Granitic intrusions in Precambrian gneiss, as seen on Mount Meeker, Rocky Mountain National Park.
(Photo: Rick Aster)
A Note from the Department Head

RICK ASTER

Dear Friends,

Welcome to the 2018 GEOScape newsletter of the CSU Department of Geosciences. This year witnessed many exciting new developments in our department and College. Our physical space was transformed by the completion of the Michael Smith Natural Resources Building, a major addition to the south side of the 1960s NR Building. The new building includes spectacular new classrooms, teaching laboratories, and collaborative spaces, as well as a dramatically enlarged first-floor atrium that includes a college-wide student career and success center. The superbly designed building integrated into our older space, and the entire complex has now been christened the Michael Smith Natural Resources Building. As part of this extensive project, we secured resources to repurpose our old 316 teaching laboratory (the one in the northeast corner of the department, for geographically oriented alums who may recall taking paleontology, sedimentology, and other classes there) into a new office, kitchen, and meeting space for our graduate students. Classes formerly taught in 316 have been relocated to modern and state-of-the-art teaching labs in the new building. In additional benefits from this construction frenzy, the department gained a new sample storage room with movable shelving, a dedicated visitor office, a new laboratory and office space for Assistant Professor Dan McGrath, and (finally) a new roof (!). We’re also benefiting from a number of external improvements, that include a renovated outdoor meeting (and sometimes teaching area) in the nearby Sherwood Forest, and an outdoor “megaspecimen” project featuring prominent boulders of special interest (Yule Marble, Pikes Peak granite, and ore from Cripple Creek), spearheaded by Jerry Magloughlin. We’re happy that all the construction noise and disruption is finally over, and we can now reap the many benefits of these many and historic infrastructure improvements!

The department and College also organized and sponsored two exceptional alumni gatherings, symposia, and emeritus tributes this year in honor of our highly distinguished colleagues Tommy Thompson and Frank Ethridge, both of whom have had extraordinary and historic influences on the department and its students. These events gathered far-flung classmates and colleagues together from around the world and certainly emphasized the tremendous impact that these professors continue to have, on the important and global impacts of our department. Please read further in this newsletter to learn more about these wonderful events.

Finally, 2019 will start out with a January Strategic Planning meeting of the department. This will result in a refresh of our 2013 strategic plan. The principal objectives of the 2013 plan were to expand our research and graduate programs, including the Ph.D. program; to grow our global visibility as a department; to sustain and advance our many teaching and professional development opportunities for our students; to enhance our internal and broader department community; and to advance our physical, faculty, staff and financial resources. We’ve made excellent, if variable, progress toward these objectives, and am very much looking forward to a very bright future for the department in 2019 and beyond!

Rick Aster, Geosciences Department Head
Greetings from Fort Collins!

As Rick noted in his letter and as I’m sure you’ll see from reading the pages of this edition of GEOScape, the past year has been an exciting one for geosciences and Warner College.

Our move into the new addition of the Michael Smith Natural Resources Building has been nothing short of transformative. The new building was crafted with careful attention to creating a plethora of opportunities for interactive community engagement. The result is a place where students, faculty, staff, and visitors can come together in formal and informal gatherings. In addition, the artwork, displays, and the construction of the building, inside and out, was designed to highlight the various disciplines and activities of the College, and geosciences has heightened visibility and prominence as a result.

In addition to supporting the core disciplines of our academic programs, the College is engaged in a number of cross-disciplinary initiatives that we believe will bring value and advance the overall strength of all of our programs. Among these initiatives are our efforts to strengthen the teaching and research platforms at the University’s Mountain Campus located at about 9,000 feet in elevation in Pingree Park, just north of Rocky Mountain National Park. Geosciences has been a major player in this effort and, in the coming year, we will see new instrumentation on the site that will improve our meteorological, geomorphological, hydrological, and seismic capacity at the Mountain Campus.

Another important initiative we are pursuing is a focused effort to expand access and recruitment of students from underrepresented groups and underserved communities into geosciences and other programs in the College. We see this as a critical element of our land-grant mission and service to society and, in the coming year, we look forward to major strides in this area. The excitement of discovery and learning is palpable in the halls of the geosciences department and across the College.

Stop by and see us!

John Hayes
Dean, Warner College of Natural Resources

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First-year and transfer geology students joined other incoming Warner students for a September discovery trip to the Mountain Campus. (Photo: Field Peterson)
Joe Sertich (B.S., ’04) alumnus and curator of dinosaurs at the Denver Museum of Nature and Science, came back to campus in April 2018 to share his story and inspire others.
ALUMNI NEWS

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

A five-decade geology career provides perspective on navigating career and life

Ed Warner,
B.S., ’68

My geology career has spanned five decades. Along the way, I’ve learned a few things from personal experience. Not everything I’m going to talk about will be comforting to you students who are looking forward to a career in geoscience.

One of the first things I discovered after grad school was that a good deal of the specific fields I studied as an undergraduate and graduate student were of little value to my future career. If I could point to the most important thing I learned in school, it was how to learn. I was a terrible student before I started at CSU. I rarely studied in high school, relying, not on skills, but on pure intelligence. Possibly the reason I graduated in the lower 40 percent of my high school class and probably why I flunked out of college on my first “try.”

At CSU, I became a student thanks to the mentoring I received. I learned to apply myself. Toward the end of graduate school, I decided not to pursue a career in “hard rock” but instead to go into oil and gas exploration – soft rock. During an interview with Shell Oil Company, I asked the interviewer why Shell would hire someone with virtually no soft rock course work. He said, “Ed, you had just about straight A’s in Honors Physics; higher math, phase equilibria. You took many grad courses as an undergrad and you aced them. Work for Shell, and we’ll send you back to school at Shell Development. The ‘Lab’ will teach you all you need to know about soft rock.” Knowing how to learn fast came in handy.

The areas where my studies paid off were crystallography and structure. Turns out, I’m good at spatial geometry. I could visualize three dimensions through time, key to solving exploration geology problems.

Working in industry, whether for a company or on your own, is a Mad Hatter’s Ride. Be prepared for failures. Drilling dry holes is part of the game. Business cycles are somewhat predictable, so you must expect, during a 30- to 40-year career, that booms and busts will occur. More money is made near the bottom of downturns than when the boom is on. Be prepared. With a job in industry, geology is not enough. Learn whatever you can about the other professions: land and legal, geophysics, and engineering. Finally, learn the business of business. The most valuable person out there is someone who has multiple skills. Whatever else you become, be a life learner.

ALUMNA HIGHLIGHT

The department congratulates our Warner College Distinguished Alumna Robbie Gries (B.S., ’66) on becoming the president of the Geological Society of America for 2018-19.

Among her many accomplishments, Robbie was the first woman B.S. geology graduate of Colorado State, the co-founder of GeoScienceWorld, a past president of the American Association of Petroleum Geologists, an author and documentary moviemaker (recent author of Anomalies — Pioneering Women in Petroleum Geology 1917-2017), and an internationally respected expert in petroleum exploration and development. Congratulations, Robbie!
Frank Ethridge leads a post-symposium trip to Horsetooth. (Photo: John Singleton)
2018 SYMPOSIA
Frank Ethridge and Tommy Thompson
2018 Thompson Symposium

It was a tremendous honor for the department to host a special symposium this April 26-27 for our distinguished colleague and CSU emeritus professor (1973-1995) Tommy Thompson. Tommy has advised nearly 100 graduate students over the years, and is a 2005 recipient of the SEG Marsden Medal (and Tommy was also featured in the 2015 GEOScape newsletter). He retired from the University of Nevada Reno in 2014, was the Denver Region Exploration Geologists Society distinguished lecturer, in 2014, and continues to work actively as a minerals industry consultant. Events started out with an evening reception attended by more than 30 of Tommy’s friends and former students, and it was a true joy to welcome so many old friends back to CSU. The following day, the department hosted a special symposium with talks by Jon Foruria (M.S., ’84), Linda Kirkpatrick (M.S., ’88), Ralph Stegen (M.S., ’88), and John Musgrave (M.S., ’86), capped off with a keynote presentation from Tommy. Tommy’s exceptional legacy emphasizes the historic economic geology strength of the department, and we have an active engagement and development program underway to sustain and strengthen geosciences’ future in this critical area.

In recognition of Tommy’s outstanding legacy, the geosciences department and the Warner College are initiating a campaign to raise funds to create a permanent faculty position focused on practical and applied elements of economic geology. See Page 42 for more details.
On Sept. 15 the department and College hosted a tribute to long-term professor emeritus (1975-2005) and geosciences friend Frank Ethridge, in honor of his exceptional and continuing contributions to sedimentology, to his many students ("Juniors") and other mentees, and to CSU. The day kicked off with a morning and afternoon symposium featuring talks by Sarah Andrews (M.S., ’01), Hank DeWitt (M.S., ’78), John Dolson (M.S., ’81), Ellen Wohl, Steve Crews (M.S., ’85), Donna Willette (M.S., ’90), Sven Egenhoff, Lesli Wood (Ph.D., ’92), and Bill Wescott (Ph.D., ’79), capped off with a keynote address by Frank. Afterward, Sarah Andrews emceed an evening tribute and roast, and the celebration concluded with a special appearance by the Oilfield Grass Band! (featuring Lesli Wood, John Dolson, Gerald Craig (M.S., ’82), Dave Bauer, Joe Piombino, and Gary Taylor). Sincere thanks to everyone who traveled (from as far away as Europe) to visit with Frank and friends and celebrate Frank’s tremendous legacy. Sunday morning capped off the weekend with a Horsetooth field trip led by Frank and John Singleton!

For those who would like to honor Frank’s legacy with a gift to support future sedimentology and petroleum geologists, we ask that you consider a contribution to the Ethridge Endowment. This endowment supports faculty research efforts in the department. Additionally we aspire to support Ethridge graduate fellowships through a targeted fundraising effort which directly complements this fund. Contributions can be made by contacting the Warner College Advancement Office (Roberta Brouwer at (970) 491-1902 or by email at roberta.brouwer@colostate.edu, or online at: https://advancing.colostate.edu/ETHRIDGE). Our sincere thanks to many Ethridge Symposium and Tribute attendees who have already contributed to this effort.
STUDENT HIGHLIGHTS

Our students experience a comprehensive learning environment of knowledge-gathering, research, outreach, and career-mentoring.
Annette Patton, [M.S., ’16]
Ph.D. Graduate Student

“Landslides: Proof That Gravity Still Works”
– Mona, the Denali National Park and Preserve bus driver

To address fundamental and applied research questions about landslides in Denali, Ph.D. student Annette Patton is working with her adviser, Sara Rathburn, and other collaborators at CSU including Dan McGrath and Ryan Brown, to evaluate the influence of permafrost thaw, lithology, and slope topography on landslide occurrence in Denali.

In the dynamic landscape of Denali National Park and Preserve, Alaska, landslides mobilize hillslope sediment, expose soils, and pose persistent hazards to park visitors and infrastructure. The frequency and magnitude of landslides are likely to increase in the coming decades, as a warming climate thaws the discontinuous permafrost and produces conditions conducive to slope movements. These changes will be prevalent throughout the Alaska Range and other regions where permafrost temperatures currently hover near 0° C.

This research utilizes both remote sensing and field data collection, including surficial geologic mapping, landslide morphology surveys, and ground penetrating radar transects. GPR, which images physical boundaries in the subsurface, is being used to map how the permafrost surface varies across hillslopes and beneath existing landslides.

The results of this research will improve fundamental knowledge of the mechanisms that influence landslide initiation and development in permafrost systems. Annette and Sara have also been working closely with Dr. Denny Capps, the Denali Park Geologist, to share project results to inform management decisions and improve human safety in the park.
Student Club Notes

Geosciences Club

This year has been full of adventure and growth for the Geosciences Club. In 2018, we have more than 50 members, with active participation in career-building workshops and industry speakers. Our faculty adviser, Sean Gallen, provided lots of helpful guidance for students going to graduate school and into industry. In October, we had alum Ana Vargo, senior engineering geologist at the Natural Resources Conservation Service in Denver, come to talk about her career in engineering geology. The Geosciences Club has focused on career growth and community in the department and partnered with multiple professional associations, such as the Society of Economic Geologists, the American Association for Petroleum Geologists, Association for Professional Geologists, and the Society for Exploration Geophysicists, to expand the professional growth of our members. Our activities this year included a very successful couple of tailgate get-togethers at CSU home football games, which we intend to continue in the future. The club also held a Geology Movie Night for the students to come and relax after a hard day of classes with movies (e.g., *Dante’s Peak* and *2012*). This November, the club will be going to the Denver Museum to visit the paleontology collection behind the scenes with alum paleontologist Joe Sertich (B.S., ’04), shown below. In 2019, we hope to bring in more speakers to expand career paths for our members as well as provide more trips to explore the geology of the Front Range. We welcome alumni and the surrounding community to join us for our future events!
Society of Economic Geologists Club

2018 has been another fun, ambitious, eventful year for our SEG chapter. We ran regular semimonthly meetings where members presented short talks on topics including mine equipment, historic mining techniques, and copper salts in the Atacama Desert. We also brought in a number of external speakers, including John Lufkin, SEG Distinguished Lecturer Dan Wood, Donald Runnels, Daniel Webber, SEG Thayer Lindsay Lecturer John Dilles, and Alex Gysi. These speakers covered a wide range of topics from lithium brines to New Mexican tin deposits. And John Dilles shared his many years of experience in copper porphyry systems with us!

We also coordinated a Reflected Light Ore Petrography short course here at CSU in the spring, taught by John Lufkin. Twelve students participated and learned to identify opaque and ore minerals in reflected light. John provided an incredible suite of samples for practice as well as an ore petrography textbook to all participants, and students were able to greatly improve their identification skills. This course was funded by a generous gift from a donor.

We also arranged two field trips during 2018: our annual spring break trip to Arizona and New Mexico, and an underground tour of the Henderson Mine here in Colorado. The Grand Canyon was completely fogged in, but we made up for it with excellent visits to the Bagdad, Ray, and Morenci mines, and got a special inside look at the developing Resolution Project from SEG alum Alexandra Racosky (former SEG vice president, M.S., ’17). Guidebooks for our SEG field trips are available to anyone who would like one!

We had three major fundraising events to fund our trips: a trivia night at a local restaurant, a cornhole tournament at a local brewery, and participation in CSU’s safe-ride program. We were awarded funding from the SEG Stewart R. Wallace Fund, and our industry mentor and club sponsor, Roger Steininger (Ph.D., ’87), also generously provided trip funding.

During 2019, we will continue our commitment to field-based activities and networking to provide our members with the best possible background and opportunities in the mining industry. Our first field trip to the San Juan Mountains (in conjunction with CSU alums Tara Tafi and Kirstin Brown) will expose members to mine reclamation sites and techniques. Our spring field trip will be conducted in collaboration with Tommy Thompson (CSU professor emeritus) and will focus on the Carlin and other deposits of northern Nevada.

Our final meetings of 2018 will feature Nicole Hurtig (AIRIE) and SEG alum Erik Ovens (Red Dog Mine, B.S., ’18). We have also invited Simone Runyon (University of Wyoming), Chris Holm-Denoma (USGS), Jay Chapman (University of Wyoming), and several other speakers to our campus for the spring semester. We will continue to fundraise and plan to host another round of cornhole and trivia tournaments to support our chapter, and we encourage all friends and alumni to join us!
Above: GEOL 401 students at Great Sand Dunes National Park (Photo: John Singleton). Bottom left: Mike Prior, Stewart Williams, and Skyler Mavor mapping in Mexico (Photo: John Singleton) Bottom, right: Sven Egenhoff teaching Stratigraphy and Sedimentology for the first time in the new MSNR 250 teaching lab.
The subaerial mid-Atlantic Ridge in Iceland
(Photo: Judy Hannah)
OUR FACULTY and STAFF

Our faculty and staff explore the wide world of geosciences.
Rick Aster,  
Department Head

While department head and other responsibilities kept me largely away from fieldwork this year (including being unable to join Derek Schutt and colleagues in Yukon and Northwest Territories this year on our Mackenzie Mountains project), 2018 was nevertheless especially satisfying in that a number of long-term publication efforts were finally brought to completion. In particular, the third edition of my textbook, Parameter Estimation and Inverse Problems was completed. This is a broad textbook on how geophysicists (and many other scientists) can best extract models from data in the most general and practical terms and represents the culmination of an effort that started more than 15 years ago(!) when my co-authors Brian Borchers (New Mexico Tech) and Cliff Thurber (U. Wisconsin-Madison) got together to write the first edition. My POLENET colleagues and I published a seminal paper in Science this year that was a culmination of seismic tomography and GPS geodesy modeling over the past decade. The mantle viscosity of West Antarctica is sufficiently low that the rate of glacial isostatic uplift from mantle flow, and its influence on the stability of the West Antarctic Ice Sheet in a warming world (primarily due to destabilization from warming Southern Ocean currents, in this case) has been underestimated. Although this isn’t a large enough effect to stop the ice mass losses currently occurring there, it is a mediating process that may buy some time and somewhat slow sea level rise due to land-based West Antarctic ice entering the ocean and melting. A downside, however, is that underestimation of the isostatic uplift of the solid Earth has resulted in underestimation of how fast the ice sheet is losing mass based on space-based gravity measurements (ice mass loss estimates have to be increased by about 10 percent). My collaborators and I received a new grant from the National Science Foundation to continue our geophysical work in West Antarctica for the next four years, and work in this area is proceeding with CSU grad students Michael Baker and Hank Cole. Ph.D. student Nicole McMahon graduated and moved directly into a staff geophysics position at Sandia National Laboratories, where her extensive knowledge of earthquake event detection in Oklahoma and elsewhere will be well utilized. Former graduate student and recent postdoc Julien Chaput was hired into a geophysics faculty position at the University of Texas, El Paso, and had his eerie YouTube sound video of shallow elastic waves in the Ross Ice shelf, produced with the help of AGU, viewed more than 1 million times this October. (No, we did not intentionally publish the paper just before Halloween). We reported in the associated Geophysical Research Letters paper, co-authored with Dan McGrath and Michael Baker, that these incessant seismic surface waves are extremely sensitive to melt and other near-surface snow and ice perturbations and provide a new method to continuously monitor a changing ice shelf.

Sean Bryan,  
Senior Instructor

I continue to teach our general education Introduction to Physical Geology course (GEOL 120) and coordinate the Intro to Geology Labs (GEOL 121). Interest in our introductory courses continues to be very strong; during the 2017-18 school year, 1,066 students completed GEOL 120, and 880 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 (Kristen Cognac, Ethan Ader, Joel Spansel, Adi Khare, Andrew McCarthy, Erinn Johnson, Mike Vogler, Dalton Meyer, Kelly Ebrahim, Mariah Kuhr, Rachael Hirsch, Anthony Mainiero, Colleen Olson, Freddy Tremblay, and Mallory Johnson) and learning assistants in GEOL 120 (Shannon Weld, Dylan Rolley, Kevin Ramm, Lauren Mitchell, Alexis Conley, Pete Carlson, and Jeff Snell) over the past year. Our efforts to spread geoscience literacy across the University would not be possible without their hard work.

Last spring, I also had the pleasure to collaborate with the College of Natural Sciences to offer a fully online graduate-level course for current and future teachers (Earth Sciences for Educators). This was a fun and challenging change of pace, figuring out how best to teach geology online and from a distance. However, the most interesting part was learning from the students located across the U.S. and internationally about the geology, hazards and resources of their communities. Other highlights from the past year included serving on the pilot of a new learning analytics system called LoudCloud, helping to promote Open Educational Resources with the Libraries, and publishing a paper in EPSL on the incorporation of minor and trace elements during biomineralization of corals and aragonitic foraminifera.
Andy Darling,
Research Scientist

I have been busy coordinating publication of four recent papers in geoscience education and tectonic geomorphology research and participating in workshops on re-envisioning those fields for the next 10 years. Some of this published work was discussed at the semiannual Friends of the Pleistocene trip – in Moab, Utah, this year – where discussions of landscape evolution on the Colorado Plateau were great to be a part of. GSA this year was a great time to talk about some of this new work, catch up with old colleagues and friends and think about new possibilities for education research and scholarship support opportunities. I will begin to implement some of the evidence-based teaching practices in next semester’s Grand Canyon seminar. My education research has been focused lately on conducting numerous clinical interviews with students on their knowledge of foundational mathematics topics – key to geoscience success – and that work will be reported to mathematics education conferences next spring, and likely to GSA, as well, next fall.

On a more fun note, my role as the treasurer of the Geoscience Education Division supported the newly re-imagined division reception at GSA this year. With record attendance and great reports about the venue and food in Indianapolis, we look forward to anyone interested in teaching geoscience coming to next year’s reception, which we hope will be even better!

Sven Egenhoff,
Professor

I accepted an offer by AGU/Wiley to write a textbook on Mudstone Sedimentology (shale sedimentology), which has been a focus of my research on shales for many years. I plan to undertake this task with the help of Neil Fishman (formerly Hess Corporation) and Lauren Birgenheier (University of Utah). There is no textbook at the moment that focuses on shale sedimentology, and this will also be a valuable reference for specialists who wish to understand fine-grained rocks in detail (but likely not a best-seller!). I also continue to work as a section editor for Marine and Petroleum Geology and as an associate editor for the Journal of Sedimentary Research. In August, a new graduate student, James Van Hook, joined my group, and James and Aleksandra Novak (Ph.D. candidate) are currently working on two Ordovician units in Scandinavia: the Huk Formation, and the Tøyen Shale. Aleksandra got an offer from Exxon to work full time after a very successful internship in Houston this past summer. She is expected to graduate next summer with her thesis work focused on the Bakken in the Williston Basin (N.D.), and the aforementioned Tøyen Shale publication. This year’s research has combined regional geology with some international publications: two papers focus on local Scandinavian rocks and are published in the regional journal GFF (the journal of the Geological Society of Sweden); one on carbonates, and one on shales. Another publication, with Neil Fishman and others has been accepted as an AAPG Memoir, and another has been accepted in AAPG Bulletin pending revisions. This follows an end-of-last-year publication of a student first-author paper (Damien Borkovsky) in AAPG Bulletin on the Upper Bakken Shale.
FACULTY AND STAFF BRIEFS

Judy Hannah,  
Professor

Although my research continues to focus on black shales and associated petroleum systems, this year will be most memorable for the addition of two more hotspots to my travel list. Not hot tourist destinations, but the products of mantle plumes, of course. Earlier adventures on Hawaii and the Canary Islands provided plenty of pictures and samples “enjoyed” by legions of Ig/Met students. This year, it was the Galapagos Islands and Iceland. The differences among these four sites are astonishing—in the landforms, the magma chemistry, the climate, and the people (and the tortoises). Visiting the equator and the Arctic in one year definitely demanded an expanded wardrobe. The AIRIE Program (Director Holly Stein, postdocs Nicole Hurtig and Vineet Goswami, research scientist Svet Georgiev, and research associates Gang Yang and Aaron Zimmerman) continues to push the envelope with dating of oil generation and using osmium isotopes to document the influence of mantle fluids in hydrocarbon systems.

The Geologic Resources Inventory group that I coordinate with the National Park Service has created perhaps the best data model anywhere for building Geographic Information Systems to display and interpret geologic information for NPS units—all 272 of them! The team started with 1 person 20 years ago, has grown to nine research associates, and trained more than 30 student interns. With luck (and a little persuasion) the program will never end, as evolving software and geologic knowledge demand continuous updates. Our aim—to have the parks fully understand, feature, explain, and respect the geology of the NPS system.

Sean Gallen,  
Assistant Professor

I have been happily busy since arriving in Fort Collins from Switzerland in January. I have developed two new courses (Tectonic Geomorphology and Critical Zone Science), taught a week of Field Camp, enthusiastically taken over GEOL 150, and co-led the GEOL 401 field trip with John Singleton. It has been a pleasure interacting with undergraduates at various levels as well as teaching graduate-level curriculum. This fall, I welcomed two new Ph.D. students, Johanna Eidmann and Eyal Marder, who will be working on projects in Colorado, Italy, and Puerto Rico. I continue to work with my trailing graduate students at ETH-Zurich, having graduated three master’s students since January, and I expect my ETH Ph.D. students to graduate in 2019. I had the pleasure of conducting fieldwork in Wyoming, the southern Appalachians, and southern Italy this year. I have been busily working on several proposals (some submitted others forthcoming) on topics ranging from intraplate earthquakes to the impact of hurricanes on sediment connectivity and water resources to interactions between mantle convection, earth surface processes, and subduction zone dynamics. I also published two papers, one on drivers of landscape dynamics in ancient mountains and the other on how surficial erosion can ignite intraplate earthquakes. Thanks to the generosity and support of the department, College, and University, my lab will soon host a facility to dissolve rock and sediment to produce pure quartz. Quartz purification is a key set in processing samples to measure cosmogenic isotopes that allow us to determine rates of earth surface processes, a key tool in my research. In the coming year, I look forward to refining my courses, advising my graduate students, and getting new projects off the ground.

Dennis Harry,  
Professor and Edward M. Warner Chair in Geophysics

I spent the past year on sabbatical, finishing some old projects involving continental rifting in West Antarctica, getting a new project underway to investigate the magmatic consequences of rifting in Antarctica, and laying the groundwork for new projects investigating opening of the southeast Indian Ocean and extension and magmatism in the Snake River Plain. The highlights of the year included travel to Gondwana to spend time as a visiting scientist at Victoria University in Wellington, New Zealand, and two months spent at sea aboard the coring ship, Joides Resolution, as part of International Ocean Discovery Program Expedition 369. While at VUW, I collaborated with their Antarctic research team to wrap up seismic mapping in the Victoria Land Basin of West Antarctica and to brainstorm about directions for future work. It was a timely visit,
Jerry Magloughlin, Associate Professor

Spring semester, I taught Advanced Petrology again, along with our online Physical Geology course. The latter has been slowly growing since first offered and has grown to about 30 students for each offering. The course is a normal introductory physical geology course but with a small emphasis on examples of geologic features from the well-known parks and monuments. This past summer, I taught two courses, and a major undertaking was on the geoscience “presence” in and around the new building — or addition — completed late this past summer. Of course, we in the geosciences are fortunate in that there are so many beautiful, and generally maintenance-free things we can make available for display. So we now have a full display case of beautifully polished petrified wood, much of it donated a few years ago by Larry Edwards, a local former geologist. We have a growing collection of mineral and polished lapidary-type specimens on display in another case on the first floor. By the time you read this, one of the stairwells in the new building will be displaying beautiful polished slabs of stone, in a generally stratigraphically appropriate fashion, from the first to fourth floors. This was very interesting, as I discovered the enormous variety of stone from all over the world that’s now available; and yes, we are talking about the kind of polished stone many folks install as countertops! Want a metaconglomerate kitchen countertop, or banded iron formation from Brazil on your bathroom vanity? It’s out there.

Also this summer, I made a trek to the fluorescent mineral capital of the world, Franklin, N.J. I was able to do some underground fieldwork, collecting oriented specimens of fault and shear zones in the world-famous Franklin Marble, much of the work happening at night so as not to interfere with tours by the public. In addition, I was able to collect fluorescent specimens at night, which was like shooting fish in a barrel. It’s kind of like reverse field work; you collect the specimens in the dark based on their fluorescence, put them away, and then some days or weeks later unpack them and see what it is you collected! I also was able to drive back a gorgeous 340-pound slab of brightly fluorescent Franklin Marble generously donated by Mike and Lou Steppe. This will warrant a large display case and be available for public viewing; finding the right dimly lit corner is one of the challenges. I continue to build up the department’s collection of fluorescent specimens (see adjacent image).

This fall, I’m teaching Mineralogy (about 50 students this year) and Optical Mineralogy again, in addition to the online course, and something new: a seminar on meteorites, which is the first time this topic has been tackled in the department. We have discussed the origin of chondrules, planetesimals, the home-bodies of various categories of meteorites, the very early solar system, and many other issues — it’s fascinating to contemplate the period and processes before Earth was even formed. I’m also working on putting together a small collection of meteorites and meteorite thin sections for the department, and I have two undergraduate students, Andrea Distel and Noah Williams, working on identifying and studying two new meteorites discovered in the Sahara, where many of today’s new meteorites are coming from. I also have three other students doing independent study projects, including Kayla Stott; her great-grandfather was honored by having a mineral named after him; thus, the rare mineral stottite. We expect to submit a paper on the mineral and its history to Mineralogical Record.

I have had quite a few of alums stop by this semester and it has been great speaking with you all and finding out what you’ve been up to. If you are in town, do certainly swing by, and I will be happy to show you around all the new things we have to show off.

A 340-pound slab of Franklin Marble (arranged with generous assistance from Alum Mike Steppe) will soon be on display in the Department of Geosciences in a new fluorescent mineral display. This marble is famous for its bright green fluorescent willemite, a zinc silicate akin to forsterite, and its red fluorescent calcite. This specimen shows both plastic and brittle deformation.
It's been a great year filled with progress on various research projects and, most recently, new members of the research group. Among my various projects, I continue to study the glaciers along Colorado’s Front Range. These glaciers, and their unique mass balance processes, are an interesting space-for-time substitute to examine how small glaciers around the world will respond in coming decades to a warming climate. In December, I gave two talks at the American Geophysical Union Fall meeting – the first on glacier mass balance in Alaska with colleagues at the U.S. Geological Survey and the second, related to my work on the NASA SnowEx project studying the remote sensing of seasonal snow. The SnowEx project will expand this coming winter with extensive fieldwork at Cameron Pass, Colo., and many other locations in the Western United States. In August, I worked with Annette Patton (M.S., ’16) and Sara Rathburn to use ground-penetrating radar to study the relationship between mass movements and permafrost thaw depth in Denali National Park and Preserve. The fieldwork and scenery were fantastic! Over the past year, I've continued to teach The Blue Planet – Geology of the Environment, a large (generally) non-major introductory class. I’m currently developing a number of new courses, the first of which, titled Remote Sensing for Geoscientists, will be offered in Spring 2019. Lastly, I’m excited to welcome two new students to my research group! Brianna Rick (Ph.D.) and Randall Bonnell (M.S.) arrived in August and are quickly making progress on their research projects!

Sara Rathburn, Associate Professor

This last academic year was busy and fulfilling. I had a full teaching schedule last fall with GEOL 150, GEOL 201 (co-taught with John Singleton), and my graduate-level Field Geomorphology course, GEOL 652. In September, I spent two weeks in Italy as a visiting professor hosted by colleague Francesco Comiti (Free University of Bozen/ Bolzano). We completed fieldwork, worked on manuscripts, and I interacted with his students and postdocs. Early snow at the field site shut down our sediment transport monitoring during glacial melt, but the Alps under fresh snow are stunning! My husband, Jim, accompanied me on the trip and continues to show his field assistant prowess by carrying heavy gear to the front of numerous glaciers. I literally changed from snow pants into shorts in a matter of weeks and gave an invited talk at the 47th Annual Binghamton Symposium at Texas State University. In spring, I taught GEOL 154 Historical Geology and hosted guest speakers including John Ridley, and Joe Sertich, and again borrowed the NASA lunar samples as part of a scientific report-writing laboratory exercise. Highlights of my research include working with graduate students Johanna Eidmann (M.S., ’18) and Annette Patton (M.S., ’16) on tracking post-flood sediment and wood along North St. Vrain Creek, and mapping landslides in Denali National Park to understand the role of lithology and permafrost degradation on mass movements, respectively. Johanna presented her results at AGU Hydrology Days and graduated in Summer 2018! Fortunately, Johanna is still in geosciences as a new Ph.D. student with Sean Gallen. Annette published her M.S. thesis on debris flows in Rocky Mountain National Park and submitted a review paper on permafrost degradation and hillslope instabilities. Also, Matt Sparacino (M.S., ’18) recently had his manuscript accepted in Earth Surface Processes and Landforms. I was invited to CU Boulder in the spring to give a talk at the Hydrology Symposium and was awarded the best publication in geosciences at the WCNR spring banquet. Last summer, I conducted fieldwork along North St. Vrain Creek with Johanna, and in the Yampa Basin with John and colleagues Chris Lidstone (M.S., ’81, and Geosciences Advisory Council member) and Jonathan Friedman (M.S., ’81) of the USGS. I missed going with Annette to Denali this summer, but Dan McGrath generously helped her run shallow geophysics at key locations of shallow landsliding to detect permafrost extent. A new Ph.D. student, John Kemper, joined the lab this fall to work with me in the Yampa Basin. John received a prestigious Warner Graduate Research Assistantship for his first year. I feel lucky every day to interact with young, bright students and energetic colleagues!

Dan McGrath, Assistant Professor

As in previous years, we will continue to update the department history, building on the original document initiated by David Harris, Jack Campbell, Bob Johnson, Frank Ethridge, and Don Doehring.

Please check out the latest edition by clicking the link on our department homepage (http://warnercnr.colostate.edu/geosciences-home or at https://warnercnr.colostate.edu/wp-content/uploads/sites/2/2017/10/GEO-CSU-HISTORY-Current.pdf). Help us document the amazing history of our department; we very much welcome your additions or corrections!
Mapping the Atacama Fault System
(Photo: John Singleton).
FACULTY AND STAFF BRIEFS

John Ridley,
Associate Professor and Malcolm McCallum Chair in Economic Geology

After many years, the volcanology-ore deposit geology module of Field Camp had to be moved, at very short notice, because of the (too close to Silverton!) 416 fire, from the snows of Red Mountain Pass to the sand and heat of the San Luis Valley and the Oligocene Summer Coon Volcano. And yes, there is at least one drillable prospect there. A knock-on from the rushed move was delay of the planned trial introduction of new digital mapping technology for Field Camp. Hopefully, the trial will be this coming year. My own research work through last year concentrated on following up on results from a few years back on the gold deposits of interior Alaska. I presented a new interpretation of ore fluid data at the Pan-American fluid inclusion conference in Houston in June. The focus area of research projects of my current graduate students has migrated over the past couple of years to Montana, as a part of the world with interesting and tractable ore-deposit problems in copper and sapphires, and the re-examination of lamprophyre-gold relations.

Bill Sanford,
Associate Professor

I was on sabbatical this past spring semester. During this time, I was able to focus on research in four areas. The first is a continuation of laboratory testing of the transport of a novel nanoparticle through sand columns with various water chemistries. Our goal is to be able to use them as groundwater tracers in many different settings – fractured oil reservoirs, mining impacted systems and as analogues for other nanoparticles which are deleterious to the environment. Second, work has continued on quantifying the groundwater contribution to headwater stream flow in the Medicine Bow-Routt National Forest surrounding Steamboat Springs, Colo. We are measuring stream discharge, electrical conductivity, water chemistry, and stable isotopes of water. I have a third project where we are developing models and using groundwater chemistry to help manage groundwater resources in the Todos Santos, Mexico, aquifer. Preliminary results show that the vast majority of groundwater recharge occurs during large storm events, such as tropical storms and hurricanes. In addition, water quality has degraded over the past decade due to over-extraction of water during the dry periods between storms. Lastly, I am working with the National Park Service at Joshua Tree National Park to use electrical resistivity and water chemistry to identify the extent of an aquifer and to estimate recharge to that aquifer, which is used as a source of water for park facilities. I also continue to work with colleagues at Cornell University in putting together a proposal to develop a well field on the Foothills Campus to be used to develop tracer methods to characterize fractured reservoirs. These methods are, among other things, of interest to oil companies to aid in improving reservoir characterization and improve secondary recovery.

Derek Schutt,
Associate Professor

Last year was the typically exciting mix of teaching and research. I am currently working with four graduate students. We’ve welcomed M.S. student Andrew Bolton to our group, and he will be working on looking at mantle fabrics in the Yukon and Northwest Territories. Kivanc Subunis continues to work on mantle fabrics just to the south, in British Columbia. Aditya Khare has been hard at work and is producing some fascinating tomographic images of seismic velocity structures in the Yukon and Northwest Territories, and David Heath not only contributed to the Northwest Territories component of our fieldwork in the Mackenzie Mountain this year, but also is busy relocating earthquakes in this high seismicity region. I was glad (but wistful) to see our excellent student Derek Witt (M.S., ’17) graduate and get a job (with SWIIM System here in Fort Collins). Derek was from our first cohort of geophysics track undergraduates, so I first got to know him back in 2011 when he took my Solid Earth class. He did an amazingly competent job and contributed a lot to running our Mackenzie Mountain project field operations for several years, while also being a productive researcher.

On the undergraduate teaching front, I spent a week at a summer teaching workshop learning about active teaching methods and was named a 2018 Mobile Summer Institute Scientific Teaching Fellow. I’ve also been the Master Teacher Initiative coordinator for the Warner College of Natural Resources, which involves sharing a weekly teaching tip with the faculty and graduate students.
students. It’s been amazing how enthusiastically Warner College members have received the teaching tips, and I often get emails with follow-up questions or thoughts on additional posts. This semester, I am on a teaching sabbatical, during which I will be working on flipping my Global Seismology class. I plan to use what I learn as I develop this to bring other innovative methods to my undergraduate teaching. My group had an exciting and productive research year as well. Tony Lowry (Utah State), Janine Buehler (Scripps), and I published a paper in Geology on the Moho temperature and mobility of the lower crust in the Western United States that got picked up by local and national press, including Newsweek. Aditya and David also presented their research at the 2017 IRIS Workshop, and we are looking forward to adding our latest batch of Mackenzie Mountains data to their studies. Our work in the Mackenzie Mountains continues, and we spent a rainy but quite successful field season up in the Northwest Territories recovering our second full year of seismic data. Graduate students David Heath and Michael Baker did amazing work from two different sides of the Continental Divide, under sometimes quite difficult conditions.

(Lithosphere), Nikki Seymour (Geology) and Kajal Nair (The Mountain Geologist). Our project in northern Chile was funded by the NSF Tectonics program, and we are looking forward to two more field seasons in Atacama Desert. This project primarily involves geologic mapping and geo/thermochronology to address the deformation history of the Atacama fault system — a major strike-slip shear zone localized in the Early Cretaceous magmatic arc. A research highlight this year was completing fieldwork on our project in the Sierra Madre Oriental, which is perhaps the most spectacular place I have ever worked. CSU grad students Stewart Williams and Skyler Major and postdoctoral fellow Michael Prior have done an excellent job unraveling the complex history of shortening in this fold-thrust belt. In addition to having amazing outdoor adventures during fieldwork, we really enjoyed staying in the tiny village of Rio San José, tucked away in the heart of the Potosí uplift. During Field Camp this summer, I got to teach a new project near Cañon City due to a wildfire that forced us out of the Silverton area at the last minute. We are looking forward to returning to Silverton next summer, but I really enjoyed learning about the geology near Cañon City. This fall Sean Gallen and I led a great GEOL 401 field trip that looped through central and southern Colorado, and Sara Rathburn and I enjoyed getting out in the field with students in our GEOL 201 course (Field Geology of the Colorado Front Range).

Lisa Stright, Assistant Professor

It has certainly been an exciting year, filled with teaching established courses (Well Logging and Petrophysics; Reservoir Characterization and Modeling) and working on existing research projects (Chile Slope Systems), but also some expansion into new courses and research directions. Our petroleum program is growing through the addition of new students, through alumni and industry engagement, and through course expansion. One example of this was a seminar I taught last spring, called Introduction to Petroleum Geosciences. In this course, 12 undergraduate students received lectures from me, alumni, and industry guests focused on the science of exploration and development of petroleum resources. A few lectures covered career pathways to and in the industry. A generous alumni donation of $10,000 was leveraged to send undergraduate students to AAPG, where they all took a short course, explored the exhibit hall, and attended talks and luncheons. These types of activities are helping to both mentor our students and to build relationships with our alumni and industry. On another positive note, ExxonMobil has taken note of our students by adding them into their short course recruiting pool. So far, one student has received a full-time offer and three additional students have received internship offers.

My research with Chile Slope Systems is currently in Phase 2 with nine industry sponsors. We have just completed a Phase 3 proposal, which we will pitch to current and potential sponsors in Houston at the end of the year. We expanded our research area from studying outcropping deepwater slope deposits in Southern Patagonia, Chile, to a new set of outcrops around Victoria Island, British Columbia. New and exciting research directions for me into virtual reality also started this year when I received a small grant from the CSU Office of the Vice President of Research to work on geologic applications of Virtual Reality both for teaching and research. This grant supports an undergraduate researcher, Cesar Quiroz, who is one of our top geoscience students. He is in the geophysics concentration and also a minor in computer science and mathematics. Additionally, through my research program, I graduated one student, Adam Nielson (M.S., ’18), who received a job with Noble Energy in Houston. Andrew McCarthy, will finish up this year and is becoming well versed in geostatistical modeling and python coding. Two new students, Noah Vento and Andrew Reutten, will be working with me on modeling deepwater slope deposits in CSS.

John Singleton, Assistant Professor

In 2018, our research group continued to work on projects in the Coastal Cordillera in northern Chile, the Plomosa Mountains in western Arizona, and the Sierra Madre Oriental in eastern Mexico. We managed to publish 13 conference abstracts and seven papers, including three papers led by CSU grad students — Evan Strickland
Sally Sutton, 
Associate Professor

Along with my students, I have continued to focus in the last year on local sandstones, both with regard to diagenesis and to which might be suitable candidates for aquifer storage and recovery. 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. Graduate students Adam Adam (M.S., ’17) and Daniel Collazo (M.S., ’18) have both graduated in the last year after completing theses that utilized the water well database maintained by the state of Colorado. They used the data to identify likely stratigraphic units and likely geographic areas for ASR. Current student Amanda Doherty is working on modeling rock-water interaction that could occur if treated, when fresh water is injected into some of the aquifer sandstones under consideration. M.S. student Ahmad Issa (M.S., ’18) also completed his degree this year, with a thesis looking specifically at the petrology and geochemistry of the Ingle-side Formation. In addition to the ASR-related sandstone work, I continue to look at shale-hosted ore deposits. Undergraduate Blake Stocker is busily acquiring detailed geochemistry of drill core from the Cu-rich Nonesuch shale of northern Michigan.

Ellen Wohl, 
University Distinguished Professor

My highlights for the past year include receiving the Distinguished Career Award from the Geological Society of America’s Quaternary Geology and Geomorphology Division and the G.K. Gilbert Award from the Earth and Planetary Surface Processes section of the American Geophysical Union. Research in our group continues to focus on large wood dynamics, beaver ecosystem engineering, and organic carbon storage along river corridors. Current projects include: (1) large wood and associated carbon fluxes to the Arctic Ocean in Canada’s Mackenzie River catchment; (2) the influence of downstream spacing of channel-spanning logjams on hyporheic exchange in Little Beaver Creek, a tributary of the South Fork Poudre River; (3) the relative importance of downstream variations in bedrock channel geometry and instream large wood on sediment dynamics along Biscuit Brook in the Catskill Mountains of New York; (4) the spatial distribution and persistence of channel-spanning logjams in Rocky Mountain National Park; (5) the influence of beaver dam analogues on channel morphology, sediment accumulation, stream flow, and riparian water tables along Campbell Creek and Fish Creek, both in the Colorado Front Range; (6) assessing river corridor condition and the potential for restoration on the Old Elk Ranch properties along the Colorado-Wyoming border; and (7) spatial scales of floodplain heterogeneity in relation to drainage area and valley geometry. Ph.D. students DeAnna Laurel, Katherine Lininger, and Dan Scott, finished in May 2018. DeAnna now teaches at Aims Community College, Katherine has joined the faculty in the geography department at CU Boulder, and Dan is a postdoc at the University of Washington. We also welcomed new M.S. students, Emily Iskin, Julia Grabowski, and Zachary Kornse, to the fluvial geomorphology group.

DEPARTMENT PUBLICATIONS

Using Google Scholar, we have set up a Web interface that automatically tracks geosciences department publications. For a comprehensive and timely look at what the department-affiliated authors have been publishing, or for links to specific papers of any date, please go to: warnercnr.colostate.edu/geosciences/geo-publications, and click on the Google icon.
The National Park Service Geologic Resources Inventory program works within geosciences through a cooperative agreement with the NPS. Over the past two decades, the team has compiled detailed geologic information into a GIS for almost every park unit. They are now beginning to update the older products to modern software, often adding new geologic details.

In September, M.S. advisee Gavin Rach defended his thesis on the hydrologic impacts of lined gravel pits along Front Range streams. Gavin is now working as a staff hydrogeologist with a water resources consulting firm in Lakewood, CO. Graduate student Kristen Cognac is studying the evolution of Denver Basin aquifer system water budgets in response to long-term groundwater pumping. Along with these activities, I have continued with research focused on the hydrogeology of mountain watersheds. I collaborated on two 2018 publications that investigated groundwater-surface water exchange in mountain wetlands, and I have been involved with new hydrologic instrumentation at CSU’s Mountain campus.

In this fall I am teaching a new senior-level elective course – Groundwater Resources. By focusing on groundwater as a resource, this new offering is designed to complement our existing hydrogeology course that emphasizes the physics of fluid flow through geologic materials. In the new course, students learn how different geologic settings influence the availability and quality of groundwater resources, and they explore management strategies for the sustainable use of groundwater. Still a work in progress, but so far it’s been a fun new teaching experience.

The report team integrates data from each GIS into a report on key geologic features, hazards, and resources in language accessible to park managers. With continuous improvement in accuracy and accessibility of the GIS data, and quality of reports, the team continues to draw kudos from appreciative park managers. You can learn more about the program and pull up the GIS or report for your favorite park by visiting the CSU-GRI Web page at https://warnercnr.colostate.edu/geosciences/geologic-resources-inventory/.

The GRI has grown to nine research associates scattered across Western North America, five of them alumni of our own department. Alumni Stephanie O’Meara, Jim Chappell (B.S., ’99) and James Winter (M.S., ’97) form the core of the map team, working on the third floor in geosciences along with two student interns (currently Sarah Low and Dylan Rolley). Longtime intern Dalton Meyer (B.S., ’17) just left us this fall to begin graduate studies at Yale. Our most remote mapper, Ron Karpilo, works from his home in La Grande, Ore. Alumni John Graham (Ph.D., ’96) and Trista Thornberry-Ehrlich (M.S., ’01) both write for the report team from home, John in Fort Collins and Trista with husband Tim Ehrlich (M.S., ’99) up in the wilds of Bigfork, Montana. Writer Katie Keller-Lynn works from her home in Vancouver. The other two members of the report team, Georgia Hybels and Michael Barthelmes, help write, edit, and assemble reports in the NPS Geologic Division office in Lakewood, Colo. Despite the distances, our dynamic team works together seamlessly, and maintains strong interactions and personal relationships through constant electronic exchanges and our annual team meeting.
Western view from the balcony of the Michael Smith Natural Resources Building
(Photo: Field Peterson)
Michael Smith Natural Resources Building

On Oct. 12 (CSU Homecoming Friday) the department and College celebrated the official dedication of the Michael Smith Natural Resources Building. This dramatic 50,000-square-foot addition to our Warner College of Natural Resources space is an historic development that will benefit generations of future students. Michael and Iris Smith additionally met with CSU Smith Scholars in a special session, where they discussed career success and happiness with the contingent of scholars, including current geosciences (four-year full tuition) scholar recipients, Aren Roybal, Laishla Seda Mercaco, Nathan Hollars, Cody Delgado, and Gaby Sanchez Ortiz.
Above: The Pillar welcomes visitors to the Michael Smith Natural Resources Building. Bottom left: Geosciences graduate students enjoy their new lounge space. Bottom, right: Michael Smith speaks in front of the two-story living wall during the dedication ceremony of the Warner College of Natural Resources Building that bears his name.
As part of the broad project branding the new building and the surrounding grounds, the department, with excellent help from the College, was able to undertake a project bringing some large-scale geology onto campus. Key to this project was selecting important Colorado lithologies and then getting various quarries and mines to donate fresh specimen boulders for display.

Aided by several of our alumni who work for the companies involved, we received enthusiastic support from the various owners and operators. A local trucking firm picked up the giant specimens from around the state, and a local landscaping firm installed them. The boulders weighed between 2 tons to a little more than 5, so they are now highly noticeable additions to the grounds! We were able to acquire a very large molybdenite ore boulder from the Climax Mine (thanks to Raymond Luzuk and Chris Schmitz), and two boulders from the Cripple Creek & Victor gold mine (thanks to alums Richard Zaggle (M.S., ’14) and Brandon Bzdok (B.S., ’14)). Ordovician dolostone was supplied by Martin Marietta from one of its quarries. We obtained two boulders of representative local Precambrian gneiss (thanks to Aggregate Industries, Bryan Scott, and our very engaged alum Jeremy Deuto (B.S., ’00)), and a beautiful boulder of Pikes Peak granite (thanks also to Martin Marietta and David Bieber), which now resides prominently at the southwest corner of the new building. A particularly fine acquisition is a 4-ton cut block of the Colorado state stone, Yule Marble (thanks to Colorado Stone Quarries/Carrara Marble Company and Marco Pezzica). Small pieces of each of these lithologies were collected and will be available for integrating into our classes, and petrographic thin sections will be prepared from each. We’re also looking forward to shortly exhibiting a large petrified log (generously donated by Robert and William Lowe, in honor of their grandfather, Alex Lowe).
Students enjoying the Mountain Campus (Photo: Field Peterson)
MOUNTAIN CAMPUS

Just north of Rocky Mountain National Park, our beautiful Mountain Campus sits in a spectacular glacier-carved valley.
Potential at 9,000 feet

Geosciences expands teaching and research at CSU’s Mountain Campus

CSU’s Mountain Campus, a 1.5-hour drive west of Fort Collins, is situated within a spectacular glacier-carved valley at an elevation of 9,000 feet, just north of Rocky Mountain National Park. The South Fork of the Cache la Poudre River, which is primarily fed by snowmelt, runs through the valley bottom, carrying a substantial volume of water and sediment. The campus offers an ideal location to support a variety of teaching, research, and outreach activities. In early 2018, the Warner College dean’s office provided funding to reestablish and expand climate and hydrological instrumentation at Mountain Campus.

Faculty and students from geosciences joined colleagues from Ecosystem Science & Sustainability and the Colorado Climate Center to establish an initial monitoring network. In addition to a revamped weather station measuring air temperature, wind speed and direction, and solar radiation, new instrumentation includes a river stage gauge, a turbidity meter to evaluate suspended sediment, a piezometer nest within the channel to characterize vertical gradients and groundwater-surface water exchange, and two groundwater monitoring wells to measure temporal variability in water table height. As part of this initiative, some of these observations will be transmitted in near real-time to campus and will be displayed and interpreted for students and others in the high-traffic building entrance area of the Michael Smith Natural Resources Building. The data will also be available to the general public and resource stakeholders, will be integrated into a variety of courses, and will establish baseline data sets for future studies focused on critical zone processes, snow hydrology, channel migration and sediment transport, and surface-subsurface water storage in mountain watersheds.

These activities are further supported by a recent instrumentation grant from CSU’s Office of the Vice President for Research led by Assistant Professors Dan McGrath and Sean Gallen. This effort will add additional instrumentation in summer 2019, including a second weather station at a forested site, a precipitation gage, and water quality instruments (dissolved oxygen and dissolved organic matter) in the South Fork. In a parallel effort, the Colorado Geological Survey, in collaboration with Rick Aster, will be funding a high-quality seismograph at the Mountain Campus.

In addition to instrumentation developments, we are increasingly integrating the Mountain Campus into our courses. Fifteen undergraduate students in Geology 201, Field Geology of the Colorado Front Range, participated in a weekend of geological exploration at CSU’s Mountain Campus this fall. John Singleton and Sara Rathburn team-taught the course, directed at our sophomore Geology majors, which provides career perspectives while strengthening general geology, field, and mapping skills using the natural laboratory of the Front Range. During the weekend at the Mountain Campus, the students continued to hone their field note taking, measured foliations in Proterozoic schist, gneiss, and mylonite, mapped the Quaternary glacial and active alluvial deposits, and enjoyed the splendor of autumn colors hiking in the Mummy Range. The accommodations at the Mountain Campus are comfortable and conducive to teaching this and other field courses. The students stayed in cabins heated by wood-burning stoves, filled-up on good cafeteria-style food, waded in the South Fork of the Cache la Poudre River, and listened to lectures under the backdrop of the glacially sculpted valley. The fine weekend was topped off with dirt volleyball until dark, then cards and musical chairs in one of the classrooms. Student feedback was very positive, with one student commenting that having two instructors is “great because we learn so much hearing the questions you two ask each other.”
Above: A picturesque entrance welcomes students and visitors to the CSU Mountain Campus (Photo: Dan McGrath). Bottom left: GEOL 201 students measuring near-vertical foliation in Proterozoic metamorphic rocks, Poudre Canyon. Bottom, right: Kira Puntenney-Desmond (B.S., ’11), John Kemper, and Sara Rathburn (Ph.D., ’01) gauging streamflow and installing sensors at the CSU Mountain Campus.
DEPARTMENT HONORS

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

Undergraduate Students

Tavon Boaman: Philip Connolly Memorial Scholarship and the Undergraduate Explorationist Scholarship
Erin Davidson: The Geology Field Camp Scholarship
Cody Delgado: Michael Smith Scholars in Geosciences
Fallaye Diallo: Charles Beverly Memorial Scholarship
Christopher Dunkelman: The Geology Field Camp Scholarship
Amanda Eddleman: Katharine Compton Field Experience Scholarship, The Geology Field Camp Scholarship
Vashti Espinosa: The Geology Field Camp Scholarship and the Treckles Scholarship in Geosciences
William Gnesda: Thomas Evans Scholarship and the David Harris Memorial Geology Scholarship
Omar Gomez: Salonee Kharkar Memorial Scholarship
Nathan Hollars: Michael Smith Scholars in Geosciences
Qiuling Huang: The Geology Field Camp Scholarship
Wyatt Jeffery: The Geology Field Camp Scholarship
Connor Kounnas: The Geology Field Camp Scholarship
Sarah Lowe: Warner College of Natural Resources Student Success Scholarship
Andrew Lueker: The Geology Field Camp Scholarship
Sara Newman: Ernest and Bernice Dice Scholarship and the Charles Beverly Memorial Scholarship
Erik Ovens: The Geology Field Camp Scholarship
Cesar Quiroz: Thomas and Anne Shepherd Diversity Scholarship and the Undergraduate Explorationist Scholarship
Kevin Ramm: The Geology Field Camp Scholarship
Aren Roybal: Michael Smith Scholars in Geosciences
Gabriella Sanchez-Ortiz: Michael Smith Scholars in Geosciences
Laishla Seda Mercado: Thomas and Anne Shepherd Diversity Scholarship and the Michael Smith Scholars in Geosciences
Logan Shelton: Geosciences Honors Senior Award
Blake Stocker: The Geology Field Camp Scholarship
Matthew Swarr: Leon and Katherine Rust Hurd Scholarship and the John and Dolores Goodier Scholarship

Frederique Tremblay: Chris Lidstone and Kate Laudon Scholarship
Candace Whitten: Steve and Gail Kloppel Scholarship in Geosciences and the Oscar and Isabel Anderson Undergraduate Scholarship
Noah Williams: Roy and Ruth Coffin Memorial Scholarship

Graduate Students

Ethan Ader: Schumm Graduate Scholarship and the Hill Memorial Fellowship
Alexander Brooks: Hill Memorial Fellowship
Jenna DiMarzio: Warner College Master’s Thesis Award
Johanna Eidmann: David Williams Memorial Scholarship, Evelyn Clark Graduate Scholarship
David Heath: Oscar and Isabel Anderson Graduate Fellowship
Sarah Hinshaw: Ware Geosciences Fellowship
Erinn Johnson: McCallum Mineralogy and Petrology Graduate Scholarship
John Kemper: Edward Warner Graduate Research Assistant Fund
Amber Lidell: Robert Stollar Scholarship in Hydrogeology
Skyler Mavor: McCallum Mineralogy and Petrology Graduate Scholarship, WCNR Student Success Scholarship, and WCNR Graduate Student Showcase Top Scholar Award
Lindsay Mota: Geosciences Graduate Scholarship
Annette Patton: Marie Morisawa Graduate Fellowship
Erinn Phillips: American Institute of Professional Geologists Scholarship
Brianna Rick: Edward Warner Graduate Research Assistant Fund
Julianne Scamardo: Thomas Jones Graduate Fellowship
Nikki Seymour: Lary Kent Burns Memorial Scholarship
Joel Spansel: Geosciences Graduate Scholarship
Stewart Williams: Roger and LuAnne Steininger Fellowship and WCNR Graduate Student Showcase Top Scholar Award
Department and College Scholarships and Awards

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

**Student Awards**

**Jenna DiMarzio** – Warner College Master’s Thesis Award

**Amanda Eddleman** – Rocky Mountain Association of Geologists Neil J. Harr Award

**Skyler Mavor** – American Institute of Professional Geologists Scholarship

**Annette Patton** – Geological Society of America Morisawa Award

**Erinn Johnson** – American Institute of Professional Geologists Scholarship

**Nikki Seymour** – Society of Economic Geologists Student Research Grant

**Logan Shelton** – Geosciences Honors Senior Award

**Faculty and Staff Awards**

**Rick Aster** – Geological Society of America, Fellow

**Jill Putman** – National Academic Advising Association, Emerging Leaders Class of 2018-2020

**Jill Putman** – Warner College Administrative Staff Award


**Ellen Wohl** – Distinguished Career Award from the Geological Society of America Quaternary Geology and Geomorphology Division

**Ellen Wohl** – G.K. Gilbert Award from the Earth and Planetary Surface Processes section of the American Geophysical Union

**SPECIAL THANKS**


Special thanks to our speakers at our student club events this year — we truly appreciate your engagement in inspiring and mentoring the next generation of CSU geoscientists!

Harley Benz, Ernie Brown, Greg Cudney, John Dilles, Lauren Duncan, Alex Gysi, Nicole Hurtig, Scott Larson, John Lufkin, Erik Ovens, Donald Runnels, Joe Sertich, Ana Vargo, Mike Viney, Daniel Webber, and Dan Wood.

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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. Opportunities for engagement include: visiting the department to present a guest lecture in a course: assisting with a student field trip; supporting and advising our AAPG, SEG, or other student club activities and mentoring; and becoming a mentor to enhance student preparation for geosciences careers. The survey asks these and other questions to help us better align alumni and department interests. Your participation will contribute substantially to advancing our department and College activities to enrich the academic and professional preparation of undergraduate and graduate students. You can access the survey at https://goo.gl/forms/alQn59AeNpFEOAjc2 or from the Alumni tab on our department web page at warnercnr.colostate.edu/geosciences.
Ethridge Sedimentology Endowment

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, kindly contact Rick Aster (rick.aster@colostate.edu) or alumna supporter Lesli Wood (lwood@mines.edu). Direct contributions to the fund can also be made online at 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 the Eckles family to establish the Eckles Scholarship in Geosciences, provided substantial scholarship support to 12 of our five-week summer Field Camp students. Please consider a 2018-19 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 many to 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 or (970) 491-7606.
The impact of your gifts

**Blake Stocker**

“Thank you for the honor of allowing me to be a recipient of the Department of Geosciences Field Camp Scholarship. It is wonderful, and I’m blessed to have a department that is supportive and understands the needs of my family and myself. My family and I can breathe a sigh of relief knowing that I will be able to complete my undergraduate degree. Thank you again for supporting this extremely important scholarship fund.”

**Kevin Ramm**

“I would like to take this opportunity to thank you for the support of the Field Camp Scholarship. I am grateful for the financial support, as I rely on financial aid, and student loans to help finance my education. Receiving this scholarship motivates me to push myself to be the best at Field Camp.”

**Vashti Espinosa**

“You have my honest and heartfelt thanks for the donations you have made to help fund my education. Without your help, there would have been no way for me to attend Field Camp this summer, as I would have had to work and save for the next summer. Because of your help, I can finish my undergraduate degree much earlier and continue on to pursuing opportunities after graduation.”

**Wyatt Jeffery**

“No matter what job or field of study I end up pursuing, I will owe a great deal of it to this scholarship, which is helping me so much when I am so close to finishing school and quickly running out of money. I am so excited to really dig into the “hands-on” geology at Field Camp, which is also my first steps in moving toward a more professional direction in geology. The stress that this scholarship is releasing from me this summer, I hope will let me truly perform at my fullest potential and be worthy of this scholarship.”
Special Thanks to Our Supporters
Your gifts provide critical support to our students and programs and elevate the department’s teaching, research, and outreach.

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1.4 Gy Colorado granite of Greyrock Mountain, Larimer County (Photo: Rick Aster)
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Thank you. Please mail this form with your gift/pledge to: Colorado State University Foundation, P.O. Box 1870, Fort Collins, CO 80522-1870 Want to further explore giving opportunities in the Department of Geosciences and at Warner College of Natural Resources? Contact Scott Webb, scott.webb@colostate.edu | (970) 491-3594
The **Department of Geosciences** is housed within the Warner College of Natural Resources.

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