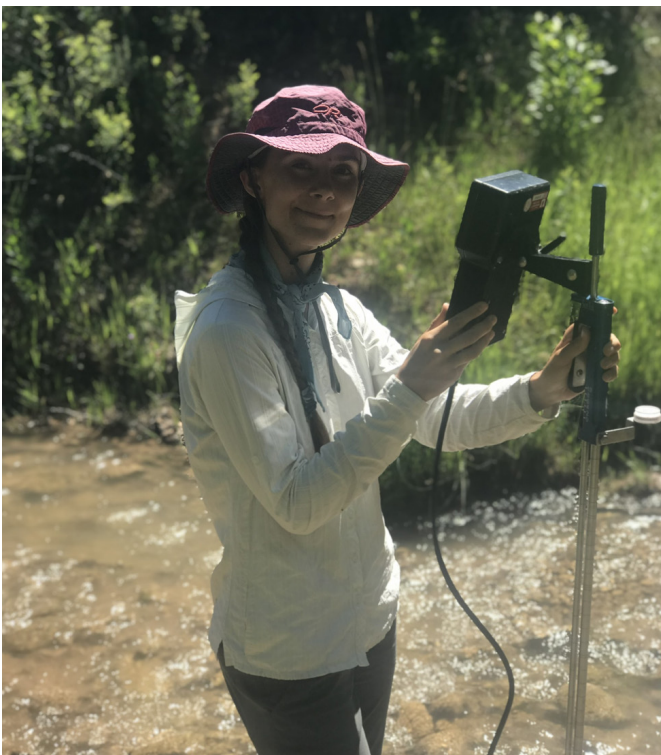
*Black sand (basalt) beach along the southern coast. Vestmannaeyjar in the distance.*



*Standing by the newly installed BDAs*



*Holding up a pressure transducer, used to measure groundwater level*



*Measuring streamflow at the research site*

### **New Stream Restoration Tool**

Lily Bosworth - Undergraduate (Honors Geological Engineering & Environmental Geoscience)

Piqued by a 2018 summer internship with Trout Unlimited, I have been conducting research on beaver dam analogues (BDAs) advised by Dr. Paul Brooks. BDAs are a new, affordable, low-tech stream restoration tool that benefit stream and riparian ecosystems similar to natural beaver dams. However, little data is available on BDAs' impact on stream hydrology. Water is a vital, sensitive resource in Utah and throughout the West, so it's important to understand how BDAs impact water availability and timing. Recognizing this knowledge gap, I obtained a grant from the Sustainable Campus Initiative Fund and partnered with Trout Unlimited, Wild Utah Project, and a Summit County landowner to install a BDA restoration site and collect before-and-after hydrologic data. I continued my research this summer 2020 as a research assistant for Wild Utah Project and hope my work will help inform water stakeholders how to effectively use BDAs while balancing stream restoration goals with water availability.



### AEG Explores Southern Utah

Sam Lopez - PhD Candidate (Geological Engineering)

Right before the onset of the COVID-19 pandemic, the U of U Student Chapter of the Association of Environmental and Engineering Geologists (AEG) led a field trip to Southern Utah. We visited and learned about various geohazards in red rock country, which is the focus of Dr. Jeffery Moore's research group. After a long drive south the night before and an amazing night camping under the stars, we first visited Natural Bridges National Monument which is unique for its three massive sandstone spans, all at different points in their geologic lifespan. At Arches National Park, we visited the geologic remains of fallen Rainbow Arch and learned about the possible influence of anthropogenic activity (vibrations from the nearby road) on the arch's recent collapse. On the last day of the trip, we visited a spectacular detaching 400m long slab of rock at Courthouse Mesa and learned about long-term rockfall hazard assessment. The AEG student chapter hopes to lead many more trips like this in the future along with other fun activities, so please get involved! For more information, contact them at [uofuaeg@gmail.com](mailto:uofuaeg@gmail.com). Big thanks to the U of U Department of Geology and Geophysics and the AEG Utah Chapter for helping to make this great trip possible!



## Unraveling Sedimentology Mysteries in Argentina

Dr. Lauren Birgenheier

Dr. Lauren Birgenheier and two graduate students, Raul Ochoa and Katie Valery, traveled to Argentina for four weeks of field work in the Neuquén and Mendoza Province in October 2019. They were there to unravel the sedimentologic mysteries of the Cretaceous Agrio Formation in the Neuquén Basin. The Agrio Formation is a marine, organic-rich black shale that is of interest for unconventional resource development. It has not been sedimentologically studied in outcrop in many regions. The team visited outcrops in northern Neuquén and southern Mendoza, measuring several full sections through the Formation and collecting over a hundred pounds of rock samples to ship home to Utah for mineralogic and geochemical analysis. Field sites covered a large area. They landed in Buenos Aires, then flew to Neuquén and drove out to Buta Ranquil to access outcrops. Then they drove back to Neuquén, flew to Buenos Aires, then to San Rafael and drove on to the field sites of south of Malargüe. In addition to field work, the team also met with the Hydrocarbon Secretariat of Neuquén, a collaborator at La Plata University, and a team of geologists at Chevron in Buenos Aires. Highlights included 40 miles of hiking in five days of measuring section, roller coaster-like 4WD jeep tracks, a little snow, and, of course, some Argentinian wine. It was a great adventure!



### A Student's View of Wasatch in the Field

U of U Undergraduate Geology student taking GEO 2500 Wasatch in the Field, Fall 2019

"We looked at fault scarps from a distance that cut through glacial deposits to understand the history of earthquakes in the Salt Lake Valley. We were able to get up close and personal with the faults and explored the damage they cause their host rocks and the tell-tale signs of their movement, the fossilized earthquakes left on the fault surfaces. There was even some exploration of how fault influence groundwater flow. It was a good day out. Hat tip to our teaching assistants Gabby St. Pierre and Courtney Wagner for helping students new to geology get so much out of this exercise."



## Outreach

### Fall Open House 2019

Shanna Futral

On the evening of October 18, 2019, the Frederick Albert Sutton Building bustled with excitement as the department's annual Public Open House was in full swing. Close to 400 community guests, including students from local schools, area families, prospective students from SLCC, and department alumni, roamed the halls while engaging in 28 different hands-on activities, including virtual reality, augmented reality, rocks and gems with microscopes, 3D images, drones, and so much more! Topics included encompassed earthquakes, volcanoes, dinosaurs, fossils, meteorites, commercial products that use minerals and rocks, sustainability strategies, earth science careers, the power of metals and Utah rocks.

The evening also featured "Fun with Fossils" and "Hot Rocks" theme tours of the buildings. Many guests (kids and adults alike!) participated in a building-wide scavenger hunt that ended at a prize station where they could pick out rocks/minerals and geology books to take home. They could also take their rock/mineral to the Rock Identification Station and receive a certificate with information about their treasure. The event also featured GeoClub selling department swag, archival maps, and rocks, which raised \$1000 for student activities!

One of the key activities of the evening was the lecture, "Minerals Old & New Messengers of How Worlds are Made," by Dr. Barbara Nash, Professor Emerita in the U of U's Department of Geology & Geophysics. A video of the presentation can be viewed on the Department YouTube page.

The evening's activities were led by students and faculty within the department, including its Global Change and Sustainability Center and Seismograph Stations, and several university and community partner organizations, including Energy & Geoscience Institute, Mineral Collectors of Utah, Natural History Museum of Utah, Titan Forged Siege, U of U Youth Education, Utah Friends of Paleontology, Utah Geological Survey, and Utah Student Robotics. Student groups were also among those represented; Association of Environmental & Engineering Geologists (AEG) and GeoClub. In total, 97 volunteers donated approximately 315 hours the day of the event in order to make it a huge success.

*Due to restrictions on large gatherings, we had to postpone the Fall 2020 Open House. Check our website for updates.*



## SACNAS in Paradise

Michelle Tuitupou

In October 2019, four graduate students from the department, one research professor, and our academic advisor attended the SACNAS (Society for Advancement of Chicanos/Hispanics and Native Americans in Science) conference in Honolulu, Hawaii. The organization is inclusive to underrepresented student populations and dedicated to fostering the success of students and professionals in STEM fields. Funding for the trip was provided by both the department and the College of Mines and Earth Sciences Dean's office. As part of the Dean's strategic plans to promote diversity within the college's programs, the SACNAS conference was a perfect venue.

Holding the annual conference in Hawaii was a conversation the organization had for many years. There was fear, however, they would have low attendance. 2019 turned out to have one of the largest attendance in the conference's history with 5,186 attendees! The use of indigenous knowledge coupled with the island experience made for a unique experience.

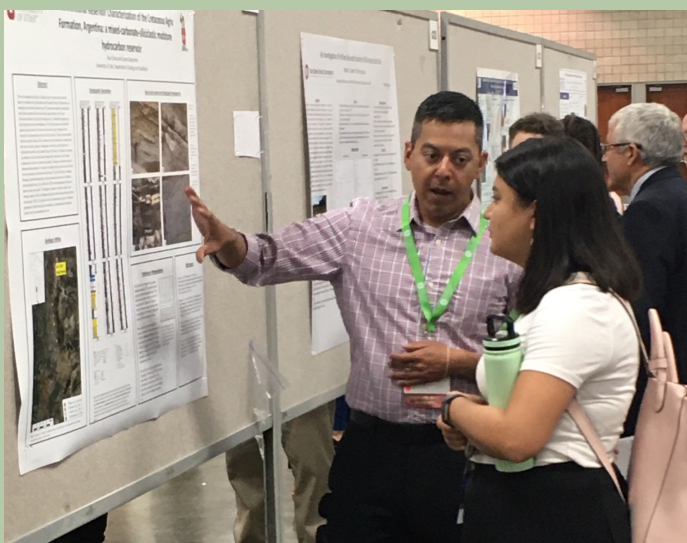
"It opened my eyes to how the culture of the conference impacts the outcomes and goals. I could not believe that 5,000 people stood up and participated in the hula and mele that was guided by the Kanaka Maoli group leading the welcome ceremony," said Jory Lerback (PhD Geology), who also has Native Hawaiian ancestry.

Raul Ochoa (PhD Geology), was able to reconnect with individuals from his academic career. He also presented his poster, "Unconventional Reservoir Characterization of the Cretaceous Agrio Formation, Argentina: a mixed-carbonate-siliciclastic mudstone hydrocarbon reservoir."

"At this meeting, the majority of presenters were members of underrepresented communities," Ochoa stated. "Other STEM meetings that I have attended in the past, underrepresented communities are generally the overwhelming minority, but this was not the case at SACNAS."

Gabby St. Pierre (PhD Geology), was excited to spend time at the college's table talking to potential students. "Many of the students at SACNAS are undergraduates looking for graduate schools, and this was a great opportunity for us graduate students to share the range of research we do in our department, including diversity initiatives such as Inclusive Earth within the College of Mines and Earth Sciences," said St. Pierre. Both St. Pierre and Lerback are two of the founding members of Inclusive Earth. "Scientists I talked to valued more than just research. They value those who give back to their communities and create diversity initiatives in their respective labs/programs/universities."

*L-R: Dr. Diego Fernandez (Research Associate Professor), Gabby St. Pierre, Jory Lerback, Kevin Mendoza (PhD Geology)*



*Raul Ochoa presenting his research*

*The 2020 SACNAS conference will run from October 19-24 2020. Originally scheduled to be hosted in Long Beach, California, the conference has now been moved to a virtual format.*

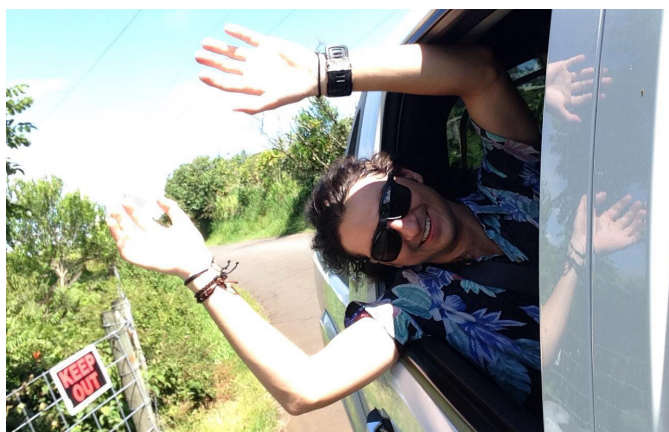
## Student Achievements



**Jeremiah Bernau** (PhD Geology) was featured in the University of Utah Magazine's segment titled "They Pay Me To Do This." Jeremiah is obsessed with salt and as a doctoral candidate, has been studying it for years. To read the entire article, click [HERE](#).



**Hannah Hartley** (MS Geology) received a LacCore grant to travel to the University of Minnesota where her core samples are archived. She also received a GSA research grant, specifically from the Continental Scientific Drilling Division. Hannah studies how seasonal and long-term lake level changes are recorded in sediment cores from Lake Powell.



**Otto Lang** (MS Geology) received a GSA research grant to study the modifications of the magma composition during magma-rock interactions.

## Undergraduate Scholarship Recipients

We thank the College, the Department, and our many friends who made substantial and important support possible for the following students:

### **Kenneth & Nedra Bullock Keller Scholarship**

Brennon Peterson, Lila Sorensen, Joshua Taylor, Mitchell Poen, Annie Matze, Aiden Beukema

### **Chevron Scholarship**

Daniel Burt, Erin Lofgran, Jessica Kent, Tristen Lieberknight

### **Dorothy Goode Scholarship**

Karrah Spendlove, Audra Tessman, Neo Hill, Isabel Duke

### **Wasatch Gem Society Scholarship**

Karrah Spendlove

### **Ekdale Paleontology Scholarship**

Neo Hill

### **Doelling Scholarship**

Hayley Lind, Sarah Stropkai, Eva Shaw

### **Frischknecht Scholarship**

Madeleine Festin

### **GG Scholarship**

Summer Seggar, Mallory Scofield, Alan Manzo, Megan Denney, Adam Culbertson, Michael Terlaga

### **Hiromi Honda Endowed Scholarship**

Jessica Jensen

### **Joklik Scholarship**

Ivan Gaichuk

### **Kenneth W. Larsen Scholarship**

Edward Tang, Sam Bagge, Carlos Ramos

### **Mikulich Scholarship**

Andreas Cordova

### **Mineralogical Society of Utah Scholarship**

Sarah Cronin, Gregory Mancini, Nathan Wenger, Clayton Russell

### **Nackowski Scholarship**

Amin Hamidat

### **Marta S. Weeks Legacy Scholarship**

Kyle Christianson, Sarah Smart, Brooke Garza

### **Dr. Ricardo Presnell Memorial Scholarship**

Justin Krier, Ann Fankhauser, Jasmine Garcia,  
Jenny Hambleton

### **University of Utah T53 Scholarship**

Emily Larson, Zachary Claerhout, Brittney Hoskins

### **Field Camp Scholarship**

Steven Rumph (Orlo Childs)  
Sarah Stropkai (Orlo Childs)  
Hayley Lind (Earls Family)  
Sarah Cronin (Earls Family)  
Mark Radwin (UGA & GG Scholarship)  
Gregory Mancini (UGA & GG Scholarship)  
Teresa Casterline (GG Scholarship)

## **Student Awards**

### **UROP Recipients**

#### **Fall 2019**

Sarah Hamilton (Sarah Lambart)  
Justin Krier (Michael Thorne)

#### **Spring 2020**

Justin Krier (Michael Thorne)  
Mack Tawa (Courtney Wagner)  
Elliott Gray (Sarah Lambart)  
Sarah Hamilton (Sarah Lambart)  
Hayley Lind (Richard Fiorella)  
Clayton Russell (Jeffrey Moore)

### **Outstanding Undergraduate Student Awards**

|                                  |                |
|----------------------------------|----------------|
| Geology                          | Hayley Lind    |
| Geophysics                       | Avery Conner   |
| Environmental Geoscience         | Baylee Olds    |
| Geological Engineering           | Cash Stallings |
| Earth Science Composite Teaching | Mitchell Poen  |

### **Excellence in Undergraduate Research Award**

Mark Radwin  
Sarah Hamilton

### **Ronald Terrill Award-Geological Engineering**

Andrew Stropkai

### **Outstanding Graduate Student Awards**

|     |             |
|-----|-------------|
| MS  | Cheng Tarnq |
| PhD | Sin-Mei Wu  |

### **Outstanding Teaching Assistant Award**

Katie Valery



**Courtney Wagner** (PhD Geology) was awarded the Schlanger Ocean Drilling Fellowship, a one-year fellowship for PhD students working on projects relating to the International Ocean Discovery Program.

She was also awarded the P.E.O. Scholar Award. This is a merit-based award designed to support women pursuing a doctorate degree. To apply, the applicant must first reach out to their local P.E.O. chapter for a nomination between August and November.

**Jonathan Voyles** (Honors BS Geosciences and BS Geological Engineering) is a recent graduate now in the Geophysics PhD program at Sanford University. He shared his very first first-authored, peer-reviewed publication through geoscienceworld.org. The link to the online version can be found [HERE](#).



**Jory Lerback's** (PhD Geology) review of Eugenia Cheng's book, "x+y: A Mathematician's Manifesto for Rethinking Gender" was published recently in Nature. Read the review [HERE](#).

**Please consider making a gift to the Department of Geology and Geophysics by clicking on the link below or contacting TJ McMullin, Development Director for the College of Mines and Earth Sciences.**

- Give online [HERE](#)
- 801-581-4414
- [travis.mcmullin@utah.edu](mailto:travis.mcmullin@utah.edu)

## Faculty Focus



**Dr. Peter Lippert** was awarded tenure and promoted to the rank of Associate Professor, effective July 1, 2020. He was also assigned as the Undergraduate Affairs Committee Chair for 2020-2021. We are excited to see what adventures come next next in your career and are honored to have you as a member of our department!

Dr. Lippert received the *Early Career Teaching Award* which is given to outstanding young faculty members who have made significant contributions to teaching at the University of Utah. He also won the *Career Champions Award* from the Career & Professional Development Center recognizing individuals who have made a substantial impact on students' career development at the university.

In December 2019, **Dr. Lauren Birgenheier** was invited to participate in the filming of a PBS documentary show called Road Trip Nation. This particular documentary followed three single moms on a road trip through the country as they seek to find new career paths in STEM. One of the women on the road trip, Kiera, is an aspiring geologist so the show reached out to Dr. Birgenheier, a single mom, to serve as a mentor and interviewee. Dr. Birgenheier met the road trip RV crew on their route outside of Las Vegas, Nevada at Red Rock Canyon National Conservation Area. They spent a day together filming an interview and a little field lesson.

You can view the trailer for the documentary, “A Single Mom’s Story,” [HERE](#). The full documentary will be released November 6, 2020 on the same link. You can also view Dr. Birgenheier’s interview and profile page containing some of her personal story about becoming a geologist and professor along with some advice for aspiring geologists and parents [HERE](#).

*Photo credit: Nathan Staph, Road Trip Nation Videographer*



*Utah's Redrock Metronome*

Castleton Tower, located near Moab, Utah, is one of the world’s largest freestanding rock towers, rising 400 feet at the end of a ridge overlooking Castle Valley. With the assistance of two volunteer climbers, **Dr. Jeff Moore’s** team measured the vibrational properties of Castleton Towers, finding that the tower resonates in response to wind and seismic energy of the Earth with two dominant vibrational modes at 0.8 and 1.0 Hz (i.e. around once per second). The climbers placed one broadband seismometer on top of the tower and another at the base of the tower for comparison, and recorded several hours of ambient vibration data. The team analyzed this data, in conjunction with 3D modeling based on photogrammetry, to distinguish important details of the tower’s dynamic response, which are necessary to predict how the tower might respond to earthquakes or human-caused vibration energy inputs. The measurements also allow for future structural health monitoring, using repeat measurements of the resonant frequencies to check for mechanical change

potentially related to damage. In order to help people get a sense for Castleton Tower as a lively, dynamic landform, the team sped up the ambient vibration data so it can be heard as sound. The low rumble represents a voice unique to the tower consisting of its resonant tones, and can be heard on the website [HERE](#).

Dr. Moore was selected as the 2020-2021 L. Jackson Newell Fellow in the Liberal Arts and Sciences. The award is given to a fellow who combines expertise in their scholarly area with appreciation for transdisciplinary work across the liberal arts and sciences spectrum and a capacity for conveying that expertise to a public audience.



Welcome to Dr. Tonie van Dam, our newest faculty member! Dr. van Dam is joining us from the University of Luxembourg where she worked as the Vice President of Strategic Projects, the Vice President of Doctoral Education and Training, International Relations, and Gender, and as a professor. She first presented her research on Absolute Gravity in Greenland to the department just over a year ago. Dr. van Dam joined us on July 1, 2020 and we are excited to be working with her!



**2020 Outstanding Faculty Research Award**  
John Bartley



**2020 Outstanding Faculty Teaching Award**  
Kathleen Ritterbush



July 2019: Plein-air painting class, week one of leave.



November 2020: With John Gitonga at Mpala Research Center, Kenya.



December 2020: With Iain Douglas-Hamilton, my long-time colleague for doing research on elephants (diet, ivory forensics).

## Notes from the Field - Dr. Thure Cerling

*(Dr. Cerling was awarded the Emile Argand Medal, the highest award of the International Union of Geological Sciences, for his work in isotope geochemistry. This was to be given at the meeting in Delhi, India, in March 2020. Due to the COVID-19 pandemic, the meeting has been rescheduled for August 2021.)*

In July 2019, I went with the University of Utah Taft-Nicholson Center to Centennial Valley along the Idaho-Montana boundary, at the invitation of our Dean, Darryl Butt, and an art class taught by Kim Martinez. Darryl is an artist. I think I was along to give some geological context to the “plein air” projects of the students. It was a spectacular setting with towering Madison Limestone forming the mountains to the south. Centennial Valley is home to the Red Lakes Wildlife Refuge and not very much else. Low hills making up the north side of the valley is the Huckleberry Ridge Tuff, from one of the Great Yellowstone eruptions. This would be a good site for future field projects of the department with complex structural geology, extensive Paleozoic and Mesozoic sediments, volcanics of both Eocene and Quaternary age, faulting cutting across Quaternary debris flows and glacial moraines. A geological wonderland!

I spent August 2019 and early September at the National Museum of Kenya working with Kyalo Manthi, Adjunct Assistant Professor in Geology and Geophysics, and then at the Turkana Basin Institute in northern Kenya working with Meave and Richard Leakey. The goal there was my continued work on mammalian diets. We have identified the transition from the grazing elephants to the modern browsing elephants. It is still a mystery as to why elephants abandoned a grazing diet, which they had for millions of years, for a browsing diet which began only in the past 100,000 years. We also continued our work sampling the early hominin fossils for isotope analysis, and making a strontium-Isoscape of the region for anthropologists working on the transition from hunter-gatherer to pastoral cultures.

From mid-September to early November, I was in Zurich, Switzerland, working with Stefano Bernasconi of ETH and Marcus Clauss of the University of Zurich. What was I doing? Don't laugh! I was sampling animal breath at the Zurich and Basel Zoos, measuring CO<sub>2</sub> and methane and the isotope ratio of the CO<sub>2</sub>. What does this have to do with Geology?!? We were looking at different digestive physiologies so that we can make the correction from isotope in teeth to animal diet. This is key towards reconstructing animal diets of fossils because the carbon isotopes from life are perfectly preserved in them.

I headed back to Kenya for 6 weeks where I was at the Mpala Research Center. This is an ecological center where I have been working for about 20 years. This was a month of writing from 8 am to 4 pm everyday, then a game drive to look for elephants, hippos and other wildlife. We also visited John Gitonga, who manages the stable isotope facility at Mpala and managed the Stable Isotope Ecology Short Course in Utah in 2018. The stable isotope lab at Mpala is run completely on solar power! John has set up this lab with Kevin Uno (U of U 2012, now at Columbia University). This was a very good place to do writing!



**Dr. Kathleen Ritterbush** received the 2019-2020 College of Mines and Earth Sciences Outstanding Faculty Teaching Award. According to her students, Dr. Ritterbush is a deeply engaging, distinctive, and passionate teacher. Her accessible teaching style, critical learning methods, and inclusiveness has profoundly impacted her students.



**Dr. Sarah Lambart** was awarded an ASC PRF grant for two years to study the circulation of immiscible fluids in porous media. This will allow her to expand the MagMaXLab team and develop new research directions with applications as diverse as CO<sub>2</sub> sequestration, secondary migration, and planetary differentiation. She also received a 2-year NSF grant to study the petro-geochemical effects of magma migration in the mantle. The primary objective of this research is to develop a new experimental technique to simulate the circulation of magmas through the mantle. The experimental products will be compared to the natural volcanic rocks and will be used to understand the relation between melting processes at depths and volcanism at the surface of the Earth.

In Spring 2021, Dr. Lambart will be offering an advanced petrology class that will include an introduction to thermodynamic modeling with a tutorial on alphaMELTS2 that allows for modeling of magmatic processes.

**Dr. Rich Fiorella**, in collaboration with Dr. John Lin (Atmospheric Sciences) and colleagues at Oregon State University, have been awarded an NSF grant to help improve our understanding of the water cycle using atmospheric models and stable water isotopes. A small fraction of water molecules possess different oxygen or hydrogen isotopes-or atoms an element with a different atomic mass. Small variations in the amount of these isotopically substituted water molecules in time and space record information about the water cycle. While the underlying processes responsible for variation in water isotopes is well understood, mixing and transport of water vapor in the atmosphere often makes these signals difficult to interpret. This project will aim to reduce these uncertainties by improved methods to trace water through mixing and transport processes in atmospheric models. In addition, Drs. Fiorella and Lin will partner with the STEM Community Alliance Program ([www.stemcap.org](http://www.stemcap.org)) at the University of Utah to develop educational opportunities for youth in a youth-in-custody facility. The team is planning to work with youth to grow and monitor ozone 'bioindicator' gardens containing plants that are sensitive to near-surface ozone. This work aims to build student confidence in their capacity to learn about and participate in science, and to bring greater awareness to the summer ozone pollution that is prevalent in the Salt Lake Valley. Educational materials developed for this program will also be made available to the public.

**Drs. Lauren Birgenheier and Cari Johnson** were recipients of the GRIT Award 2019 under the Affinity Network Category with She Persisted, University of Utah Energy. The GRIT Awards & Best Energy Workplaces, sponsored by Medallia, were created to recognize women leaders in energy and the male allies who advocate for their advancement. Experience Energy, the leading resource for diverse talent, careers, and culture in the energy industry, revealed the winners in October 2019, which included a newly-added category, Best Energy Workplaces.





The inaugural Michael J. Fitzgerald Student Mapping Course was offered November 4-9, 2019 at the Cooper Flat porphyry-breccia Cu-Mo-Au mine (THEMAC Resources) in New Mexico with instructors **Drs. Erich U. Petersen**, William X. Chavez, Jr. (NM School of Mines), Ralph A. Gonzalez (Archean Minerals), and Adrian Landstedt (NM School of Mines). Sixteen participants, consisting of students and young professionals representing 11 countries, mapped rock types, lithologic contacts, and vein structures at detailed mine map scales and conducted ground magnetometer surveys along a mine bench to locate concealed basaltic dikes.

Students were grouped into teams for each exercise, allowing students and young professionals with different backgrounds to collaborate and share field mapping techniques. Map areas offered variable exposures of mine wall-rock and host-rock units, so participants were challenged to classify rock units, assess ore-mineral veinlet structural settings, and determine lithologic contacts. To complement the field mapping, discussion sessions presented students with the salient characteristics of porphyry systems, with emphasis on the mineralogy and geochemistry of large hydro-thermal systems, supergene processes and magnetometer surveys.

This course was established by the Society of Economic Geologists and is supported by the estate of Michael and Marisa Fitzgerald. Michael, a University of Minnesota graduate, was a long-time supporter of students and field geology programs. The Fitzgerald estate continues to enhance student and young professional potential through generous support of this SEG field course.



### Reactive Glasses in Environmentally-Friendly Roman Concretes

**Marie Jackson** is the recipient of a Department of Energy Advanced Research Projects Agency (ARPA-E) award for “Roman Reactive Glass Concretes in Energetically Self-Sustaining Systems.” Fabrication of glass aggregates from recycled glass in collaboration with Silica Dynamics LLC and Savannah River National Laboratories mimics the reactive properties of volcanic tephra selected by Roman engineers 2000 years ago for architectural and marine concretes. Basaltic tephra studied by Professor Barbara Nash serves as a proxy for these glasses in developing protocols for fabricating the modern Roman concrete materials. The experimental fabrication, analysis and testing of the experimental concretes is taking place in University of Utah Geology and Geophysics, Civil and Environmental Engineering, and Mechanical Engineering laboratories.

Dr. Jackson has also been named a Fellow of the American Ceramic Society. She is currently Vice-Chair of the ACerS Art, Archaeology and Ceramic Science (AACS) Division.



*Photo: Philip Brune, mechanical engineer, Bradley Cottle, MSc graduate student, and Isabelle Bowers, undergraduate student, prepare an experimental Roman mortar with reactive glass aggregate.*



**Distinguished Professor Marjorie Chan** is the recipient of the 2020 Geological Society of America (GSA) Distinguished Service Award for exceptional service to the Society. Dr. Chan has enjoyed a rich career of GSA involvement including initiation of the successful “On To The Future (OTF)” program encouraging diverse students to attend their first GSA meeting, being the 2014 GSA Distinguished International Lecturer, service as GSA councilor (2016-2020), and numerous other leadership and committee positions. She was also recognized as the 2019 Sloss Awardee for lifetime achievements in Sedimentary Geology.

Lunar meteorites were recovered from ice-fields near the Dominion Range (DOM) of the Transantarctic Mountains, roughly 250 miles from the South Pole. The new meteorites were found by the 2018-2019 U.S. Antarctic Search for Meteorites program (ANSMET) field team, led by **Dr. Jim Karner** at the University of Utah and Ralph Harvey at Case Western Reserve University.



Every December, Dr. Karner and a crew of eight volunteer meteorite hunters trek to Antarctica. Working in teams, they traverse the ice with snowmobiles for six weeks, looking for telltale characteristics of rocks that are not of this world. In Fall 2020, Dr. Karner added a special topics course, GEO 5920-014 Earth and the Planets, geared toward freshmen and sophomore students interested in learning more about planetary geology. This year’s trek has been cancelled due to COVID-19 travel restrictions.

*Photo credit: Paul Scholar, ANSMET*



Professor **John Bartley** and former research professor and current friend of the department, Dan Barnett, spent May 30th looking at the Eocene fluviolacustrine Claron Formation, a whole lot of it, while running the Bryce Canyon 50 mile race.

## **2019-2020 Guy F. Atkinson Distinguished Lecture Series**

**Dr. John Howell**, School of Geosciences,  
University of Aberdeen  
*The Virtual Geoscience Revolution*

**Dr. Tony Dore**, Global Chief Scientist,  
Energy & Geoscience Institute  
*Tectonic Controls and Petroleum Systems*

**Dr. William Brazelton**, Biology, University of Utah  
*Rock Powered Life on the Sea Floor*

**Dr. Philipp P. Ruprecht**, Geological Sciences &  
Engineering, University of Nevada Reno  
*Crystal spectators*

**Dr. Zach Ross**, Seismological Laboratory, Cal IT  
*Structural Architecture of Fault Zones*

**Dr. Kendra Murray**, Geosciences,  
Idaho State University  
*Oligocene Magnetism*

**Dr. Pete Lippert**, Geology & Geophysics,  
University of Utah  
*Magnetic Biomarkers*

**Dr. Adrian Harpold**, Natural Resources &  
Environmental Science, University of Nevada Reno  
*Snow and Streamflow*

**Dr. Alisha Clark**, Geological Sciences,  
University of Colorado  
*Experimental Constraints on the Degree of Melting  
Beneath Tectonic Plates*

**Dr. Brenda Bowen**, Geology & Geophysics,  
University of Utah  
*Environments as Analogs*

**Dr. Kent Condie**, Professor Emeritus, Earth &  
Environmental Science, New Mexico Institute of Mining  
& Technology  
*When Did Plate Tectonics Begin?*

**Dr. Kate Maher**, Geological Sciences,  
Stanford University  
*Plants, Hydrology, and Weathering*

**Dr. Mark Schmitz**, Geoscience, Boise State University  
*Bringing Deep Time into Focus: New developments in  
high-precision geochronology and their impact across  
Earth Sciences*

**Dr. Alexis Ault**, Geology, Utah State University  
*Nanoscale Textural And Thermochronometric Evidence of  
Paleoearthquakes in the Wasatch Fault Zone*

**Dr. Justin Filiberto**, Lunar and Planetary Institute  
*Constraints on the Martian Volatile Budget*

**Dr. Carlos Santana**, Philosophy, University of Utah  
*Whose Anthropocene? What Linguistics Tells Us About the  
Prospects for Cross-Disciplinary Collaboration on  
Defining the Anthropocene*

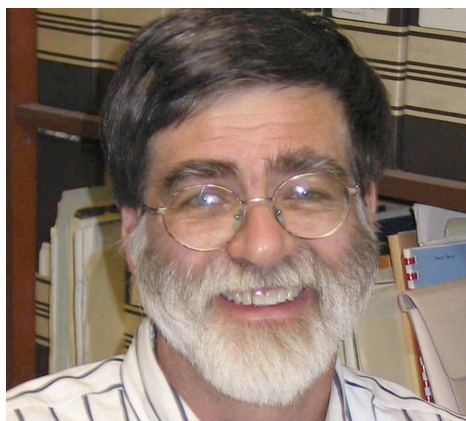
**Dr. Jani Radebaugh**, Geological Sciences,  
Brigham Young University  
*The Surface of Saturn's Moon Titan from the Cassini and  
Dragonfly Missions*

**Dr. Adolph Yonkee**, Earth and Environmental Sciences,  
Weber State University  
*Structural Geology and Paleomag in the Andes*

**Dr. Tiffany Rivera**, Geology, Westminster College  
*Revisiting the Mineral Mountains: New  $^{40}\text{Ar}/^{38}\text{Ar}$   
Geochronology, Paleomagnetic, and Geochemical Data*



Please visit [www.earth.utah.edu](http://www.earth.utah.edu) for the Fall 2020 schedule and Zoom links. Some of the past lectures are also posted on the department's YouTube channel.



### **GG Faculty make a difference**

*A tribute to retiring faculty members: Drs. John Bartley, John Bowman, & Erich Petersen*

By: Anke Friedrich, PhD

Increasingly, the significance of geological field work in undergraduate education is questioned. Some geoscientists even proudly announce they don't utilize any field skills in their day-to-day geoscientific work. I assert, however, these geoscientists may have gotten to their current jobs due to their prior engagement in field camp led by geology faculty. My own case proves it. I tell my story to celebrate the academic careers of three outstanding GG faculty who recently announced their retirement: Drs. Bartley, Bowman, and Petersen. All three instructed me during the 1989 GG field camp and induced life-changing academic moments for me, as surely for countless other U of U students.

I was a newly arrived international student to the U in the summer of 1989. Back in my homeland of Germany, I had been told that geology was not suited for women. Field camp in Germany occurred on forested and farmed land with zero rock exposure, not even a quarry. Instructors used thick pen to mark contacts on their field maps. What might we have learned from them? Luckily, I was able to escape to Salt Lake to study geology at the U. I had just survived John Bowman's metamorphic petrology class and Schreinemaker's diagrams. A few weeks later, we headed for the 6-week field camp, mostly in central and southern Utah.

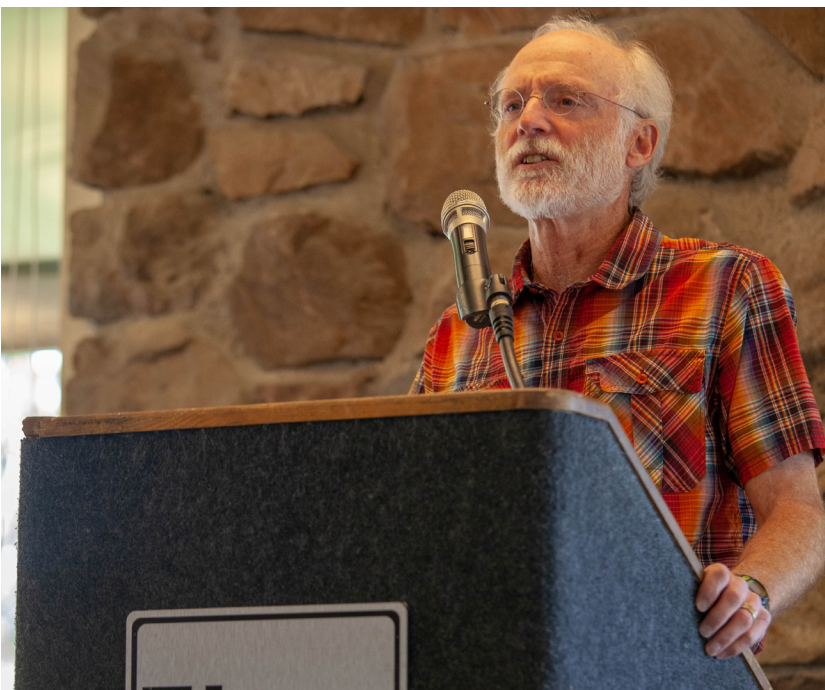
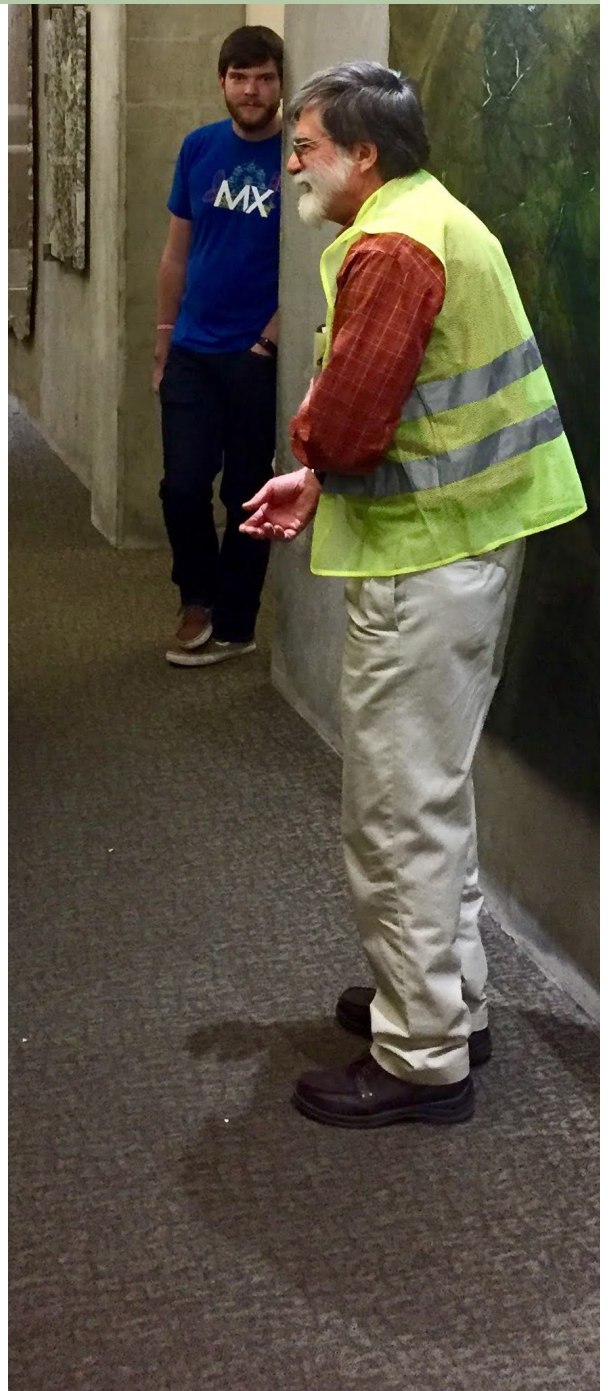
Weeks 1 and 2 were spent with Drs. Petersen and Bowman learning some basic rules of field work. Most memorable was their 1-hour challenge to let us map the area around Alta's Cecret Lake. At first, we didn't see much. We didn't know, so we couldn't see. At the end of the hour, Erich and John took us around the lake and the contact magically became perfectly traceable on the ground, along numerous bends and curves. Suddenly, there was so much more to see and map! Thrilling! What a life changing moment! We had just learned from these two fine geologists how closely one can observe and how neatly one can map (in this case, a low-angle contact on gently dipping glaciated terrain, but their neat drawings of subduction zones also came to mind...). This was learning moment #1: A sharp pencil is like a sharp mind -- use it!

Weeks 3 and 4 were spent with Dr. Bartley mapping in the remote Needle Mountains range of southwestern Utah. This week changed my life forever. Camp was set up: Springbar tents, Coleman stoves, rattlesnakes, sliced-and-diced tomatoes, reenactments of Monty Python by Quintin (now GG curator) and more. On July 16th, I had mapped the SW-corner of my area. Remembering learning moment #1, I mapped a particular contact as a pinch out. That evening, Dr. Bartley came to see how I was doing on my map. He reflected for a moment, then continued, "So, you think it is a pinch out. Mmmm-hhh." Then, he continued, "I think a fault cuts out the contact..." Suddenly, I was unable to listen any longer as my thoughts wandered off. Surely I must be wrong once more. This reflex came from the German academic culture at the time, where "Herr-Professor-Doktor" would always be right. Imagine my surprise as Dr. Bartley continued by asking why I thought that the contact was pinching out? I thought, I couldn't trust my ears and eyes. In Germany, a Professor just didn't talk to the student. Perhaps in many cultures around the world this might still be the case today. However, that evening, a professor was taking his time to understand my arguments (through my "deutsch-lish"). What followed was my first ever geological conversation, at the same table, with a professor -- my instructor. By the end of the long conversation, John Bartley had suggested that we both look at the particular contact in question. The next day, we spent a long day in the field, mapping away, solving this problem and several others, too. It was not important who was right. I don't even recall. What mattered was to be taken seriously as a student. I had not encountered such possibilities before in Germany. Coming to Utah (to the U and the GG department) changed my life. This scene flipped a switch inside of me --

permanently. It enabled a thinking mode I didn't know I had. John turned it on that day. Of course, I needed many further opportunities to practice this skill.

I am eternally grateful for this opportunity, granted by an altruistic instructor and brilliant geologist, and I ended up working with John Bartley on the Master's thesis in a neighboring mountain range. I also kept learning much more from John Bowman and Erich Petersen over the years. All three are an inspiration and very fine examples of how faculty empower students scientifically. They will remain life-long friends and colleagues, as they are now joining ranks of our other recently retired GG faculty stars (Ron Bruhn, David Chapman, Tony Ekdale, and Barb Nash to name a few). Arguably, neither zoom meetings, nor online teaching might have accomplished what almost any in-depth classroom and field setting provides: the opportunity for personal academic growth empowered by respectful and inspiring faculty.

Many more such stories could be told. I encourage any GG alumni to reflect on how your former GG instructors made a difference in your academic life and career. Perhaps future newsletters could host an alumni corner in which these stories are told as a small form of appreciation to many current and retiring GG faculty.



## ***Alumni, Emeritus, & Auxiliary Faculty Clips***



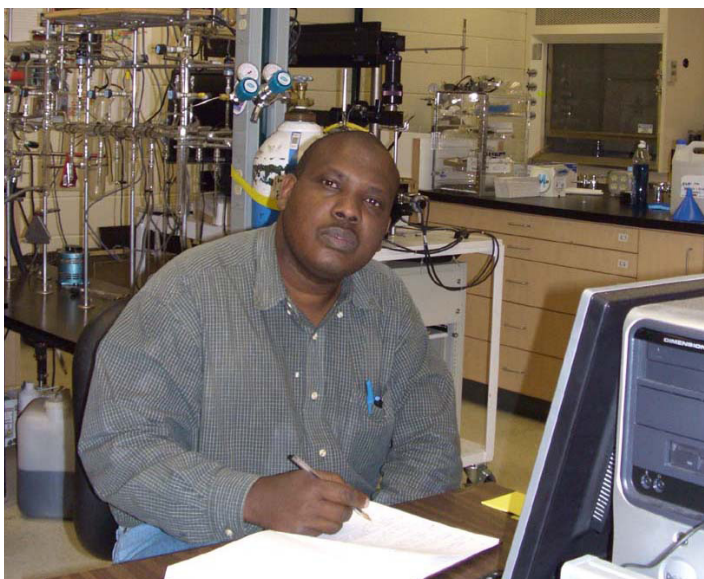
**Dr. Anke Friedrich**, Professor and Endowed Chair of Geology at Ludwig-Maximilian University (LMU) in Munich, was the 2019 recipient of the GG Distinguished Alumni Award (B.S. 1990, M.S. 1994, University of Utah). Some of you met Dr. Friedrich during her short 2019 spring sabbatical in Salt Lake City, but we wanted to share a bit more about her that we weren't able to include in our last newsletter.

Dr. Friedrich is a high-energy, exceptional scientist with a strong pedigree (Ph.D. from MIT, postdoc at CalTech, and 2004 German Geological Society young scholar award). She currently holds an endowed chair position at LMU where she has a highly visible program in tectonics and geodynamics with a team of 10 scientists, technicians, and staff. One of her current research areas is how mantle plumes affect surface topography and basin stratigraphy. Anke is a renowned field geologist who has worked and led field trips all over the world.

What brought Anke from Germany to the University of Utah in the first place? It was skiing! What you might not know is that she was a top Olympic-caliber athlete who won three NCAA crowns; back-to-back Giant Slalom in 1989 and 1990, and Slalom in 1990. This tells you Anke has laser focus and can tackle anything she sets her mind to. Anke turned down the Olympics to pursue geology. She is a devoted friend to the department, who cares about people and making opportunities for others. Through her efforts we are building formal ties across international boundaries, linking the UofU and LMU.

**For those students who are around in Summer 2021, we will explore the possibility of seeing amazing Alps geology (classic localities known from over 100 years ago) with Dr. Friedrich and our own Dr. Pete Lippert! This may utilize fantastic new 3D virtual outcrop models, or visiting in person if COVID-19 conditions will allow. Stay tuned!**





In 2015, **Dr. Fredrick Kyalo Manthi (FKM)**, a Leakey Foundation Baldwin Fellow and a Research Scientist at the National Museums of Kenya, proposed to the late Dr. Frank Brown that it would be a good idea to construct a Science Lab in a high school in Makueni in honor of Frank's contribution to science. Dr. Brown liked the idea very much and agreed that a Science Lab, *The Prof. Francis H. Brown Science Lab*, be constructed at Thomeandu Boys Secondary School, a school where children and grandchildren of a large number of Frank's field crew members in the Omo-Turkana Basin schooled. Frank and FKM embarked on a campaign to raise funds from mostly his friends, as well as colleagues and his former students at the University of Utah. In six months, about \$20,000 had been raised. These funds enabled the commencement of the construction work of the lab that would replace the current lab which was constructed in 1974. At the time of Frank's passing in September 2017, about 90% of the lab was complete. An additional \$6,500 required to complete the Science Lab was provided by two donors through the Leakey Foundation. This enabled completion of the lab which was opened on July 27, 2019.

The Prof. Francis H. Brown Science Lab at Thomeandu Boys Secondary School epitomizes Frank's love for science, and his many years of association and friendship with the people of Makueni region in Kenya. Generations after generations of Kenyan people will benefit from this Science Lab and this will ultimately help in fulfilling one of Frank's dreams - seeing children, particularly those from poor backgrounds, acquire a good education, especially in science.

*Prepared by Dr. Fredrick Kyalo Manthi, a Baldwin Fellow and Senior Research Scientist in the Department of Earth Sciences, National Museums of Kenya. Dr. Manthi was mentored by the late Dr. Francis Brown.*

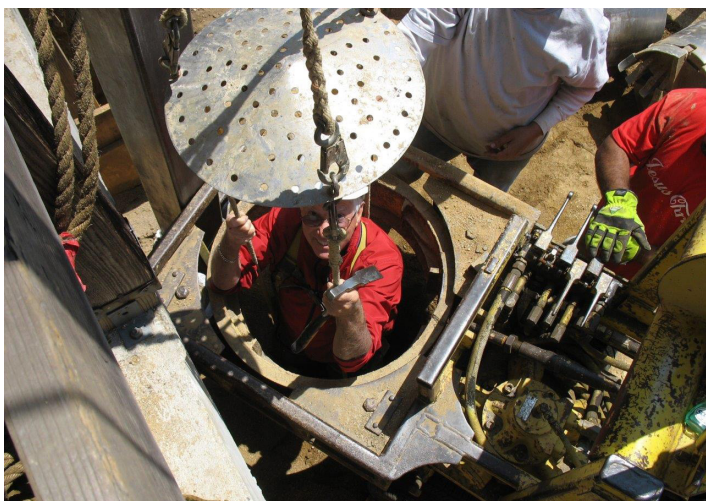


**Dr. Annie Putman** (Ph.D., 2019) is a hydrologist with the Utah Water Science Center (USGS) in Salt Lake City, Utah. She received the 2019 Editor's Citation for excellence in Refereeing for *Geophysical Research Letters*. Annie also co-authored a research article in AGU's online publications titled "Atmospheric Dust Deposition Varies by Season and Elevation in the Colorado Front Range, USA."

Geology professor **Armand Eardley** (1901-1972) accompanied Dr. Frederica De Laguna on an archaeological expedition to Alaska in the summer of 1935. At that time, he was a professor at University of Michigan, before finishing his career at the University of Utah, where he was a faculty member and dean. This past year, Prof. Eardley's family left one of his photo albums from that trip with the department. The album documented the archaeological explorations of the Lower Yukon led by Dr. De Laguna (a pioneering woman archaeologist). Prof. Eardley gave a fascinating and detailed account of his trip with photos and sketches, as well as stories and interactions with the native tribes. The album has historical significance and is now housed at the National Anthropological Archives in Washington, D.C. The University of Utah Marriott Library special collections retains a digital proof of the photo album as well. It's a fascinating read!

*Photo: L to R: Norman Reynolds (Ethnologist), Frederica De Laguna (Archaeologist, leader), K.A. Gorton (Asst. Geologist), A.J. Eardley (Geologist).*





**Carl Schrenk** (B.S. 1966) is profoundly grateful for excellent geology professors (Bronson Stringham, Harry Goode, and many others) that helped him define his amazing career in engineering geology.

His connection to the UofU was serendipity. After 2 years in junior college, he applied to the U, Colorado School of Mines, New Mexico School of Mines, and University of Missouri. He chose to live by the Wasatch Mountains. Some vivid memories were the great skiing electives, and being one of the first on the Park City gondola opening day!

During summer breaks from the U, he worked at the State of California Division of Water Resources (DWR) and also with Dam Safety. He really wanted to be a hydrogeologist, but after graduating he was nervously wondering about his future. Soon he received two phone calls, one was DWR (a call he missed) and the other was with the California Bridge Department (a call he managed to take) where they wanted him to interview right away. The missed call from DWR changed his entire career path. He accepted the Bridge Department offer and became well versed in subsurface exploration and foundation recommendations for bridge supports. At one point he mused about joining the Navy during the Vietnam War, but fortunately the Navy recruiter dissuaded him. Instead he worked for an independent consulting firm, and later as city geologist with the City of Glendale. That helped him go into business for himself and he is still practicing geotechnical engineering after 50+ years.

Being a consulting geologist is both challenging and satisfying, and Carl enjoys solving and mitigating geologic problems. One highlight is the State of California recognition of gratitude for his many years of service.

Carl expresses his appreciation to his alumni department. His advice is to take criticism to heart and use it positively to learn to improve. Perseverance pays off!

**Dan Barnett** (Postdoc & Research Faculty in the 1990s) went to law school and now practices law in downtown Salt Lake City. He remains a very good friend of the department. Dan joined John Bartley in running the Bryce Canyon 50 mile trail run earlier this year (see photos on page 22).

**John M. (Mike) Bodell** (M.S. 1981) and wife Colleen are enjoying retired life in Bend, Oregon. Mike is still actively engaged in energy market analysis and research through his company, Aperio Energy Research. He volunteers with the U.S. Forest Service to help build and clear trails, and gets outdoors with bike rides and backpack trips like the Pacific Crest trail.

**Jonathan Caine** (Ph.D. 1999) continues his work in the northern Cordillera with the U.S. Geological Survey including exciting collaboration with Dr. Alexis Ault (Utah State University) on the thermochronology of the Denali fault in the Kluane Ranges, SW Yukon. He enjoys life in Colorado and took a trip to Vietnam with his wife in 2019.

**Rick Dalrymple** (took undergraduate classes ~1995) started his own local Salt Lake City rock and mineral store and successfully operated “Rock Pick Legend” for 25 years. Now his daughter sells their inventory online out of Ogden. Although Rick’s current career is in real estate, he still loves collecting minerals and often relies on knowledge he garnered from classes at the U.

**Diane I. Doser** (M.S. 1980, Ph.D. 1984) was honored as a GSA Fellow at the 2019 meeting in Phoenix.

**Todd Ehlers** (M.S. 1997, Ph.D. 2001) is Professor and Department Sprecher/Chair at the University of Tuebingen in Germany and is excited about their upcoming cluster hire of 4 positions in Geo-Biosphere interactions. He keeps very busy with family, including 2 teenage girls, and his Earth System Dynamics Research group.

**Susan Fisher** (M.S. 1984) had a busy year moving to a condo but managed to fit in traveling abroad on a Rhine River cruise and visiting museums in Amsterdam.

**William Gallin** (M.S. 2011) left Texas amicably in September 2017. He’s been mapping landslides in lidar for the last two and a half years. Last May, Mike Vanden Berg at UGS contacted him about joining a grant proposal. The project is just starting (bad timing with COVID). The PI is at New Mexico Tech, but Rich Esser and Brian McPherson at EGI are heavily involved in organizing the project. William and his wife Pam live in Olympia, WA, with their two children and just bought their first house.

**Greg Gavin** (B.S. 2018) is a staff hydrogeologist with Loughlin Water Associates in Park City and also volunteers to help in Utah Geological Association activities.

**Marko Gorenc** (M.S. 2015) is a geoscientist who mentored Gabby St. Pierre (current PhD candidate) in her summer internship at Chevron (2019).

**Matt Heumann** (Ph.D. 2011) has been working for a small independent company exploration team in Cairo, Egypt. A change from Houston, he reports!

**Will Hurlbut** (B.S. 2013) is currently a geotechnician for the Utah Geological Survey working on projects in the survey's core lab as well as the FORGE geothermal effort. He built on his U experiences cataloging the department collections with Quintin Sahratian, and also working in Dave Chapman's laboratory, and now is an enthusiastic ambassador for sharing geoscience broadly in the state's communities.

University of Utah alumni involved in the Utah FORGE project include but are not limited to:

**Mark Gwynn** (B.S. 1996, M.S. 2013)

**Christian Hardwick** (B.S. 2010, M.S. 2013)

**Will Hurlbut** (B.S. 2013)

**Clay Jones** (B.S. 2006, M.S. 2009)

**David Handwerker** (M.S. 1996, PhD 2003)

**Thom Little** (M.S. 1988) continues his work in semiconductors and enjoys geology as his hobby. He also took on a challenging restoration project of a homestead ranch in eastern Arizona with his normal spirit - "I can fix that!"

**Derek Loeb** (M.S. 1986) retired to Bend, OR and is one of the founders of Central Oregon Geoscience Society (<https://www.cogeosoc.org>). He also leads geology hikes for the Deschutes Land Trust.

**Jess Moore** (M.S. 2005) is a Resources to Reserves to Production advisor with Chevron working and living the past year in Angola.

**Baylee Olds** (B.S. 2020) received the Association for Women Geoscientists-Salt Lake Chapter Outstanding Undergraduate award! Baylee will have a gap year working for the USGS as a NAGT (National Association of Geoscience Teachers) in Virginia, then hopes to return to graduate school.

**Oodoo (Ochirbat) Otgonbayar** (B.S. 2016) continues to enjoy an ideal work life balance in Mongolia working as a structural geologist for Rio Tinto.

**Wren Raming** (B.S. 2015) has been researching geomorphology and landscape evolution of Hawaii and looks forward to finishing up his PhD at Arizona State University.

**Eric Roberts** (Ph.D. 2005) had hoped to be on sabbatical but it was unfortunately cancelled due to COVID-19. He is busier now than at any point in his career as head of both Geology and Environmental Management (a merged school) at James Cook University, Australia.

**Dave Rohrs** (M.S. 1980) is thoroughly enjoying retirement in California after a wonderful and rewarding career in geothermal energy as an exploration and development geologist working primarily in the USA and Southeast Asia.

**Anna Stanczyk** (M.S. 2019) moved to Seattle, WA after graduating to be closer to her significant other (who recently became her fiancé!) and got a job with Golder Associates, an international geotechnical and environmental engineering firm. She works as a geologist in their geosciences group where she focuses on landslide hazard assessments along pipeline corridors. She considers herself lucky to have found this niche geohazards position because landslides have been her primary research interest since undergrad. She is still working toward publication of her master's thesis as well as her undergraduate thesis, and continues to engage with the National Park Service in Denali National Park where she conducted the latter. In her free time, she gets outside with her fiancé and dog as much as possible for hiking, fishing, and hunting in the North Cascades, along with cooking and making art whenever she can. She is learning to love the Pacific Northwest, although she admittedly misses Utah and the U!

**Jake Umbriacco** (M.S. 2004) has been one of our long-standing Chevron recruiters at the University of Utah. After 13 years of visiting our campus, he will be rotating out to let some new folks rotate in. We have appreciated his many years of support in encouraging and employing many of our students! Another alumni, **Keith Christianson** (M.S. 2009) will be taking over Jake's role.

**Mike Vandenberg** (M.S. 2003) is the Petroleum Section Manager for the Utah Geological Survey and enjoys overseeing a variety of projects in the Green River Formation and the Uinta Basin.

**David Wheatley** (Ph.D. 2017) has been enjoying work on Chevron's team for exploration in the Gulf of Mexico. Last year he and Valerie got away for a relaxing vacation in Belize.

**John C. Young** (B.S. 1950, M.S. 1956) fondly remembers graduate work in the Lakeside Range 1950 (with A. Eardley and L. Stokes) that preceded his PhD from Princeton in 1960. He led a full career examining coastal erosion, doing seismic work in California, exploring for resources in Nevada for Sun Oil, and initiating the geology program at Humboldt State University where he taught for 20 years. Though he retired to Salt Lake City, he still does some consulting work on California earthquakes.

**Steven Young** (B.S. 1985) continues his work as the business development manager at Paterson & Cooke (engineering services company) based in Golden, CO. He had been at the Prospectors & Developers Assoc. of Canada (PDAC) meeting in Toronto with ~25,000 people in early March 2020, just at the beginning of the COVID outbreak!

#### *Emeritus & Auxiliary Faculty*

**Ron and Sandy Bruhn** are still sailing and enjoying the Pacific northwest, and the views toward the Hood Canal with Olympic Mountains in the distance.

**Dave and Inga Chapman** enjoy the quiet of the Kitsilano neighborhood of Vancouver, British Columbia. Their two daughters are both physicians and live nearby with their families. Dave has been gardening and reading for pleasure.

**Tony Ekdale** has a new home in southern California, living with his daughter Joan (middle school French teacher) and grandtwins. His son Eric (San Diego State Univ) has also been able to join the family as his teaching switched to online during the COVID crisis.

**Barb Nash** hopes to be able to soon move to Bellingham, WA where she will get immersed in her art studio.

**Jerry Schuster** was adjusting to online teaching at KAUST and still working on a new book on machine learning but he makes it a point to get in his daily bike ride.

**Bob Smith** has been busy lecturing and interviewing highlighting his affiliation with the Yellowstone Volcano Observatory. He is the highlighted participant in an upcoming National Geographic documentary on the Yellowstone hotspot focusing on his 63-year Yellowstone career. The documentary, filmed in October 2019, was unfortunately postponed indefinitely. Stay tuned to National Geographic for updates!

#### *In Memoriam*



In November 2019, we lost **John Scott Isby** (M.S. 1984) aged 61, to a brief battle with lung cancer, a late effect of radiation treatment for Hodgkin lymphoma treatment in 1981. He had worked nearly 35 years for BP in Houston, England, Kuwait, and Alaska, and was known for his modeling skills. He and wife **Peggie Gallagher** (M.S. 1984) and children Ian and Andrea, all enjoyed the outdoors of Alaska. John will be long remembered for his friendship and giving spirit.

In April 2020, **Ralph Stearley** (M.S. 1988) had recently retired and had plans to do more paleontology and spend time with the family. Sadly, he lost his wife, Gloria, to an unexpected aneurysm. Ralph is emeritus professor at Calvin College, Grand Rapids, MI, and has helped supply many outstanding students to our department's graduate program over the years.

Karleton Wulf, aged 98, passed away in May 2020. Karl was the husband of **Marta Weeks-Wulf**, our major donor for the Frederick Albert Sutton building. He was remarkable vibrant and a classic gentleman who always had a kind smile for everyone.

***Your fellow alumni and colleagues in the department would like to hear about your professional accomplishments, job promotions, or changes, or any other news you would like to share. Please send updates to [michelle.tuitupou@utah.edu](mailto:michelle.tuitupou@utah.edu).***

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### Your support is vital to our mission

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*Bob Smith's view during quarantine.*

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*GSA 2019 Group Photo*

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*September 2019 Field Work at Lake  
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The pandemic forced the department to make changes to not only teaching modalities, but in how we find new and creative ways to reach students. A few of the creative ways faculty and staff connected and adjusted teaching were GigaPan images to use during online lectures, gathering collections (thanks to Quintin Sahratian and Paul Eubanks) to give out to mineralogy and sed strat students, and using virtual meeting platforms for student appointments. It has been an interesting year and we are grateful for everyone's hard work and dedication to students!

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