



GEOSCIENCES  
COLORADO STATE UNIVERSITY

# GEOscape

Department of Geosciences Alumni and Friends Annual Newsletter

Fall 2019



Ph.D. students Juli Scamardo (foreground) and Celeste Weiting (background) in a Cottonwood gallery forest along the Green River in Canyonlands National Park, Utah.



## Message from the Department Head

RICK ASTER

2019 marked five years serving as CSU Geosciences department head, a milestone that invited even more than the usual level of reflection on where we've been, the state of today's department, and the exciting and impactful directions that we realize in a 21st-century CSU Department of Geosciences department.

As with the majority of our U.S. peers, the popularity of geology as an academic major has waned since the energy industry jobs boom that peaked around January 2014. This has predictably trimmed our undergraduate numbers (112 undergraduates this semester, down from around 180 in 2014). We've weathered this scenario before – our department history shows that we had around 300 majors at one point during the early '80s oil boom. Interestingly, essentially all of this recent undergraduate numbers decline has occurred in our "traditional" geology concentration, while we have been holding our own in our geophysics, hydrogeology, and environmental geology concentrations.

On the positive side, our graduate student accomplishments and numbers show consistent strength thanks to strong external funding and dedicated faculty advising. Our on-campus introductory courses also continue to hit enrollment caps. These courses now serve about 2,000 students each year, including 900-plus undergraduates in our intensive hands-on introductory geology laboratories. Our expertly delivered 100-level courses are a demanding operation – kudos to our superb introductory teaching faculty who coordinate the large lectures, extensive grading, and long hours (Sean Bryan, Dan McGrath, Lisa Stright, Sean Gallen, and Mike Ronayne), and to our graduate and undergraduate teaching assistants who contribute so importantly while honing their own teaching skills. These courses are of course, fertile ground for recruiting geosciences majors. To continue to attract and retain talented undergraduates to geosciences, we will also be expanding our recruiting efforts on and off campus to continue to raise awareness of geosciences and our profession's diverse and satisfying professional opportunities.

A particular joy in assembling *GEOScape* is seeing anew how the department as a whole exceeds the sum of its impressive individual and group contributions – our research and teaching substantially span the applied and fundamental geosciences, including where and when our interests interact with the atmosphere and oceans. This is reflected in outstanding education, research, and engagement in geomorphology; sedimentology; petroleum, structural, and, economic geology; hydrogeology; geodynamics; geochemistry; tectonics; geophysics and seismology; and glaciology, increasingly pursued in innovative and multidisciplinary ways. Our annual newsletter provides a unique (certainly non-exhaustive, but valuably representative) snapshot of department excellence while showcasing a formidable breadth and depth. After reading, I hope that you feel the same way.

Finally, it's once again a pleasure to recognize our alumni and other friends who critically enrich our students' success and our department culture. Your engagement this year continued to span substantial and critical student philanthropy, service on our Geosciences Advisory Council, participation in the classroom, field trip leadership, department seminars, and a solid offering of evening (typically pizza-enhanced) mentorship talks. Should any of you wish to be involved (or more involved) in these sorts of fostering pivotal experiences and support opportunities for future CSU geoscientists, please contact me. Sincere thanks to our far-flung CSU Geosciences community!



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## On the cover

Department graduate students install geophysical equipment on Lake Agnes rock glacier to image subsurface properties, including ice thickness. Photo by Dan McGrath

*GEOScape* is the annual newsletter produced for alumni and friends of the Department of Geosciences at Colorado State University. We appreciate your continued support and welcome your thoughts.

A handwritten signature in black ink that reads "Rick C Aster".

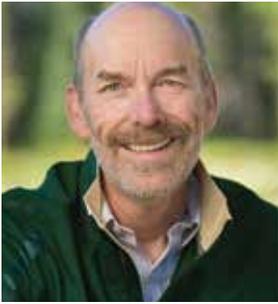
Rick Aster, Ph.D.  
Geosciences Department Head



**WARNER COLLEGE  
OF NATURAL RESOURCES**  
COLORADO STATE UNIVERSITY

## A Note from the Dean

JOHN P. HAYES



Greetings from Fort Collins!

What an exciting year for Warner College and the Department of Geosciences! Each year, I look forward to digging into another exciting issue of *GEOScape* and learning more about all the tremendous work being accomplished by our geosciences' faculty, staff, alumni, and students.

As a College, we've continued making strides in a number of important areas this past year. Our program to strengthen teaching and research at CSU's Mountain Campus has really taken off.

We will be breaking ground on a new donor-funded Research and Education Center there this spring, which will offer state-of-the-art facilities for both teaching and research. With the help of a number of the Geosciences faculty members, we've continued to deploy research infrastructure throughout the campus as well, including a new seismometer, multiple groundwater wells, and stream instrumentation.

These tools will not only add to our basic understanding of the area's physical environment but are also contributing to international datasets. I've delighted in checking in to find that the seismometer is picking up seismic events from all over the world. You can see some of these data displayed at [datavis.warnercnr.colostate.edu](http://datavis.warnercnr.colostate.edu).

It's also an exciting for the University. This year marks our 150th anniversary as Colorado's land-grant institution, a proud tradition that has long included the fields of geoscience. We've also welcomed our 15th University President, Joyce McConnell.

President McConnell arrived this past summer and has already made great strides in stewarding the University's success for its next 150 years. Of particular note, and pride for our College, President McConnell holds her tenure home in Warner College, and so she, like many of you, is a proud Warner Ram!

Every time I get the chance to wander through the department's halls, I'm astounded by the breadth not only among the faculty's work, but also in the posters the students proudly display. Geosciences truly is a forward-thinking, innovative, department that cares deeply about educating the next generation of geoscientists and making an impact on the world. I'm proud to be a part of a college that is home to such a great program.

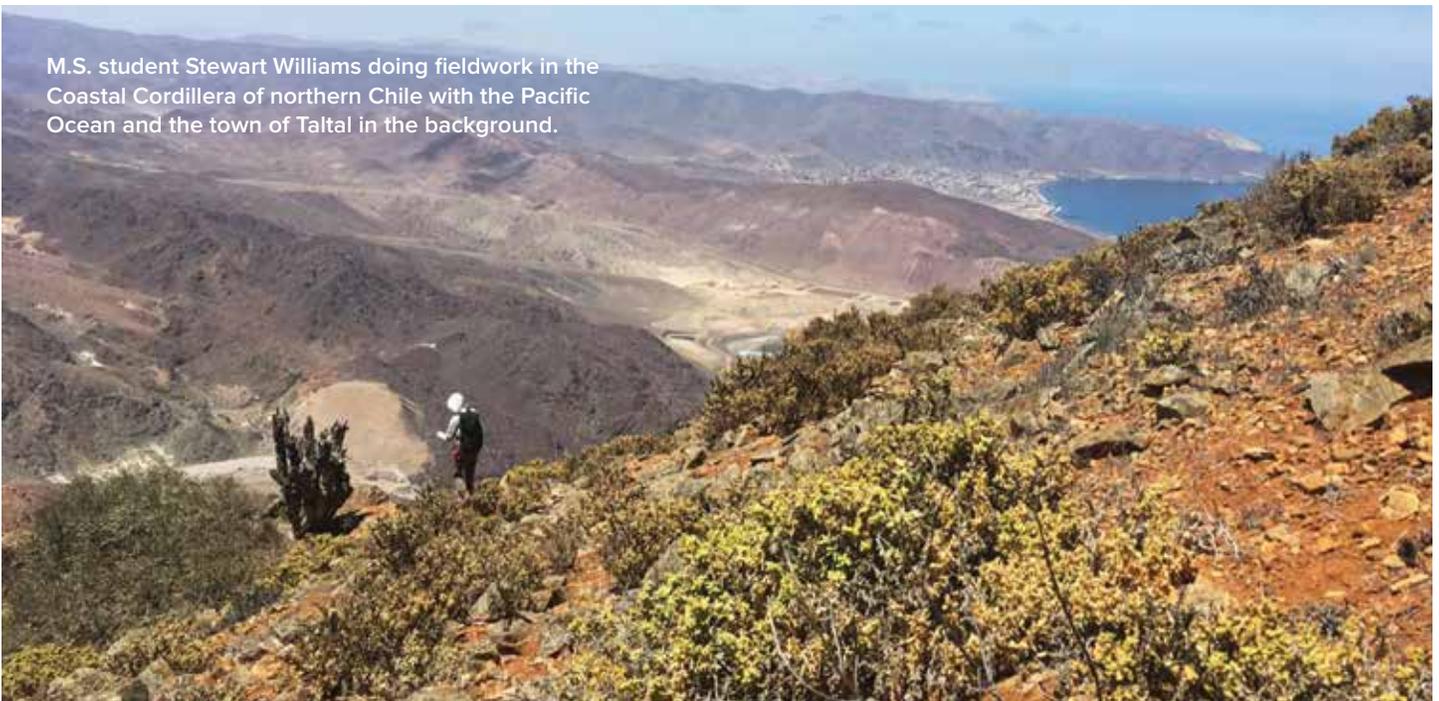
As always, if you're in the area, we hope you'll stop by and say hello!

John P. Hayes Ph.D.

A handwritten signature in blue ink that reads "John P. Hayes". The signature is stylized and cursive.

Dean, Warner College of Natural Resources

M.S. student Stewart Williams doing fieldwork in the Coastal Cordillera of northern Chile with the Pacific Ocean and the town of Taltal in the background.





Torres del Paine National Park, Chile,  
Photo by Ellen Wohl

Coastal Cordillera in northern Chile.  
Photo by John Singleton





## **ALUMNI NEWS**

Our alumni are contributing to geosciences work and research all over the world.

# Respect, Responsibility, and Gratitude

A lifelong relationship  
with hydrogeology

**Robert L. Stollar, M.S., geology**  
with a specialty in hydrogeology, '69

As a kid, I was always interested in science and went to a special engineering and science high school, Brooklyn Technical. In my senior year, I was informed that I needed to go to college to pursue a science career. In those days, I couldn't afford to go to a private college, so I chose Hunter College of the City University of New York. It cost \$25 a semester! The problem was that I lived in Brooklyn and the campus was in the Bronx, one-and-one-half hours each way on the New York City D train. Long commutes are not conducive to success in college and it took a toll on my study habits. I started as an engineering student, taking math, physics, and chemistry. Not at all fun. One day, a subway friend of mine suggested I take a geology class. I had no idea what geology was, but he enlightened me and added that it was a fun, easy A. Sign me up. My Geology 101 professor was from Rutgers, and it was obvious that he loved teaching that course. It was fun and interesting; therefore, in my junior year I changed my major to geology. I was still commuting to school; taking field classes in the summer; driving an NYC cab on Friday and

Saturday nights; loading and unloading trailer trucks for a trucking company; and being technical director of Theatre Workshop at Hunter College. In my senior year, I asked this professor what I needed to do to make geology a career and he informed me that graduate school was necessary. I also missed some of the analytical approaches of engineering and he gave me some textbooks on geophysics and hydrogeology.

It didn't take long to realize that hydrogeology seemed to fit exactly with what I wanted to do. In 1966, very few schools offered a specialty in hydrogeology, so it was a choice between Arizona and Colorado State University. Whoa ... CSU, the Rocky Mountains ... are you kidding? This was a dream come true for an East Coast big-city boy who couldn't afford even summer camp. My grades were a disaster and I doubted I would be accepted; but thanks to recommendation letters from my Hunter professors I was. So, in July 1966, I bought a beat-up 1956 Plymouth and drove to Fort Collins with \$250 in my pocket. I was on Highway 14 in Sterling when I first saw the sign "Welcome to Colorful Colorado." I stopped, got out of the car, and took a deep breath ... it was the stockyards.



My years at CSU were wonderful. During my second year, I chose the thesis topic “Measuring Aquifer Geometry with Seismic Refraction and Earth Resistivity Methods.” Some of you may actually remember the 1960s – it was a time of unrest and the Vietnam War. With the seismic method, I used dynamite and blasting caps (can you imagine, no permits were required!). The first day the department authorized an undergrad to work with me. He drilled the hole for the dynamite and helped lay out the geophones. I placed the dynamite in the ground and very officiously yelled, “fire in the hole” and hit the toggle switch. As the Polaroid film started to flow, the undergrad tapped me on the shoulder and asked, “Hey, Bob. When you blow up dynamite, is water supposed to be shooting out of the ground 15 feet in the air?” I had blown up a Fort Collins water main.

There are many other funny anecdotes of my years in Fort Collins. But more importantly, CSU was about the professors and my professional relationships with them. They made me feel that my contributions as a student, as a young professional, and as a human being had real value. Drs. Robert Johnson, Jim Waltz, and Dan Sunada, as well as countless others, changed my life. I cannot overemphasize this; and because of it I want to give back to CSU with my time; with scholarships; with employment and consulting opportunities for staff and students; and with student mentoring.

I am always proud to share my work experience with students and young professionals. My first job upon leaving CSU was on the East Coast with Geraghty & Miller, one of the few groundwater firms in the country back then. During my first few years with them, I worked all over the U.S. and Pakistan, supervising drilling of production wells and carrying out aquifer tests. With my CSU background, I was able to bring geophysics and groundwater modeling into the workflow, and after a few years I became manager of geophysics and modeling. Geraghty & Miller had a great philosophy – if you cannot figure out a problem, find the person in the country who is an expert and have him/her teach you. Once again, mentoring relationships played a very key role in my career development.

By the mid-1970s, groundwater contamination had become a critical issue and the newly formed EPA had very little experience with it. Geraghty & Miller began to work with the EPA and the work poured in. I was now a manager in charge of diverse projects such as groundwater investigations involving nerve gas derivatives at Rocky Mountain Arsenal; elemental phosphorous which would burst into flames when exposed to the air, and solvents and gasoline byproducts. In 1981, I accepted the position of manager of the Hazardous Waste Group for Earth Technology Company and once again moved west, this time to Southern California. In 1983, I founded R.L. Stollar & Associates, a



Wildflowers at Rocky Mountain National Park.  
Photo by Rick Aster

groundwater consulting firm specializing in groundwater contamination and resources. As president and chief technical officer, I grew the firm to 65 people, with offices in Santa Ana and Palo Alto, California, and Denver. I was firmly in the mentoring seat now. An aerospace company, and one of my biggest clients, bought R.L. Stollar & Associates in 1989. Since that time, I have been an expert witness in groundwater contamination cases. Recently, I was an expert for Orange County Water District that was suing many of the major petroleum companies to clean up an MTBE plume that was estimated to be a few miles long and had a potential to contaminate the Orange County water supply wells.

And, just as I was contemplating total retirement, Kevin France who was a water broker in Denver at the time, suggested getting involved with helping farmers better manage their water. Along with Kevin, Ed Warner (B.S., '68), and private equity funds, we established SWIIM (Sustainable Water and Innovative Irrigation Management) and soon started a research farm in the Greeley area, hiring faculty in geoscience, engineering, and agriculture to carry out experiments to better understand the relationship between water use and evapotranspiration from crops in agricultural areas under prior appropriation systems. We also hired researchers from the U.S. Department of Agriculture to run the experimental farm. We have since received three patents and have grown to about 40 technical and sales staff throughout Colorado and California. The SWIIM process aids growers in managing and measuring their water use, crop water use, and water balances. The goal is to increase profit for the farmer by saving water, increasing yield, and automating the process. Most of the data can be accessed on the “dashboard” of a tablet or desktop computer.

My relationship with CSU continues as I serve on the Warner College Dean's Advisory Council and the Geosciences Advisory Council. It is a lifelong relationship; one based on respect, responsibility, and gratitude.



Tommy in his element with Geosciences students at the Henderson Mine, Clear Creek County, Colorado, this fall.

## Emeritus News

The department welcomes back and thanks Tommy Thompson (CSU faculty, '73-'95). Tommy returned to campus as a special guest professor and participated centrally in the teaching of our GEOL 447 Mineral Deposits course and also helped open many doors for our student SEG chapter spring break field trip to Nevada. It is great to have you back, Tommy!

## ALUMNUS HIGHLIGHT – WAYNE CAMP

Sincere Geosciences department congratulations to Wayne Camp (M.S., '79), Distinguished Geological Adviser, Occidental Petroleum Corporation (L), here being honored as a GSA Fellow by President Donald L. Siegel at the 2019 GSA annual meeting. Wayne has contributed significantly to geoscience through his many publications and the editing of multiple proceedings from the conferences he has organized or helped organize. He has additionally been noted for work with scanning electron microscopy of shale oil and gas reservoirs, including the concept that he proposed in describing observed void-filling organic matter as a “cement,” and the diagenetic evolution of organic matter to form secondary porosity. This work has led to a proposed new method to estimate organic matter porosity in shale reservoirs constrained by petrographic observations and published in a new AAPG Memoir *Mudstone Diagenesis: Implications for Shale Hydrocarbon Reservoirs, Seals, and Source Rocks*. Wayne further notes: “My wife, Joanne, and I still live in Montgomery, Texas, on Lake Conroe, north of where I work in The Woodlands, now for Occidental Petroleum which acquired Anadarko in August this year. I have two daughters and four granddaughters whom I love to spoil.”





## **STUDENT HIGHLIGHTS**

Our students experience a comprehensive learning environment of research, outreach, and career mentoring.

## STUDENT HIGHLIGHTS

### Juli Scamardo

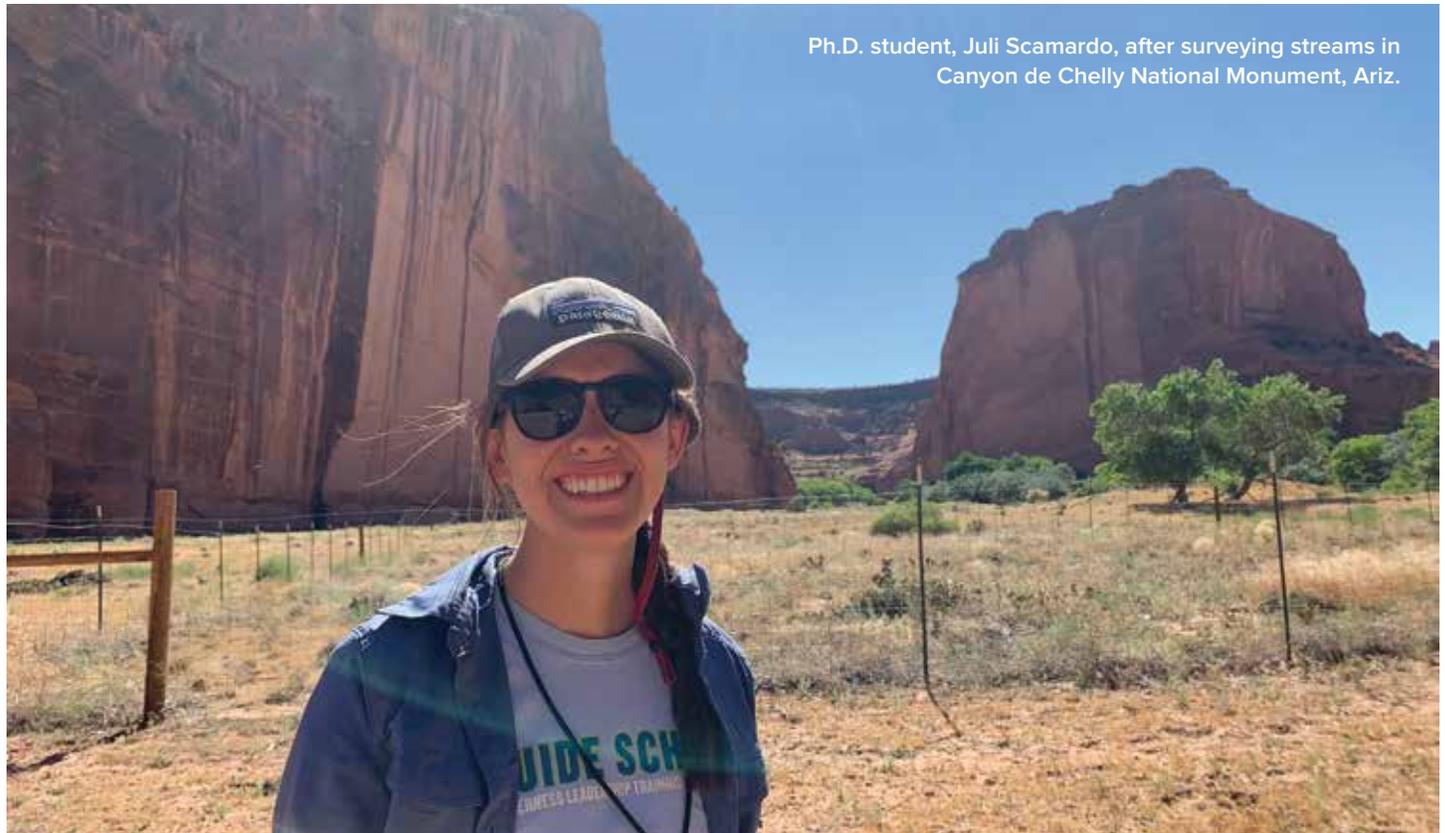
#### M.S. and Ph.D. Programs

I am a native of Texas who finished a B.S. in environmental science at University of Texas at Austin before coming to CSU as an M.S. student. My M.S. thesis work focused on beaver-related river restoration in Colorado. Beaver were historically much more abundant throughout forested portions of the U.S., including Colorado. Where beaver build low dams and dig canals across a floodplain, the valley bottom gradually becomes a much more diverse environment capable of storing more surface and subsurface water and retaining nitrogen and carbon, as well as hosting a greater abundance and diversity of plants and animals. Consequently, beaver restoration is now accelerating in Colorado and elsewhere in the U.S. and Europe.

Working in the North Fork Poudre River watershed and in the Big Thompson River watershed in Estes Park, I monitored the hydrologic and geomorphic effects of recently installed beaver dam analogs. These human-built low wooden dams are designed to mimic the effects of beaver dams by storing sediment, creating pools, fostering a higher floodplain water table, and increasing the habitat complexity of streams. In some cases, the beaver dam analogs are modified by actual beavers, as I witnessed at the Estes

Park field site. I also compared predictions of beaver presence along rivers throughout Colorado using the software program BRAT (Beaver Restoration Assessment Tool) to on-the-ground evaluations of beaver restoration potential and geomorphic evidence of past beaver occupation.

My work has generated a great deal of interest among city, county, and state resources managers and nongovernmental organizations interested in beaver restoration. This is very gratifying, but the big excitement came in Spring 2019, when I received an email from the National Science Foundation notifying me that I had been awarded an NSF Graduate Research Fellowship. To put this in perspective, the program has 12,000 applicants, and fewer than 2,000 fellowships were awarded. Of these, only 95 were in geosciences, and only five in geomorphology (including me!). I began my NSF-supported Ph.D. work this fall. I will be examining floodplain sediment dynamics in ephemeral rivers of the southwestern U.S., including sites in western Colorado. Although I may not have much opportunity to use my canoeing expertise in this fieldwork (or my newly acquired downhill skiing skills), I will undoubtedly gain new scientific insights and awareness of Colorado's lands and water. I plan to seek a career in academia after finishing my Ph.D. working with adviser Ellen Wohl.



Ph.D. student, Juli Scamardo, after surveying streams in Canyon de Chelly National Monument, Ariz.

## STUDENT HIGHLIGHTS



John Kemper receiving the Stanley A. Schumm Research Grant Award with adviser Sara Rathburn at the Annual GSA meeting in Phoenix this September. As many readers remember, Stan was a pivotal figure in founding our department's geomorphology program.

### John Kemper Ph.D. Program

During the latter years of the 19th century, stream channels across the Colorado River Basin experienced extreme erosion due to a combination of climate alterations and human-induced change. My adviser Sara Rathburn, and I are working with collaborators Jonathan Friedman at the USGS and Erich Mueller at Southern Utah University – along with local landowners and stakeholders – to understand how past erosion in tributaries of the Yampa River influences the establishment of the cottonwood forests found along the river's banks.

Large increases in sediment loads, such as those that occurred during the time period that extreme erosion was underway, generally increase river channel migration when combined with large flood events. Floodplain cottonwood forests are disturbance-driven ecosystems that are dependent on these sediment-laden floods and the associated movement of the river channel, which together create the moist, bare sandy surfaces that are well suited to cottonwood establishment. In the Yampa River Basin, which spans much of northwestern Colorado and southwestern Wyoming, this process can be understood as a linked sequence of events that begins with erosion in the tributaries and culminates with forest establishment downstream.

Overall, the hypothesized connections between tributary erosion and downstream floodplain forest establishment suggests that cottonwood forests along the Yampa may be the result of past sediment-charged floods, and that forest establishment has declined as sediment loads have more recently declined. To investigate these connections, Sarah, collaborators, and I will use a combination of field data collection, laboratory sample analysis, and aerial photograph

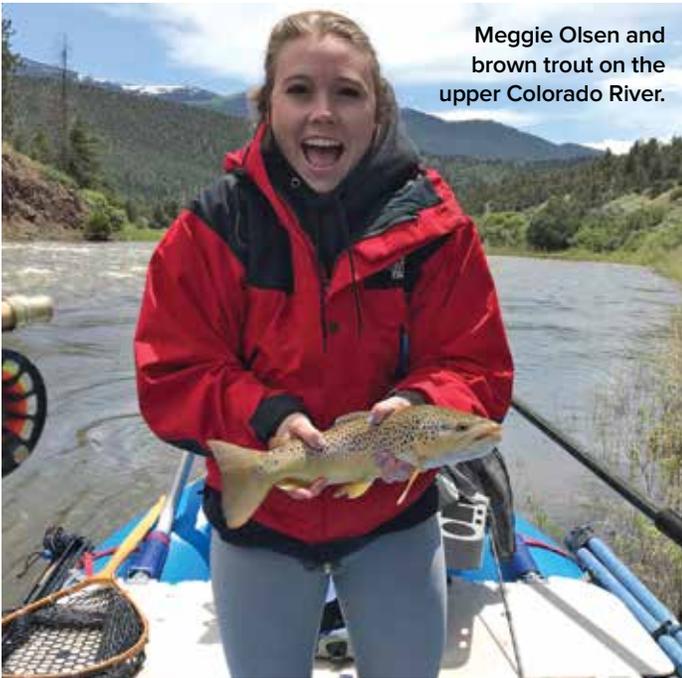
inspection. Together, these techniques should quantify the timing of erosion in the headwaters, the origin of floodplain sediments, and the amount of channel change along the larger rivers in the basin.

Research findings have the potential to inform local land management practices within the Yampa River Basin. More broadly, study results have important ramifications for management of public and private lands and considerations of future development throughout the Colorado River Basin. These results will provide insight into the response of our Western rivers to future changes in climate and land use.



### Cristophe Simbo Ph.D. Program

I am a native of the Democratic Republic of the Congo, and became interested in geology at a young age, thanks to the geologically diverse nature of my surroundings in the African Great Lakes region near Goma, a seismically and volcanically active region that hosts critical mineral commodities. After completion of my bachelor's degree in hydrogeology and geotechnical engineering at the University of Lubumbashi, I worked as an exploration geologist in the Congolese Copperbelt before earning a research fellowship in economic geology through a UNESCO-Poland Co-Sponsored Program to spend half a year at AGH University of Science and Technology in Krakow, Poland. I subsequently was awarded a Fulbright scholarship to pursue M.S. studies at the University of Arkansas with more focus on economic geology and geochemistry. My current research interests center on the geochemical water-rock interactions and their immediate or long-term repercussions, which include water contamination, formation of sedimentary ore deposits, and geothermal energy resources. Working with my adviser Sally Sutton, I will be pursuing a Ph.D. project in the geochemical evaluation of aquifer storage and recovery for subsurface management of water resources. In my leisure time, I enjoy playing soccer and watching documentaries on natural science and historical events.



Meggie Olsen and brown trout on the upper Colorado River.

### Meggie Olsen Undergraduate Geology Program with Hydrogeology Concentration

In my early years, I was never someone who had a rock collection or was otherwise especially enthralled by the processes of the Earth. In fact, I thought Earth science was frankly, quite boring. So how I ended up in the Geosciences department has been an unexpected but pleasant turn of events. Like many students, I came into college lacking a sense of direction and was stumbling along trying to discover what my academic interests were. I was one of many CSU undeclared students smothered by the pressure of declaring a major to avoid extra years in school, but I was eager to find my identity and start completing the courses of a degree track.

I had my first breakthrough during my second semester. I was taking notes in my introductory biology course on the unique properties of H<sub>2</sub>O and that's when it hit me – I wanted to work with water. I had spent a ton of time rafting the Colorado rivers with my dad, who is an avid fly fisher and well-versed in river navigation. He would announce the discharge and the water temp and what was hatching that day and at what times. He would explain to me where the fish were hanging out and why. He even taught me about the water rights associated with the river as we floated past ranches and properties. The more time we spent on the river, the more water demonstrated

its power and importance. As soon as I could, I declared a major in watershed science in the Department of Ecosystem Science and Sustainability and was soon taking a full course load. Throughout the semester, I began to feel that the degree was too narrow of a path for me. However, I was still interested in water, so I did some digging to see if there might be a better fit somewhere else. That's when I discovered the Geoscience department and the geology major with a hydrogeology concentration. This program has a broader spectrum for careers and gives me the wiggle room to explore other fascinations.

Since joining Geosciences, a lot has fallen into place for me. I have enjoyed the geology courses, challenged myself, had a lot of laughs, made a lot of friends, and found my sense of belonging. The relatively small numbers in this department make for a very tightknit and collaborative community. I am working in the Warner College Student Success Center, where I serve as the Geoscience Ambassador for recruitment and engagement. My work includes an array of activities that regularly include face-to-face interactions with prospective students, with whom I share my own student experience and discuss selecting a major that aligns with their values, skills, and career interests.

The Ambassador team and I also engage in engagement efforts for the college during CSU's various prospective student events, such as Choose CSU and Discover CSU, where we showcase how Warner College integrates unique and exciting fieldwork into its programs, including taking tour groups to the Sherwood Forest to participate in fun activities that highlight natural resources, as well as what our college has to offer more broadly. For my part, I have created a mineral and fossil show-and-tell segment. Currently, the Ambassador group is especially working on expanding Warner's watershed science, restoration ecology, and geology majors.

**American Association of Petroleum Geologists Chapter**

**Lisa Stright**  
Faculty Adviser

The Colorado State University chapter of The American Association of Petroleum Geologists provides information and opportunities to undergraduate and graduate students studying geology, especially as it relates to petroleum and natural gas, and provides exciting co-curricular opportunities for students pursuing energy careers. CSU AAPG was very active during the 2018-2019 academic year. The student chapter hosted industry speakers from Schlumberger (Ernie Brown, B.S., '78 and Greg Cudney, B.S., '78), Anadarko/

Occidental (Jason Mailloux and Jon Robbins, B.S., '05), and Corsair Petrophysics (Robert Lieber); organized a data science workshop led by retired ExxonMobil geologist David Advocate; and attended an Anadarko-led field trip for the Niobrara Formation around the Denver area (with Jarrad Berg, M.S., '04, and Tom Bergstresser). The 2019-2020 academic year is shaping up to be just as busy. The chapter will again be host hosting our dedicated local alumni speakers Ernie Brown and Greg Cudney, in addition to Steven Crews (M.S., '85) from Apache, and is planning field trips to the Arches National Park area as well as to a wellsite in the Powder River Basin. This spring, our students will also be participating in the prestigious Imperial Barrel Award competition. The chapter extends a warm invitation to our many geoscience alumni to engage with our club.



Jarrad Berg (M.S. '04) leading an Anadarko-sponsored chapter field trip to the Niobrara Formation.

SEG Club members in the Emigrant Springs open pit, Carlin Trend, Nevada.



**Student Club Chapter News**  
**Society of Economic Geologists Chapter**

**Josh Elkington**  
 Undergraduate Geology Program

2019 has been another fun and ambitious year for the department’s SEG student chapter. We held semimonthly meetings, where members presented talks on topics that included ore deposit geochronology, mining techniques, and the history of mining. We hosted several external speakers, including Alexander Gysi, Nicole C. Hurtig, Maddison Lylte, and Brandon Bzdok. These speakers covered a wide range of topics including rare earth elements, uranium mineralization, and transitioning into careers in the mining industry. Our final meeting in 2019, as I write this, will host alum Erik Ovens (Red Dog Mine, B.S., '18). For the spring semester we also will welcome an external speaker, Chris Holm-Denoma from USGS, to the department to speak on geochronology of ore-related minerals. We arranged a major field trip to visit Carlin-style gold deposits in Nevada during our annual spring break field trip. This was conducted in collaboration with Tommy Thompson (CSU professor emeritus), who opened many doors for the chapter. During our time in Nevada, we had excellent visits to the Long Canyon, Emigrant, and Phoenix mines, and got a special look at a developing prospect site with alumnus Roger Steininger (Ph.D., '86). We also attended an SEG conference in Elko, Nevada, during the trip, which benefited students with opportunities to meet and network with a number of industry professionals. Guidebooks for our SEG field trip are available to anyone who would like one; please just contact the department!

We also held a fundraising event to support the spring break trip – a trivia night at a local restaurant and were also awarded critical funding from the SEG Stewart R. Wallace Fund. During 2020, we plan to continue our commitment to field-based activities and networking to provide our members with the best possible background and opportunities for careers in the mining industry. This fall, student members joined the GEOL 447 Mineral Deposits class (co-taught this year by senior Ph.D. student Nikki Seymour and Tommy Thompson while John Ridley was on sabbatical) on two field trips, where we visited the Cripple Creek and Henderson mines. We are currently planning our 2020 spring break field trip and would welcome further connections and support from our department alumni and other friends.



Above: SEG club members with mentor and field trip leader Tommy Thompson at Long Canyon Gold Mine, Nevada.  
 Below: SEG club members touring the Phoenix Mill. Photos by Josh Elkington





Mount Alice at Rocky Mountain National Park.  
Photo by Rick Aster



## **OUR FACULTY and STAFF**

Our faculty and staff explore the wide world of geosciences.



**Rick Aster**

I was pleased to once again offer the course in Solid Earth Inverse Methods this spring, using the 2018 (Aster, Borchers, and Thurber) third edition textbook for the first time. I continued to participate in research in Northern Canada (notably with Derek Schutt) and in Antarctica (with a large number of students and colleagues). In the Mackenzie Mountains, we and our students are getting exciting results from our multiyear deployment of seismometers extending from near the plate boundary to the craton in Yukon and Northwest Territories. In the Mackenzie Mountains, the Canadian Cordillera has “invaded” the craton, so that the arcuate thrust belt and its geophysical signatures extend hundreds of kilometers farther to the east than elsewhere. Seismic tomography suggests that this excursion is “guided” on its north and south edges by cold and stiff cratonic fragments, including a newly named and entirely buried “Mackenzie Craton” to the north, but that hot and low-strength lithosphere underlies the thrust belt. Ph.D. student Michael Baker first-authored a definitive overview paper on this project for *Seismological Research Letters*. In Antarctica, colleagues Ronni Graphenthin (University of Alaska), Julien Chaput (University of Texas at El Paso), and I received late 2019 NSF funding to

establish a volcano observatory on the active Erebus Volcano on Ross Island. Ken Sims (University of Wyoming) and I are also working on a review article describing this remarkable intraplate volcano for the Geological Society of London. I also continued to work on the remarkable seismic data that Michael Baker, myself, and colleagues from four other institutions collected between 2017 and 2018 on the Ross Ice Shelf. The ice shelf continues to amaze us with a diversity of wave phenomena induced by icequake, earthquake, atmospheric, and oceanic excitation. These data will clearly keep us busy as we probe and listen to the ice shelf to understand its structure, dynamics, and stability. Hank Cole (M.S. program) is making excellent progress studying tidally triggered icequakes that occur every day near the ice shelf edges. Michael Baker also first-authored a paper in the *Journal of Glaciology* that provides the most comprehensive view to date of how various processes create the seismic spectrum of the ice shelf. The POLNET group, where I am one of several co-PIs, continued to build on a decade of intense fieldwork and seismic/geodetic data collection across much of the continent. We published several papers describing and interpreting the seismically constrained structure of the Antarctic Plate and underlying mantle. This work is producing an increasingly well-resolved imaging and geophysical understanding of Antarctica that is (at last) approaching that of Earth’s other continents. These data and models also inform our understanding of the solid Earth heat flow and viscous contributions to the evolution and stability of the Antarctic ice sheet, and thus are important for glaciological and sea-level studies.

In community activities, I continue to be active in the business of GSA (keep an eye out for the CSU-hosted 2021 Rocky Mountain Section meeting); Seismological Society of America

(for which I serve on the Government Relations Committee and will be co-chairing the 2020 Albuquerque meeting); and Incorporated Research Institutions for Seismology (where I currently serve on the board). I also continue to serve on USGS Federal Advisory Committees for the Advanced National Seismic System and Scientific Earthquake Studies Advisory Committee. This was an especially exciting year in earthquake science with the rollout of an early warning system (based on P-wave detection before damaging waves reach large populations) and the unexpected fault-jumping July Ridgecrest earthquakes (magnitude 7.1 and 6.4). These earthquakes were a wake-up call for California’s urban population – the mainshock was the largest earthquake in Southern California in 20 years.

**DEPARTMENT PUBLICATIONS**

Our department continues to publish across the spectrum of geosciences peer-reviewed literature. You can keep abreast of our publications, as well as download earlier issues of GEOScape and see our department history on the department Google Scholar page (<https://warnercnr.colostate.edu/geosciences/geo-publications/>).



### Sean Bryan

I continue to teach our general education Introduction to Physical Geology course (GEOL 120) and coordinate the Introduction to Geology Laboratories (GEOL 121). Interest in our introductory geology courses continues to be very strong; during the 2018-19 school year, 1,091 students completed GEOL 120 and 901 students completed the GEOL 121 lab. These courses benefit tremendously from the outstanding geology majors and graduate students who served as teaching assistants in GEOL 121 (Darrick Roanhaus, Peter Carlson, Connor Kounnas, Gabe Vazquez, Alex Lae, Micah Hernandez, Manny Guerzon, Emily Iskin, Andrew Bolton, Eyal Marder, James Van Hook, and Joel Spansel) and learning assistants in GEOL 120 (Micah Hernandez, Natalie Crozier, Trigg Skoe, Amanda Greenwalt, Ethan Andrews, Cody Hubbard, and Aren Roybal) over the past year. Our efforts to spread geoscience literacy across such a large group of students at CSU would not be possible without their hard work.

During the summer, I had the opportunity to attend the Earth Educators Rendezvous, a conference focused on geoscience education. I presented on our experience piloting a new cloud-based “iClicker” platform in GEOL 120 and was able to attend workshops focused on incorporating more geo-

detic data and quantitative skills into the classroom and creating virtual and augmented reality learning experiences. It’s great to see more and more examples of technology being thoughtfully and purposefully incorporated into the classroom to improve the learning experience for students. One final highlight was to see some long-term research published in geophysical research Letters this spring. Along with colleagues from the Woods Hole Oceanographic Institution and the University of Colorado, we reconstructed South Asian Monsoon strength and variability over the last few hundred years from coral geochemistry.



### Sven Egenhoff

I am looking forward to my second sabbatical during the spring of 2020. However, this semester is completely booked to work on my textbook *Mudstone Sedimentology* (although I am thinking about sneaking in two other papers that I am currently working on; one for *Sedimentology*, and one potentially for *Basin Research*. Both of these papers will be on the Bakken Formation. (How could it possibly be different?) This year, I made some progress in getting students out the door, and graduated Aleksandra Novak (Ph.D.), who started work at Exxon-Mobil in November, as well as Joel Spansel (M.S.), who also has a job offer

from ExxonMobil. However, the low oil prices have not helped in our ability to obtain support for students because of an ongoing dearth of funds for research activities by industry. Joel is currently working to get a Williston Basin consortium going because of continuing interest from industry in those North Dakota units. Research-wise, I am considering spreading out to follow my curiosity in aquifer sedimentology, teaming up with Mike Ronayne. To support new efforts in this arena, I plan to use Ethridge Funds to partially support a Ph.D. student studying in Denver and Front Range aquifer sedimentology with a focus on aquifer and aquitard geometries. Following my traditional interests, I am continuing to work on the Bakken and overlying associated Lodgepole Formation (ironically referred to as the “False Bakken”) to look at a siliciclastic mudstone succession there. I published a paper on the middle Bakken this year in *Marine and Petroleum Geology* on synsedimentary deformation structures and am currently working on this topic in the Front Range with an undergraduate student in collaboration with John Singleton, concentrating on the clastic dikes at the top of the Fountain Formation. I also taught two short courses this year for industry, one with the Rocky Mountain Association of Geologists in Denver and Golden, and one organized by the North Dakota Geological Survey in Grand Forks, North Dakota.



### Sean Gallen

It's been another busy year here at CSU, with most of my time being split among proposal writing, research, teaching, and advising. Highlights include significant renovations to the Critical Zone Science and Tectonic Geomorphology Laboratory, generously jointly funded by the Office of the Vice President for Research and the Warner College of Natural Resources. These renovations include a new fume hood and ducting system that will allow for the chemical purification of rock and sediment samples, a necessary step in isolating pure quartz. Quartz purification is an essential step to isolate and measure cosmogenic radionuclides, such as beryllium-10, that I plan to use to measure Earth surface process rates on a range of timescales. My graduate students and I conducted fieldwork in Puerto Rico, southern Colorado, and Italy this year in topics ranging from rainfall-triggered landslides to subduction zone dynamics. Teaching highlights included a topical seminar on the co-evolution of landscape and species, Field Camp in Cañon City, and teaching the Introductory Geology course for our majors. In addition to continuing to advise my graduate students Katie Schide (ETH-Zurich), Johanna Eidmann (Ph.D. program), and Eyal Marder (Ph.D. program), I am happy to be co-advising a new M.S. student, Emily

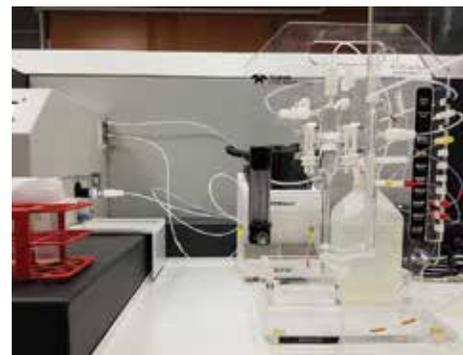
Perman, in partnership with John Singleton. Another exciting part of my year was co-convening a conference in Nepal on natural hazards (see article on Page 34), featuring our own Sara Rathburn as a keynote speaker and also attended by Dan McGrath and Johanna Eidmann to present their exciting research. Perhaps the most rewarding achievement this year is the graduation of my very first Ph.D. student, now Dr. Richard Ott, from my previous institution, ETH-Zurich, who successfully defended his dissertation in October. I look forward to another exciting and productive year here at CSU!



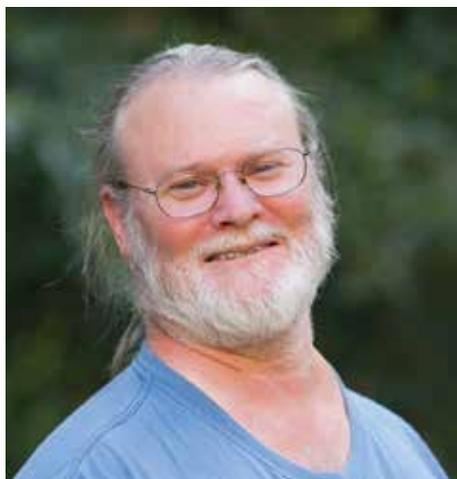
### Judy Hannah

Through the past, year I've continued to wear three hats. As always, I teach my first true love – Igneous and Metamorphic Petrology; crashing tectonic plates, growing crystals and bubbling vapors, enormous exploding volcanoes ... what's not to love? Meanwhile, the National Park Service Geologic Resources Inventory (see the article on Page 31). passes its second decade this year, with a staff of nine and two student interns. I think it is worth naming the five CSU alumni who work with the group – in order of appearance – as you (dear reader) could be a classmate: Stephanie O'Meara, John Graham, Trista Thornberry-Ehrlich, Jim Chappell, and

James Winter. They are joined by four other talented mappers and writers from other reputable institutions: Katie KellerLynn, Ron Karpilo, Georgia Hybels, and Michael Barthelmes. This "awesome" (favorite team word) group has earned kudos from Washington and parks across the country. The third hat is my AIRIE cap – the Re-Os geochronology program that Holly Stein leads. That still has me working half-time at University of Oslo, where we can interface with the Norwegian petroleum industry, our strongest supporters. We're also diversifying our tool kit, exploring a range of metal stable isotopes to further constrain processes of anoxia, organic-matter accumulation, and the generation of hydrocarbons. Along the way, we find evidence of climatic swings, warming or cooling, periods of ocean anoxia and acidity – not unlike the changes we are witnessing in the Anthropocene. Two of our postdocs are moving on to top academic positions. Nicole Hurtig is temporarily at Colorado School of Mines but will shortly move to a tenure-track position at New Mexico Institute of Technology in Socorro next year. Vineet Goswami is heading east, as I write this, to take a leadership role at the Physical Research Lab in Ahmedabad, Gujarat in India. So, it is with particular pleasure that we welcome Ph.D. student Juni Park, who comes to us from South Korea and will be working on our new project exploring mercury in petroleum systems.



Separating volatile mercury for isotopic analysis.



### Dennis Harry

This has been a year of transition for my research and graduate teaching programs, as former students finished and wrapped up old projects and new students made great strides on new projects. Ph.D. student Sumant Jha successfully defended his dissertation, representing the last of a group of my students who were working on rifting and subsidence in the Victoria Land Basin of West Antarctica. Our initial results were reported in *Geosphere* and in presentations at the 2018 Geological Society of America Annual Meeting and AGU Fall Meeting. I continue to work on data collected during International Ocean Discovery Program Expedition 369, where we drilled through the breakup unconformity on the southwestern Australian rifted continental margin. Preliminary results were published in *IODP Proceedings* and our first paper, reporting the nature of the late syn-rift and early post-rift strata on the western Australian margin, appeared in the *Australian Journal of Earth Sciences* (where we describe the dinosaur footprint that we drilled through!). Further papers are in preparation, discussing the nature of volcanism on the margin during breakup and the general tectonic evolution of the margin and its relation to opening of the Indian Ocean. M.S. student Manny Guerzon began working on the seismic reflection data on the Australian margin in Fall 2018, with intentions

to map the subsidence history. Another new graduate student, Micah Mayle (Ph.D.), has taken the lead on my research funded by the National Science Foundation into relationships between rifting and magmatism. We made a breakthrough this past summer, adapting our computer modeling code that simulates rifting to include melting and melt transport processes. Micah will be reporting on the computational methods and our preliminary geodynamic findings at an AGU Chapman Conference in Iceland and at the AGU Fall meeting in 2019. Plans for next year are to complete our seismic mapping on the southwestern Australian margin, and to apply our new computer modeling tools to test various hypotheses for the sources of melts produced during continental rifting.

### Jerry Magloughlin

Hello all, and happy new decade as 2020 rapidly approaches. 2019 has gone quickly, even though I had fewer trips than usual this year. Spring semester, I taught my graduate-level GEOL 535 Microtectonics course, along with the introductory GEOL 110 geology online course (which I'm teaching every semester now). I traveled to Portland for the GSA Cordilleran session meeting, and gave a talk on recent dating of a pluton in the Cascades. On the 39th anniversary of the May 18, 1980, Mount St. Helens eruption, I participated in a field trip looking at the story and impacts of the eruption – and how much has changed (erosion, reforestation) since 1980. Also in May, I took a CSU-sponsored course in drone piloting. Although I've flown for about five years now, passing the FAA exam (I hadn't studied for an exam in a long time!), made me an official commercial drone pilot. This summer, I did a quick research trip to the Cascades, and it was lovely as always. Had a nice visit from Justin Hufford, who was on his way to start a Ph.D. in Zurich. Things got really busy fall semester (as usual).

I am currently teaching two sections of the online intro course, along with Optical Mineralogy and Mineralogy. In Mineralogy, enrollment is back down to what it was around 2011. For the umpteenth year in a row, the Mineralogy students attended the Denver Gem and Mineral show, which has grown to the point where it could easily take a week to see everything. I currently have four students doing independent study projects; two working on classifying recently discovered meteorites; one attempting a computer model of a microstructure I discovered and named a few years back; and one working on microstructures in the famous (fluorescent) Franklin Marble of New Jersey. Speaking of the Franklin Marble, over the past year or two, I have assembled a good collection of fluorescent minerals and showed them off at the Denver show in September. Research-wise, I finished a study on unusual extremely-low-oxygen fugacity serpentine veins, and am wrapping up two more studies, one on amphibolites from the Cascades and one on a computer model for atom-by-atom modeling of rare earth element movement during metamorphism. I am also working on ultramafic rocks now with new graduate student Demi Girot. I always enjoy hearing from graduates; send an email and let us know how things are going.





**Dan McGrath**

I've had an exciting and rewarding academic year with advances in ongoing research projects, the development of a new graduate-level class, "Remote Sensing for Geoscientists," and new projects within my research group. I continue to work closely with USGS scientists studying the Benchmark Glaciers of the Western U.S. and Alaska, which resulted in two publications this year; the first quantifying interannual spatial variability in snow accumulation on glaciers, and the second on the ubiquitous mass losses from these glaciers since the 1960s. I continue to be heavily involved in NASA's SnowEx mission, which seeks to develop and test algorithms to measure snow water equivalent at global scales using space-based sensors. My M.S. student, Randall Bonnell, is focused on understanding the impact of liquid water content on L-band radar propagation, a promising methodology being tested by this mission. This coming winter, I'll be working with a group of students to make weekly snow measurements (snow pits and ground-penetrating radar surveys) at Cameron Pass, which will be one of 13 field sites in the Western U.S. participating in the coordinated SnowEx 2020 ground/airborne campaign. My Ph.D. student, Bri Rick, and I have been using historic and modern satellite imagery to quantify changes in glacial lakes in Alaska, with important implications for

our understanding of how glacial lake outburst flood hazards will change in the future. In an additional aspect of her research, we're using a range of geodetic (lidar, drone-based structure from motion) and geophysical tools (seismic refraction, electrical resistivity, ground-penetrating radar) to quantify the ice content and flow dynamics of the Lake Agnes rock glacier in the Never Summer mountains; one of the hundreds of rock glaciers in Colorado! Lastly, I welcomed two new students to my research group this fall: Lucas Zeller, who will be pursuing an M.S. project related to glacier dynamics in Alaska, and Christoph Suhr, who I am co-advising with Dr. Sara Rathburn. Christoph will be conducting surficial mapping and geophysical surveys at CSU's Mountain Campus to better understand the evolution of this glacial trough in the Holocene and help build our expanding knowledge base for future research and teaching there.

**Sara Rathburn**

Highlights of the 2018-2019 academic year include accolades for Ph.D. advisees Annette Patton and John Kemper. Annette published a paper on permafrost degradation and landslides in *Geomorphology*, defended her dissertation, and started a postdoc at the University of Oregon; John received the Stanley A. Schumm Research Grant award (how appropriate for one of our own graduate students!) from GSA for his research proposal on arroyo incision and floodplain forest establishment in the Yampa River Basin (see John's student highlight on Page 13). I also welcomed new Ph.D. student Celeste Wieting and new M.S. student Christoph Suhr (co-advising with Dan McGrath) this fall. Celeste is researching channel morphological changes after invasive vegetation removal on southwest U.S. rivers, and Christoph is investigating glacial valley evolution through geologic mapping and geophysical surveys. During the summer, I enjoyed two weeks of fieldwork with

John Kemper and USGS colleagues in the Yampa Basin collecting tree cores and surveying arroyos. I also helped John Singleton and one of his former M.S. students complete geologic mapping and worked with Mike Ronayne to install surface and groundwater monitoring equipment at the Mountain Campus to expand teaching and research opportunities. I also worked with CSU's Drone Center to acquire images of the South Fork Valley at the Mountain Campus to develop a high-resolution digital elevation model for Christoph's research. On the teaching front, I taught GEOL 154 Historical Geology last spring and hosted various guest speakers, borrowed the NASA lunar samples, and helped students complete a group poster project that they presented in a symposium format. This fall has been busy with a sophomore-level GEOL 201 Field Geology of the Colorado Front Range class (with John Singleton), and my graduate-level GEOL 662 Field Geomorphology class. I was elected as a Fellow of GSA this year and received the award at the meeting in Phoenix. I also gave an invited talk in Nepal at the Galileo Symposium on Perturbations to Earth Surface Dynamics, an amazing opportunity to see the stunning Himalaya landscape and interact with a vibrant international community studying disturbance response and recovery (noted on Page 34). I'll be on sabbatical next year with plans to go to Iceland.



EGU Galileo Conference attendees examine a landslide scarp near Hindi, Nepal. Numerous coseismic landslide scars from the 2015 M 7.8 Gorkha earthquake are visible across the valley. Photo: Dan McGrath





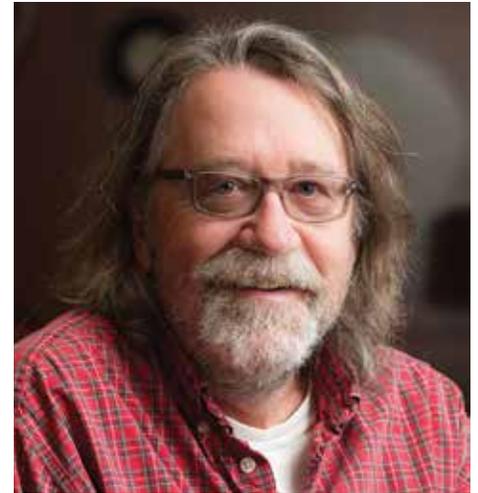
**John Ridley**

I am on sabbatical leave this fall semester but am neither traveling to anywhere exotic and interesting nor fully escaping responsibilities in the department. I am staying in Fort Collins to write a second edition of my book “*Ore Deposit Geology*,” which will hopefully be published within two years. One interesting new M.S. student project this year is on the Yogo sapphire deposit in Montana. This is unusual for known sapphire occurrences in that the gems are hosted in an ultramafic lamprophyre dyke. It is easy to find sapphires by eye underground or on the mine dumps, it is just a shame that most of them are thin plates rather than cuttable stones!

**Mike Ronayne**

I was appointed a Colorado Water Center faculty fellow for the 2019-2020 academic year. My fellowship project involves the use of historical well data and numerical modeling to investigate changing groundwater recharge dynamics in multi-aquifer systems. With specific application to the Denver Basin aquifers, this research investigates the influence of long-term pumping and the conditions that produce aquifer disconnection, which can significantly alter aquifer water budgets. During Summer 2019, I joined my Warner College colleagues

to expand hydrologic instrumentation and related research at CSU Mountain Campus. In June, our Geosciences team, including Ph.D. graduate students Kristen Cognac and Johanna Eidmann and undergraduates Josh Elkington and Ethan Andrews, worked with a drilling contractor to install two monitoring wells that will enable long-term sampling of deeper groundwater. These data will contribute to an improved understanding of groundwater recharge, seasonal groundwater storage, and groundwater-surface water interaction within the mountain watershed. On the teaching front, my graduate-level geostatistics class was approved as a regular course and is being taught again this fall semester. This is a fun class that brings together students with diverse research interests. This semester, we are applying spatial statistical techniques to analyze heterogeneity in a variety of data sets, including snowpack thickness, soil and groundwater contaminant concentrations, and subsurface porosity/permeability data.



**Bill Sanford**

Highlights for this year included Marissa Fichera’s M.S. defense on research modeling seawater intrusion in the Todos Santos aquifer, Baja California Sur Mexico. She used geochemical data and stable isotopes to examine current and potential seawater intrusion due to increased water extraction and future sea level rise near CSU’s Baja Campus site. Active Army Major John Boyle used electrical resistivity tomography to characterize a small groundwater basin in Joshua Tree National Park for his M.S. thesis, helping to improve water resource management in the park. John is now an instructor at West Point. I presented an invited talk at the Society of Exploration Geophysicists annual meeting in San Antonio summarizing our work with temporal microgravity surveys to determine hydrogeologic parameters of unconfined aquifers during pumping tests (my co-authors were Mike Ronayne, Dennis Harry, and Ph.D. student Matt Sturdivant). I continued my longstanding interaction with Larry Cathles of Cornell University to develop and implement a field demonstration of multicomponent tracer methods (including heat, He, and nanoparticles) for constraining fracture flow volume, surface area, and spacing. This proposal, if funded, would develop a well field on the

CSU Foothills Campus near College Lake. I also continued teaching my week of field camp in northern New Mexico, working with water quality and chemistry of springs in the Rio Grande Gorge and in a natural drainage that has been hydrothermally altered and highly weathered and examining its potential impacts on the Red River. This study area is also located near an inactive molybdenite mine in Questa, New Mexico. Finally, I am working with M.S. student Amber Lidell to improve the use of inexpensive sensors for specific conductance measurements in headwater streams near Steamboat Springs, Colorado. If this pilot effort is successful, these low-cost sensors will be usable in many streams to collect data to determine the contribution of groundwater to stream baseflow.



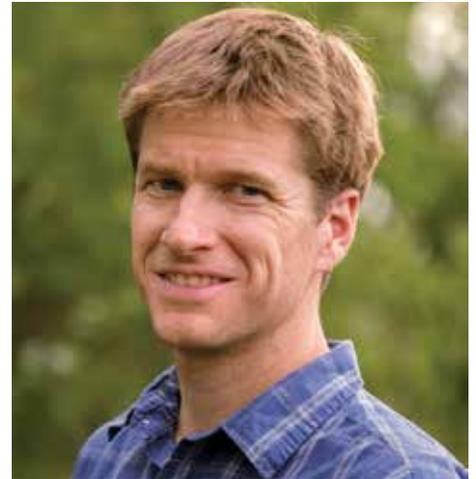
**Derek Schutt**

I welcomed new M.S. student David Cammack to my research group – this makes for five M.S. students, with two intending to graduate this semester. The students have all focused on using geophysics and seismology to investigate the tectonics in northwestern Canada, an enigmatic and until recently, a poorly sampled part of the world. As part of this interest, Rick Aster and I have been co-PIs on a large five-year project to deploy seismographs in and study the remote

Mackenzie Mountains. We are happy to report that, after tremendous efforts by CSU graduate students Michael Baker, David Heath, and Derek Witt (and many others), the field component of the project has been completed successfully, and we are now happily examining lots of data.

As the Mackenzie Mountains project is nearing completion, I have another project ramping up. This multimillion-dollar NSF project is a collaboration with several different institutions, including work with CSU mathematics (and geosciences joint) Professor Wolfgang Bangerth. The goal of my portion of the project will be to take various geophysical and seismological observations and infer the temperature and composition of Earth’s mantle as a key constraint for geodynamic computer simulations.

From a teaching standpoint it has also been a busy year. In the spring of 2019, I taught GEOL 250 Solid Earth and GEOL 574 Geodynamics. This fall, I am teaching GEOL 578 Global Seismology, which consists of both a theoretical class and a hands-on laboratory, along with running a seminar on the tectonics and geophysics of northwestern Canada. Of particular note is that Global Seismology is testing content that was developed during my teaching sabbatical last fall for a flipped learning format that brings more group activity to the classroom.



**John Singleton**

2019 started off with a fantastic January field season in the Atacama Desert near Taltal, Chile. Altogether, a group of nine collaborators (including four Chilean geologists, three CSU graduate students, and a CSU undergraduate) participated in this fieldwork. We completed our geologic mapping of a 70 km-long stretch of the Atacama fault system, ending where it enters the Pacific Ocean. In addition, we finished fieldwork on a shear zone associated with skarn mineralization and started a new project investigating the development of the Mesozoic Andean margin using the stratigraphic record and detrital zircon geochronology. Following fieldwork, we presented our findings to Chilean collaborators at Pontificia Universidad Católica in Santiago. Our Atacama research group is now focused on publishing our results, with a manuscript by former M.S. student Rachel Ruthven recently accepted and two manuscripts by graduate students Nikki Seymour (Ph.D.) and Skyler Mavor (M.S.) currently in review. In Spring 2019, a group of six CSU graduate students and I published a paper in *Rocky Mountain Geology* on Laramide shortening in the Black Hills, which arose from a graduate seminar class. Additional 2019 highlights include student Stewart Williams successfully completing and defending his M.S. research on

*John Singleton continued*

the Potosí uplift in the Sierra Madre Oriental (northeast Mexico). At the September GSA annual meeting in Phoenix, Stewart Williams and Nikki Seymour both gave outstanding oral presentations of their research, and CSU undergraduate Micah Hernandez presented an excellent poster of his Atacama research project. I have (mostly) completed research on west Arizona projects, and at the moment, my research is focused on a process-oriented investigation of quartzite that has undergone significant crystal plastic strain at relatively low temperatures (<280°C). In 2020, I am planning to start new research projects in the Sangre de Cristo Mountains and in southern Arizona. In addition, I am excited to start a new collaboration on a neotectonics project in northern Chile with Sean Gallen and M.S. student Emily Perman. I thoroughly enjoyed teaching summer field camp near Silverton this summer (the “Lime Creek project”). We had a really great group of students and perfect weather. Fall semester has been busy with field trips in Advanced Structural Geology (GEOL 572) and in Field Geology of the Colorado Front Range (GEOL 201), which I co-teach with Sara Rathburn.



**Lisa Stright**

This year has provided some exciting changes in both teaching and research for me, along with continued progress on existing projects. This fall, we resurrected Geology of Natural Resources (GEOL 124). This class quickly filled with an eager group of 80 non-geology students, most of whom are undergraduates. The plan for now is that I will continue to teach this class every fall. In this class, we focus on the basics of geology and build in the importance of understanding and stewarding our geologic natural resources (water, minerals, and energy). I

also continue to teach a number of our petroleum-related courses (Well Logging and Petrophysics; Reservoir Characterization and Modeling; Petroleum Geosciences). We kicked off phase 3 of Chile Slope Systems this summer with six industry sponsors. We will be doing fieldwork in both Patagonia and British Columbia this year, along with affiliate field trips to both locations. I currently have three M.S. students who are all working on projects associated with characterization and modeling of deep-water depositional systems. Noah Vento, a second-year M.S., is working on a machine learning problem in predicting deep-water channel stacking patterns at well locations from core data. Andrew Ruetten, also a second-year M.S. student, is building an outcrop model that will serve to elucidate characteristic, seismic-scale fluid flow patterns and test the predictability of stochastic geocellular modeling to accurately predict these flow patterns. Finally, new M.S. student Teresa Langenkamp is working on using seismic modeling to better understand the information content in inverted seismic data for predicting facies rock properties.



Geology 401 Field Trip to the glacier at Rocky Mountain National Park.

Noah will be joining ExxonMobil full time in the fall of 2020, Andrew is doing an internship with Occidental this summer, and Teresa is doing an internship with ExxonMobil this summer. I am also completing photogrammetry work with an undergraduate researcher, Cesar Quiroz, a student in the geophysics concentration who is also working on a minor in computer science and mathematics. Finally, I was honored to be named an AAPG Distinguished Lecturer this past year and used the opportunity to summarize the modeling work that we have accomplished in phases 1 and 2 of CSS. In a new format for the AAPG, the DLS talks were taped for virtual viewing. The talk, "The Impact of Bed- to Geobody-Architecture on Reservoir Prediction: Hypothesis-Based Modeling in a Deep-Water Depositional Environment," can be found at the AAPG website (<https://warnercnr.colostate.edu/geosciences/>) along with a short interview. The DLS season was capped off with a special session at GSA in Phoenix organized by none other than Robbie Gries, CSU alumna (B.S., '66), and GSA president, "At the Forefront of Exploration and Critical Thinking: American Association of Petroleum Geologists 2019.

### Sally Sutton

My students and I continue to focus on understanding geochemical rock-water interactions, particularly related to aquifer storage and recovery and diagenesis. ASR, which has seen increased use elsewhere in Colorado in recent years, utilizes aquifers to store surplus water that can then be recovered by pumping when needed. The seasonality of snowmelt-derived water makes many Colorado communities potential candidates for ASR. M.S.

graduates Daniel Collazo and Adam Adam, along with Mike Ronayne's Ph.D. student Kristin Cognac, laid the groundwork by characterizing hydrologic properties of local aquifers and identifying several sandstones that may be good targets for ASR. A question in any proposed ASR operation is whether interaction of oxidizing injected water with a less oxidizing aquifer could result in the mobilization of metals such as arsenic or uranium. We are beginning to address this with a combination of geochemical analyses and geochemical modeling. M.S. student Amanda Doherty recently defended her thesis on applying geochemical modeling to predict mineral stability during ASR in some of these local aquifers. New Ph.D. student Christophe Simbo (highlighted on Page 13) has begun work on geochemical modeling of rock-water interactions during ASR and aims to develop a protocol for the application of ASR to sandstone aquifers. In addition to continuing ASR-related work, new M.S. student Alex Marr is planning to follow up on a project of John Ridley's M.S. student Anne Ji examining the mineralogy of arsenic contamination floodplain sediment downstream from the Homestake gold mine in South Dakota.



### Department History



Reuben C. Coffin – one-man Geology Department, 1922-1946.

Please check out the latest edition of your department history by clicking on our department home page <https://warnercnr.colostate.edu/geosciences/>

#### A few notable dates ...

**1922:** Fire guts CSU's old Chemistry Building and a collection of rocks and minerals stored in the attic plummets into the debris of the basement. President Charles Lory, pondering the blackened detritus, asks Major Reuben C. Coffin (Department of Chemistry and noted uranium mineral specialist) to teach geology.

**1957:** Geology becomes a major and department (with six faculty members); first degree awarded.

**1964:** First M.S. awarded.

**1966:** First B.S. awarded to a woman (Robbie Gries – who goes on to become a highly successful and pioneering petroleum geologist and President of Geological Society of America).

**1973-76:** Geology migrates from the College of Natural Sciences to the College of Forestry and Natural Resources, and into the (then-new) Natural Resources building; the department becomes Earth Resources.

**1982:** 300 (!) undergraduates during the early '80s "oil boom".

**1999-2003:** Foundational philanthropic gifts to the department by Ed Warner (B.S., '68), including two endowed faculty positions.

**2003:** College reorganization and creation of the Department of Geosciences

**2006:** Our College becomes the Edward M. Warner College of Natural Resources

**2018:** Dedication of the Warner College Michael Smith Natural Resources Building



### Ellen Wohl

My highlights for the past year include receiving an honorary doctorate from the University of Lausanne in Switzerland. Current projects in our research group include: (1) large wood and associated carbon fluxes to the Arctic Ocean in Canada's Mackenzie River catchment (postdocs Alicia Sendrowski and Natalie Kramer Anderson); (2) field and flume experiments on the influence of downstream spacing of channel-spanning logjams on hyporheic exchange in Little Beaver Creek, a tributary of the South Fork Poudre River (M.S. student Anna Marshall); (3) floodplain carbon stock in relation to time since deglaciation in the Stehekin River valley (Washington) and the Rio Exploradores (Chilean Patagonia; (Ph.D. student Sarah Hinshaw); (4) the spatial distribution and persistence of channel-spanning logjams in Rocky Mountain National Park (eastwest); (5) sediment dynamics in river beds along ephemeral channels in the southwest U.S. (Ph.D. student Juli Scamardo); (6) assessing river corridor condition and the potential for restoration on the Old Elk Ranch properties along the Colorado-Wyoming border (M.S. student Zach Kornse); (7) channel responses to excess sand loading on North and East Sand Creeks in North Park, Colorado (M.S. student Julia Grabowski); (8) the

geography of artificial levees in the continental U.S. (Ph.D. student Richard Knox); and (9) wood loads on different geomorphic surfaces and under different disturbance regimes along the Upper Merced River in Yosemite National Park (M.S. student Emily Iskin). M.S. students Juli Scamardo (highlighted on Page 12), Sarah Hinshaw, and Ethan Ader finished in May 2019. Ethan is now with Otak Consulting in Denver. Sarah and Juli decided that one graduate degree was just not enough and are now continuing in the Ph.D. program here. We also welcomed new students Anna Marshall (M.S.) and Richard Knox (Ph.D.) to the fluvial geomorphology group. Geomorph alums may be interested to learn that Chewy now has a friend (Beverly). The serious and goofy group photos continue.

Collins is quite a bit closer to these field sites than Germany, I'm looking forward to continuing this work and having the opportunity to visit them more frequently. However, I also hope to take advantage of my remaining months in Europe – I will be traveling to Serbia next year to kick-start a project with a Serbian colleague on unraveling the tectonic and climate history of the Dinaride region, and have been traveling frequently within Europe to cement longer-term collaborations with institutions here. Though my position doesn't commence until next summer, I've already joined the Geosciences department as an affiliate faculty member and have started work on several collaborative NSF proposals (both within and outside CSU). My family and I are excited to move to Fort Collins and to join the department and the greater CSU community.

### Incoming Faculty

#### Jeremy Caves Rugenstein

I will be starting as an assistant professor in the Geosciences department in August 2020. In the meantime, I am a joint Alexander von Humboldt postdoctoral fellow at the Max Planck Institute for Meteorology in Hamburg, Germany and at the Senckenberg Biodiversity and Climate Research Center in Frankfurt, Germany. My research focuses on understanding the drivers of long-term (i.e., multimillion-year) climate change and on quantifying how terrestrial landscapes and ecosystems respond to these changes in climate. As part of my postdoctoral work, I have been collecting samples in the Rio Grande Rift and on the High Plains to understand how hydrology and climate in North America has changed since the middle Miocene. Concurrently, I have been working to utilize climate model simulations of warmer worlds to test whether global climate models can capture the response that I observe from these samples. Given that Fort



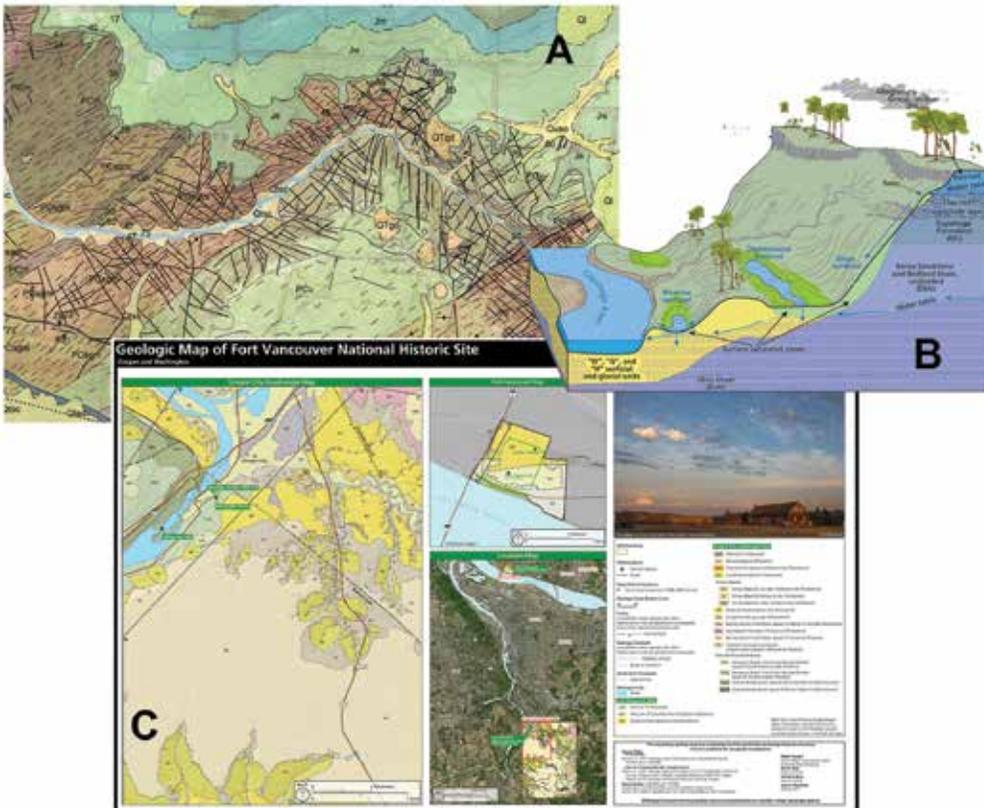
**Geological Resources Inventory Group**

**Stephanie O’Meara and Jim Chappell**

The Geologic Resources Inventory is a cooperative program between Geosciences (with Judy Hannah as the faculty lead) and the National Park Service. The GRI currently employs nine CSU research associates, five of whom are departmental alumni, and two geology student interns. CSU GRI team members work with their NPS GRI counterparts to provide park service units (parks) with the following GRI products: (1) digital geologic-GIS map(s) including Google Earth (KML) derivative data, for use with GIS software, (2) cartographic layouts displaying a park geologic map(s) with prominent park features and (3) geologic reports that present a park’s geologic significance, geologic history, and discusses prominent geologic features, processes, and issues, and presents this information in a format directed at park resource managers. All GRI products are fundamentally produced to assist park managers in protection and broader management. Additional information on the GRI, as well as completed products, can be found at <https://www.nps.gov/subjects/geology/gri.htm>.

In 2019, the GRI completed or updated 47 digital geologic-GIS maps for 16 parks, including maps for Acadia National Park, Black Canyon of the Gunnison National Park, and Joshua Tree National Park. The program also completed or updated 32 layouts, including for Colorado National Monument and Fort Vancouver National Historic Site. Lastly, the GRI produced reports for eight parks including for Bering Land Bridge National Preserve and Cuyahoga Valley National Park, and made significant progress on reports for an additional 15 parks including Grand Canyon National Park.

In 2019, several CSU GRI team members also produced a poster titled “Exploring the Geology of Arizona National Parks with Geologic Resources Inventory Products.” This poster was presented at this year’s Geological Society of America Annual Meeting in Phoenix, Arizona, at this year’s Digital Mapping Techniques Workshop, the ESRI User’s Conference, and can be found at: [https://ngmdb.usgs.gov/Info/dmt/docs/DMT19\\_Karpilo.pdf](https://ngmdb.usgs.gov/Info/dmt/docs/DMT19_Karpilo.pdf)



Some recent GRI products: (A) Portion of the GRI Digital-GIS Map of Black Canyon of the Gunnison showing jointing of Precambrian bedrock, numerous pegmatite intrusives, younger Jurassic-age sedimentary units and Quaternary surficial deposits in the canyon area just north of Vernal Mesa. The National Geographic US Topo Maps map service is used as the base layer (US Topo Maps - Copyright: © 2013 National Geographic Society, i-cubed). (B) Figure of cross section of wetlands types found in Cuyahoga Valley from the GRI Report for Cuyahoga Valley National Park. Graphic was adapted from figure 3 in Bingham et al. (2016) by Trista Thornberry-Ehrlich (Colorado State University). (C) GRI Cartographic Layout for Fort Vancouver National Historic Site.



Approaching Ganjala Pass, Nepal.  
Photo by Dan McGrath



## **Departmental News**

Galileo Conference, Field Camp, and the Mountain Campus



Langtang Himal, a subrange of the Nepalese Himalayas. Photo by Dan McGrath

# Geosciences

## Taking it to new heights

### Nepal Field Conference – October 2019

Three CSU professors (Sara Rathburn, Dan McGrath, and Sean Gallen) and Ph.D. student Johanna Eidmann traveled to Nepal this October to participate in an exciting weeklong Nepalese/European Geosciences Union Galileo Conference titled “Perturbation to Earth Surface Dynamics caused by Extreme Events.” The conference hosted 60 participants from Nepal and around the world and focused on the impacts of rare or catastrophic events, such as large earthquakes, extreme storms, tsunamis, floods, wildfires, or volcanic eruptions, on Earth surface processes and biogeochemical cycles, and that can potentially dominate system dynamics over long time scales. The goal of the meeting was to bring together leaders in the field to discuss the state-of-the-art in science, the morality of conducting science in disaster zones, and commonalities and scales of different events, and to identify grand challenges to the most pressing scientific questions. Sean was a meeting organizer along with Christoff Andermann, Kristen Cook, and Christian Mohr from the Helmholtz Centre Potsdam – GFZ German Research Centre for Geosciences, and Maarten Lupker, Katherine Schide, and Lena Märki from the Department of Earth Sciences at ETH-Zürich. The five-day meeting involved several days of talks and discussion,

and a day-and-a-half-long field trip to an area affected by the 2015 magnitude 7.8 Gorkha earthquake and by a 2016 glacial lake outburst flood. CSU was tied for second place (along with ETH-Zürich) as the most represented institution at the meeting, beat out only by the group from the GFZ, and Sara was one of seven keynote speakers, highlighting recent research in her group to improve understanding of the role of wildfires and extreme rainfall events on geomorphology and sediment and carbon transport in the Colorado Front Range. Johanna presented research conducted during her M.S. with Sara on post-flood recovery in North St. Vrain Creek, Colorado. Dan also presented his research on GLOFs in Chile, and Sean presented his study of drainage basin response to a catastrophic rockfall in Crete, Greece. To facilitate fruitful dialogue, the meeting included a series of breakout sessions for participants to consider the challenges, key research needs, and grand challenges that face the growing field of extreme event-based geoscience. The discussions were lively and informative and will ultimately form the foundation of a white paper that will outline best practices for the field, articulate data needs, and highlight key research questions needed to advance science and public safety. Sean is leading the efforts on the white paper.



Top: A landslide field lecture in Nepal during the conference. Bottom Left: Dan McGrath, Sara Rathburn, Sean Gallen, and Johanna Eidmann in Nepal. Bottom Right: Damage to structures in the Bhoti Khoshi valley from 2015 Gorkha Earthquake co-seismic landslides and a 2016 glacial outburst flood.



## DEPARTMENTAL NEWS



Top: Our 2019 Summer Field Class group. Bottom: One of many avalanches near Silverton from the exceptional 2018-19 snow year. Photo by Stewart Williams



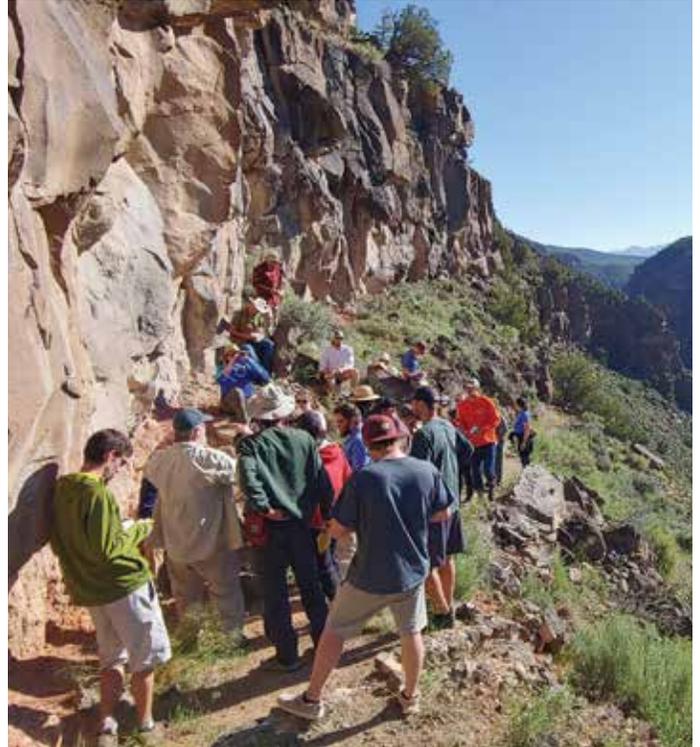
# Field Camp

June to July 2019

## Sven Egenhoff, lead Field Camp faculty

Field Camp 2019 began on May 29th this year, led by me, Bill Sanford, John Singleton, John Ridley, and Sean Gallen. As usual, Field Camp ran until early July, when the students returned, tired but all in one piece from Silverton, Colorado. We had just 26 attendees this year (which made booking accommodations and arranging for travels easier than in some of the previous years). Teaching in the field is a wonderful experience for everybody involved, and we had an incredible time. The first two sessions involved camping in New Mexico, and the last three were conducted out of houses and hostels in Silverton (as before, in collaboration with our partners at the Mountain Studies Institute). Camping went well except for a rattlesnake bite (!), fortunately “dry,” during the first week, which sent one of our students to the hospital in Cañon City. No major incidents occurred during the remaining four weeks, though, which we took as a good sign (and the students were really on alert for snakes!).

The geologic focus was on mapping surface deposits during the first week and exploring how landscapes form. The students managed to find an anomalous local basalt intrusion in the mapping that puzzled everybody, including the instructor. The geomorphology focus was followed by a week concentrating on hydrogeology, collecting water samples from springs along the bottom of the Rio Grande Gorge near Taos, New Mexico. The purpose of this project was to relate the water chemistry back to the geology – basalts, plutons and related hydrothermal alteration zones. Field Camp then switched to the western side of the Continental Divide. The southern San Juan Mountains and also Silverton had gotten a lot of snow this year (in stark contrast to the year previously, when dry conditions led to forest fires). During sedimentology week, we had to find a better access to the field areas, as the normal routes were, in many areas, inaccessible due to snow! The focus of this week was again the Pennsylvanian coarse-grained delta succession, and an only slightly older carbonate unit in the Hermosa Group close to Molas Pass. A one-day exercise also looked closely at the Hermosa Group, this time at Coal Mine Canyon a few miles south of Molas Pass toward Durango. During the second Silverton week, the students worked at lower altitudes because of the lingering large snowpack at Red Mountain Pass that inhibited



Students and faculty member Bill Sanford at an outcrop at the Wild Rivers Recreation Area, NM, looking at basalt overlying siliciclastic sedimentary strata. Photo by Stewart Williams

getting to the old field sites. They also examined the many avalanches from the past winter in the San Juan Mountains as analogs for sedimentary and volcanic mass-flow deposits. The final week of Field Camp was focused on structural geology and mapping with four days along Lime Creek and one day near Molas Pass. The weather was nearly perfect the entire week, which made working in the field pleasant (in contrast to the previous week where it had rained or snowed nearly every day!). Even the moose were out, and the group immediately spotted one in the middle of their field area.

The student cohort was extremely good this year with a very strong work ethic. This resulted in us giving out two well-deserved Field Camp awards for this summer (to Will Gnesda and Charlie Gruenberg). Nominations of our Field Camp students for the USGS-NAGT award have recently been submitted, and if any of our students win this honor it would be very well-deserved. A special thanks once more to all of our friends and alumni who contributed to the department’s Field Camp Scholarships – these annual awards continue to make a tremendous difference to our students as they complete their geology degrees!

# Geosciences at the CSU Mountain Campus



Momentum continues to build around Geosciences and Warner College research and teaching at CSU's Mountain Campus, located in the headwaters of the South Fork of the Cache la Poudre River at over 9,000 feet, and on the northern boundary of Rocky Mountain National Park. During the past year, the department has helped lead a number of developments there, including the installation of a second stream and groundwater transect (measuring river discharge and groundwater stage) at an upstream site on the South Fork; a water quality instrument (measuring dissolved oxygen and dissolved organic matter); a new weather station located in a more protected, forested location (with an array of meteorological instruments), and two ~10 m-deep groundwater monitoring wells (measuring groundwater level, temperature and electrical conductivity). In addition, a broadband continuously telemetered seismograph was installed in partnership with the Colorado Geological Survey, adding a key site to the statewide seismic network in Colorado and contributing to global seismology as well. (The instrument recorded a sizeable earthquake in Chile just days after being installed.) This real-time Mountain Campus data can be accessed at <https://datavis.warnercnr.colostate.edu/instrumentation/> and [https://www.iris.edu/app/station\\_monitor/#2019-10-01T05:16:38/CO-MCSU/webicorder](https://www.iris.edu/app/station_monitor/#2019-10-01T05:16:38/CO-MCSU/webicorder). All of this new data from the Mountain Campus will be archived to ensure access by the public and other stakeholders, and for future use in classroom and on-site field teaching and research. Other department-associated activities included a drone-based photogrammetry survey of the valley led by Sara Rathburn and the CSU Drone Center, and early surficial mapping. This effort is providing insights into the hydrology of this watershed and will contribute to understanding of the geologic and geomorphic history of this beautiful glacial valley. Much more is planned for coming years, so stay tuned!



Top: Department grad students Andrew Bolton, David Heath, and Michael Baker installing the MCSU seismometer.  
Above: A recent webcam view of the CSU Mountain Campus.



Graduate student Johanna Eidman and undergraduate student Ethan Andrews at the Mountain Campus during sediment logging during the 2019 hydrologic monitoring well installation.

## Department and College Scholarships and Awards

With sincere thanks to the generous donors who have made these scholarships and awards possible.

### Undergraduate Students

**Nicholas Andujo:** Geology Field Camp Scholarship

**Kaitlyn Berckmann:** Steve and Gail Kloppel Scholarship in Geosciences

**Lisa Burgess:** Philip A. Connolly Memorial Scholarship, Chris Lidstone and Kate Laudon Scholarship in Geosciences, and John and Dolores Goodier Scholarship in the College of Natural Resources

**Cody Delgado:** Myron Brown Ludlow Scholarship, Michael Smith Scholars in Geosciences, and Geology Field Camp Scholarship

**Fallaye Diallo:** Treckles Scholarship in Geosciences and Geology Field Camp Scholarship

**Lab Ducote:** Roy G. and Ruth K. Coffin Memorial Scholarship

**Joshua Elkington:** Chris Lidstone and Kate Laudon Scholarship in Geosciences

**William Fabrocini:** Students First Scholarship

**William Gnesda:** Geology Field Camp Scholarship

**Amanda Greenwalt:** Geology Field Camp Scholarship

**Micah Hernandez:** Outstanding Geosciences Student

**Nathan Hollars:** Michael Smith Scholars in Geosciences

**Andrew Klotz:** Geology Field Camp Scholarship

**Alexander Lae:** Geology Field Camp Scholarship

**Sarah Lowe:** David V. Harris Scholarship

**Cielo Martos:** Thomas A. and Anne L. Shepherd Diversity Scholarship and Salonee Kharkar Memorial Scholarship

**Sara Newman:** Ernest and Bernice Dice Scholarship and the Charles E. Beverly Memorial Scholarship

**Sara Phrazyn:** Geology Field Camp Scholarship

**Gabriela Sanchez Ortiz:** Michael Smith Scholars in Geosciences

**Dylan Rolley:** Geology Field Camp Scholarship and Outstanding Geosciences Student

**Aren Roybal:** Michael Smith Scholars in Geosciences

**Laishla Seda Mercado:** Michael Smith Scholars in Geosciences

**David Sispera:** Michael Smith Scholars in Geosciences

**Julie Spawn:** Chris Lidstone and Kate Laudon Scholarship in Geosciences

**Matthew Swarr:** Undergraduate Explorationist Scholarship

**Jacob Switek:** Bruno and Ouida Fritschi Scholarship and Undergraduate Explorationist Scholarship

**Gabriel Vasquez:** Katharine E. Compton Field Experience Scholarship

**Marguerite Watson:** Michael Smith Scholars in Geosciences

**Candace Whitten:** Chris Lidstone and Kate Laudon Scholarship in Geoscience

**Noah Williams:** Charles E. Beverly Memorial Scholarship and Geology Field Camp Scholarship

### Graduate Students

**Andrew Bolton:** McCallum Mineralogy and Petrology Graduate Scholarship

**Alexander Brooks:** Ware Geosciences Fellowship

**Kristen Cognac:** Evelyn I. Clark Scholarship

**Hank Cole:** McCallum Mineralogy and Petrology Graduate Scholarship

**Johanna Eidmann:** Edward M. Warner Graduate Research Assistant Fund

**Julia Grabowski:** Hill Memorial Fellowship

**Sarah Hinshaw:** J.W. Powell Graduate Fellowship and Schumm Graduate Scholarship

**Emily Iskin:** Marie Morisawa Graduate Fellowship and Warner College of Natural Resources Student Success Graduate Fellowship

**John Kemper:** Thomas A. Jones Graduate Fellowship

**Zachary Kornse:** Oscar and Isabel Anderson Graduate Fellowship

**Teresa Langenkamp:** Edward M. Warner Graduate Research Assistant Fund

**Eyal Marder:** Joby Adams Geosciences Graduate Scholarship and the Lary Kent Burns Memorial Scholarship

**Emily Perman:** Edward M. Warner Graduate Research Assistant Fund

**Anna Pfohl:** Hill Memorial Fellowship

**Juillianne Scamardo:** Oscar and Isabel Anderson Graduate Fellowship

**Nikki Seymour:** Roger and LuAnne Steiningger Fellowship and WCNR Student Success Graduate Fellowship

## Department and College Scholarships and Awards

With thanks to all of our donors who have made these scholarships and awards possible.

### External Student Awards

**John Kemper:** Stanley A. Schumm Award from the Geological Society of America

**Juli Scamardo, Emily Iskin, and Sarah Hinshaw:** poster presentation awards at the 50th annual Binghamton Geomorphology Symposium

**Juli Scamardo:** Graduate Research Fellowship from the National Science Foundation

**Johanna Eidmann:** The AGES2 (Awards for Geochronology Student Research2) award from the Geological Society of America

**Johanna Eidmann:** Best Poster Award the Rocky Mountain Rendezvous

**Eyal Marder:** John T. and Carol G. McGill Research Award from the Geological Society of America

**Eyal Marder:** On To the Future Award from the Geological Society of America

**Brianna Rick:** Research Award from the Geological Society of America

**Nikki Seymour:** Outstanding Student Award from the Laramide Chapter of the Association for Women Geoscientists

**Nikki Seymour:** October Researcher of the Month by the CSU Graduate Student Council

**Will Gnesda & Charles Gruenberg:** Field Camp Hammer Award

**Will Gnesda:** Neal J. Harr Memorial Award Rocky Mountain Association of Geologists

### Faculty and Staff Awards

**Jill Putman:** Warner College of Natural Resources Team Award (as a member of the Warner College Academic Success Collaborative)

**Sara Rathburn:** Fellow, Geological Society of America

**John Singleton:** Dean's Award for Excellence to an Early Career Faculty Member

**Holly Stein:** 2019 Ingerson Lecturer, Geochemical Society

**Lisa Stright:** AAPG Distinguished Lecturer

**Ellen Wohl:** Honorary Doctorate, University of Lausanne, Switzerland

**Derek Schutt:** Geosciences Outstanding Publication Award

### Share your thoughts with us in our Alumni Survey

We invite you, as a member of the worldwide CSU geosciences community, to share your interests with us in a brief (just three pages) online friends and alumni survey and to please consider engaging further with CSU Geosciences. Opportunities for engagement may include guest lectures, student field trips, supporting and advising our AAPG, SEG, or other club activities, and becoming a mentor to enhance our students' preparation for geosciences careers. The survey helps us better align your, and the department's collaborative opportunities and interests – experience shows that partnerships with our friends and alumni advance the academic and professional prospects of CSU graduates. Kindly access the survey department web page at [warnercnr.colostate.edu/geosciences](http://warnercnr.colostate.edu/geosciences), go to the Alumni tab and click Geosciences Friends and Alumni Survey.

### SPECIAL THANKS

Thanks to our 2019 Geosciences Advisory Council: Roger Steininger (chair), Ed Warner, Harold Pranger, Matt Morgan, Bob Stoller, Scott Larson, Jon Robbins, Tara Tafi, Chris Lidstone, and Landry Griffin.

Thank you to the many visiting speakers at our student club events this year – we truly appreciate your inspirational mentoring of the next generation of CSU geoscientists.

Club speakers this year included: Karthik Srinivasan, Ernie Brown, Greg Cudney, Jason Mailloux, Jon Robbins, Robert Lieber, David Advocate, Jarrad Berg, Tom Bergstresser, and Steven Crews.



The Hangay Mountains in central Mongolia.  
Photo by Jeremy Caves Rugenstein

## 2019-2020 Development Focus Areas

### Ethridge Sedimentology Endowment fund

The Ethridge Sedimentology Endowment honors Professor Emeritus, Frank Ethridge, and helps sustain the department's exceptional legacy in sedimentology and petroleum geology. This fund supports department research efforts. Please consider contributing to honor Frank's legacy and to support future generations of CSU geologists.

For more information, please contact Rick Aster ([rick.aster@colostate.edu](mailto:rick.aster@colostate.edu)) or alumna supporter Lesli Wood ([lwood@mines.edu](mailto:lwood@mines.edu)). Direct contributions to the fund can also be made online at [www.advancing.colostate.edu/ETHRIDGE](http://www.advancing.colostate.edu/ETHRIDGE).

### Geology Field Camp Scholarship fund

This year, the Field Camp Scholarship fund – thanks to more than 40 individual donations from friends and alumni and an endowed fund from Ted Eckles and Trinna Tressler to establish the Treckles Scholarship in Geosciences – provided substantial scholarship support to 13 of our five-week summer Field Camp students. Please consider a 2019-20 donation to this fund to help sustain critical support for future geology major undergraduate students as they enter the wider world as professional geoscientists.

### Experiential Learning and Field Studies fund

A major strength of our department and college is our strong field programs. Please contribute to this fund to specifically support our classes and student clubs in field education and research.

### Geosciences Speaker Series Endowment fund

With your help, we have established a strong yearlong department seminar series (ably coordinated this year by Mike Ronayne). Speakers and other visitors expand our students' professional networking, educational breadth, and research. Perhaps you would like to visit the department to speak, or would like to support a special speaker from industry or in partnership with a professional society, such as AAPG, SEG or GSA? Thank you for your contributions to our speakers and visitors fund that keep these activities vibrant across the department.

### Tommy B. Thompson Economic Geology Legacy fund

Dr. Tommy B. Thompson's remarkable tenure as an economic geology teacher and mentor spanned nearly 50 years, with more than two decades spent at CSU. His students in the Warner College of Natural Resources benefited from Tommy's exceptional mentorship, leading to many satisfying careers in the geosciences.

In recognition of Tommy's outstanding legacy, Warner College is initiating a campaign to raise funds necessary to create a permanent faculty position focused on practical and applied elements of economic geology.

Jeff Edwards, a "Tommy" student who spent his career with Newmont Mining, and later, GoldCorp, Inc., has initiated the campaign with a leadership gift to establish the Tommy B. Thompson Economic Geology Legacy fund.

To learn more about the initiative to enrich the future for economic geology at CSU, please contact Rick Aster, Geosciences Department head, at [rick.aster@colostate.edu](mailto:rick.aster@colostate.edu) or (970) 491-7606.



Perito Moreno Glacier, Argentina. Photo by Ellen Wohl

## Your Gift's Impact

### Amanda Greenwalt

“By awarding me the Field Camp Scholarship, you are helping in making funding for field camp less stressful. I was already thinking about making donations to the Colorado State University Geology Department and Field Camp Scholarship fund in later years, but you have solidified my decision in someday helping future students fund their education. Words cannot express how thankful I am for your generosity.”



### Andrew Klotz

“The generosity of your scholarship support is inspiring and is not taken for granted. Your donation helps financially struggling students like me to be able to attend field camp with less burden.”



### Fallaye Diallo

“Coming back to school with an immigrant background has been both academically and financially challenging. After moving from Africa in 2012 to the United States, a college degree appeared to be a luxury I could not afford. Except with the help of generous donors like you, I have had the opportunity to come this far and accomplish the biggest achievement of my life. These scholarships are the bridge that connects my achievements to my future goals, which are to eventually get a master’s degree and be able to contribute in science and society.”



### Gabriel Vazquez

“To have your support and that of our department’s faculty means that I did choose the right school. This institution believes in their students, that is clear. Your generosity will enable me to stay on schedule for graduation and facilitates my next goal to continue to graduate school.”



## The Geosciences Department

### Faculty

Rick Aster, professor and department head

Sean Bryan, senior instructor

Sven Egenhoff, professor

Jeremy Caves Rugenstein, assistant professor starting Fall 2020

Sean Gallen, assistant professor

Judy Hannah, professor

Dennis Harry, professor

Jerry Magloughlin, associate professor

Daniel McGrath, assistant professor

Sara Rathburn, associate professor

John Ridley, associate professor

Michael Ronayne, associate professor

Bill Sanford, associate professor

Derek Schutt, associate professor

John Singleton, assistant professor

Lisa Stright, assistant professor

Sally Sutton, associate professor

Ellen Wohl, professor

### Joint Appointment Faculty

Wolfgang Bangerth, professor, Department of Mathematics, Colorado State University, joint professor with geosciences

Tim Covino, assistant professor ecosystem science and sustainability, Colorado State University joint assistant professor with geosciences

Steven Fassnacht, professor ecosystem science and sustainability, Colorado State University, joint professor with geosciences

Svetoslav Georgiev, AIRIE Program, research associate IV, joint affiliate with geosciences

Stephanie Kampf, associate professor ecosystem science and sustainability, Colorado State University, joint associate professor with geosciences

Melinda Laituri, professor ecosystem science and sustainability, Colorado State University, joint professor with geosciences

Lee MacDonald, professor emeritus, ecosystem science and sustainability, Colorado State University, joint professor with geosciences

Holly Stein, Director, AIRIE Program, senior research scientist and joint appointment professor, Department of Geosciences, Colorado State University, joint professor with geosciences

### Staff

Jill Putman, academic support coordinator

Patti Uman, administrative assistant III and graduate coordinator

Lisa Zineddin, administrative assistant II



### Staff Highlight

Welcome to Lisa Zineddin! Lisa joined us in the department office this fall as our administrative assistant. Lisa works extensively with faculty, students, staff, and visitors to the department to keep us moving on an even keel. Lisa was born and raised in Pennsylvania, and has an associate's degree as an administrative assistant, a certificate in early childhood education, and a certificate as a dental assistant. She has held various positions during her career (including helping to manage a hotel at Penn State University!) but has spent the majority of her time raising her children and taking care of her family while her husband worked overseas. She moved to Colorado in 2006 with her family when her husband received a position teaching at the Air Force Academy and has been a state resident ever since.

## Thank You to Our Department of Geosciences Affiliates

Harley Benz, scientist in charge, U.S. Geological Survey National Earthquake Center

Eric Bilderback, geomorphologist, Geologic Hazards & Disturbed Lands, Geologic Resources Division, Natural Resource Stewardship and Science, National Park Service

Jeremy Caves Rugenstein, post doc Fellow, Max Planck Institute for Meteorology (Hamburg) and Senckenberg Institute (Frankfurt)

Joel Cubley, instructor and Geological Technology Program coordinator, Yukon College, Canada

Kenneth Dueker, associate professor, University of Wyoming-Laramie

David Dust, civil and environmental engineering alum, currently serving as research assistant and program aide

Neil Fishman, senior geologic adviser, Hess Corporation, Houston

Jonathan Friedman, hydrologist, U.S. Geological Survey Fort Collins Science Center

Vineet Gosswami, Physical Research Laboratory, Ahmedabad, India, AIRIE Group

Ethan Greene, director, Colorado Avalanche Information Center

James Hagadorn, Denver Museum of Nature and Science

Øyvind Hammer, associate professor, Natural History Museum, University of Oslo, Norway

Dario Harazim, technical geologist, ETC Seal and Trap Team, Chevron Energy Technology Company

Eric Harmsen, professor, University of Puerto Rico Department of Agricultural Engineering”

Ed Harvey, supervisory hydrologist and chief of the U.S. National Park Service Water Resources Division

Christopher Hiemstra, research physical scientist, U.S. Army Corps of Engineers, Cold Regions Research and Engineering Laboratory

Kenneth S Hughes, Department of Geology, University of Puerto Rico

Antun Husinec, associate professor, Department of Geology, St. Lawrence University, Canton, New York

Scott Johnston, assistant professor of geology, Cal Poly State Geochronology, metamorphic petrology and structural geology

Yvette Kuiper, associate professor Structural Geology, Field Geology, Geochronology; Department of Geology and Geological Engineering Colorado School of Mines

Chris Lidstone, geologist, Lidstone and Associates Inc.

Scott McCoy, associate professor, Department of Geological Sciences and Engineering, University of Nevada, Reno

Frank J. Pazzaglia, professor, Department of Earth and Environmental Sciences, Lehigh University

Robert Porritt, geophysicist, University of Texas Institute for Geophysics

Mike Prior, postdoc researcher

Sandra Ryan-Burkett, research geomorphologist, USFS Rocky Mountain Research Station



Current Ph.D. student, Juli Scamardo, removing rebar and tape used to measure sediment depth in a pool upstream of a beaver dam analog in Campbell Creek near Livermore, Colo.

---

Daniel Scott, postdoc, University of Washington

Joe Sertich, curator of vertebrate paleontology, Department of Earth Sciences, Denver Museum of Nature and Science

Graham Sexstone, USGS Denver  
Roger Steininger, NuLegacy Gold Corp, CSU Geosciences Advisory Council

Robert Stollar, Stollar & Associates; SWIIM; CSU Geosciences Advisory Council

Ghana Tripathy, AIRIE Group

David Wald, US Geological Survey National Earthquake Information Center

Edward Warner, geologist and philanthropist; CSU Geosciences Advisory Council

## Special Thanks to Our Supporters

Your gifts and support provide critical resources to our students and programs and elevate the department's teaching, research, and outreach.

Harold A. and Jacquelin Backer

R. Michael Beathard and Margarita Padilla

Sage M. Betts

Bruce J. Bilodeau and Deborah J. Wechsler

Ernie Brown

Jon Carlson

Steven F. and Brenda A. Carr

Steven K. and Caroline B. Compton

Howard and Cindy Coopersmith

Steven Crews

Greg V. and Laurel B. Cudney

Jeremy Dento

Ralph M. and Sharon J. Dickman

Ted Eckles and Trinna Tressler

Frank G. and Sylvia G. Ethridge

Robert H. and Kay A. Filson

Frances L. Fryberger

Douglas S. and Ncheteka Gratwick

Jason L. and Landry M. Griffin

David J. Herzog and Linda M. Bendock

David J. and Mary T. Hodge

Ryan L. Hoff

Scott M. and Rebecca Larson

Robert W. Lichty

Christopher D. Lidstone and Kate

J. Laudon

Robert and William Lowe

Chuck Mabarak

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Murray R. and Joan F. McComas

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Shunji and Nobuko Ouchi

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Mark A. Robinson and Marsha M. Hilmes-Robinson

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Logan Shelton

Robert Stollar

Cynthia M. Smidt

Michael S. Smith

Roger C. and LuAnne Steininger

Michael C. and Maria L. Steppe

Ibrahim G. Zallum

### Organizations and Agencies

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American Geophysical Union

Climax Molybdenum Company

Colorado Stone Quarries, Inc.

Cripple Creek and Victor Mine, Newmont Mining Corporation

Dominion Diamond Mines

ExxonMobil Foundation

Geological Society of America

HighPoint Resources

IHS Markit Ltd.

Incorporated Research Institutes for Seismology

Marietta Materials

NASA

National Park Service

National Science Foundation

River Restoration Northwest

Saskatchewan Research Council-Geoanalytical Laboratories

Schwab Charitable Fund

Schlumberger

Seismological Society of America

Society of Economic Geologists

UNAVCO

University Press of Kansas

U.S. Geological Survey

### IN MEMORIAM

The department is greatly saddened by the sudden passing of our dear friends and alumni Sarah (Andrews) and Damon Brown, and their son Duncan, this July. A memorial web page dedicated to Sarah, Damon, and Duncan has been posted at <https://damonsarahduncanbrownmemorial.com>.

**A special thank-you to Ed Warner and Jackie Erickson for broad and continued support to the geosciences department and the Warner College.**

## Thank you for supporting the Geosciences Department.

To add your support to Colorado State University geosciences, please mail this form, or contribute online at <https://advancing.colostate.edu/GEOSCIENCES>.

### My/Our Gift to the Geosciences Department

Enclosed is my/our contribution to the Colorado State University Foundation for a gift of:

\$50	\$250	\$500	Other \$
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