

Basement

THE COLORADO COLLEGE GEOLOGY DEPARTMENT



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**Cover Photo: Feeder dike as it converts into a lava flow,
Reykjanes Peninsula, Iceland, where the mid-ocean ridge rises onto land.
Taken by Steve Weaver**

The Precambrian Basement

2018-2019

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Greetings Everyone!

We hope you are all doing well and that you will enjoy the enclosed stories about your geology faculty and what our current students are up to (within the realm of geology!).

The college has hired a Provost for the first time in fifty years to serve as the number two person on campus after the President. Dr. Alan Townsend is an environmental scientist who spent much of his career in Boulder. One of his many tasks is to get science faculty organized on developing plans for a new science building, probably located north of Tutt Library. Olin Hall has truly grown decrepit and will likely be removed. There is a possibility Geology might move into the new building, but our general consensus is that we have great space in Palmer Hall that suits us well. The new building is expected to host several of the current Olin departments and open space in Barnes for renovations for other natural science departments to improve their facilities. We are still in an early planning stage and all of this may change in the coming months pending costs and fundraising, etc. We do expect to see some renovations in our facilities for our new faculty.

We are in the process of that multi-year hiring I mentioned last year. We tried last year to replace Megan Anderson with a very broadly defined position and identified several outstanding candidates. Unfortunately none of them chose to come to CC in the end- for a variety of personal reasons. We plan to advertise for this position again after the next two hires. I am still planning to retire after next year, so we hope to be approved to search for a replacement for me next fall.

This past fall, we searched for a replacement for Eric Leonard and reviewed one hundred applications. After a hectic schedule of careful readings, seven phone interviews, and three campus interviews in less than a month, we made an offer and it was enthusiastically accepted over winter break. Dr. Sarah Schanz has a PhD from the University of Washington (2018), her BS from Western Washington University (2011), and she is currently completing a post-doc in Indiana. She studies strath terraces and has already changed a century of thinking about how rivers develop in relationship to bedrock. She engaged our students in a fast-paced and fascinating teaching exercise during her interview, running computer models to determine the relative importance of different parameters in erosional processes. She is looking forward to extending her research with our students into the streams of the Colorado Rockies.

You can read about the ongoing exploits of current faculty members inside. We have one yearlong visitor filling in for Megan's role in the department. Emily Pope is an alumna from 2004 who went on to earn her PhD from Stanford and who has worked most recently as a post-doc in Copenhagen. Her research investigates the geologic and biologic evolution of Earth resulting from the exchange of fluids among the mantle, lithosphere, hydrosphere and atmosphere. Her areas of expertise include Precambrian geology, mantle dynamics, biogeochemistry, planetary geology, ore geology and global element cycles. Her husband, Solomon Seyum, also a Stanford PhD, is teaching several blocks for us this year. Next year Solomon will be the department's first Riley Fellow, teaching here for one year as part of the college's program with the Consortium for Diversity. Professor Jon Wilson, from Haverford College, taught Paleontology with Paul this fall, adding a significant input from geobotany, and

inspiring Paul to re-organize and update the excellent fossil collection at the college. We also include the obituary for Professor John Lewis in this issue along with a few (carefully edited) tales of his days as professor at CC.

Please save-the-date: Eric Leonard will retire at the end of the 2019 academic year (this May) and Jeff Noblett plans to follow him one year later in May of 2020. The department is planning an Eric-Jeff festival midway in between those two dates on Saturday October 26. Anticipate a suite of wonderful science talks from alums, meeting old friends and enjoying a banquet of epic proportions.

Our students again benefitted tremendously from the Witter Family Fund for Internships in Geology. Twelve students received funding to participate in an internship this past year. Their experiences were quite varied, including work for the Mountain Studies Institute (a hydrology and superfund project connected to heavy metal pollution from mines that will become a thesis), the Denver Museum of Natural Sciences (they took four of our students for various projects), the Nature Conservancy (geoarchaeological research and ranch preservation), two Colorado firms (one running hydrological computer models, one working on methane gas technologies and detection of leaks), and the University of Illinois isotope lab. We also tried a new direction with the projects. Faculty identified two up and coming sophomore stars from introductory classes and connected them with internships at 1) the Natural Resource Management Field Institute in Leadville, where an alum guided one student through water and soil sampling and analysis for work connected to several major government agencies; and 2) work with a geoarchaeologist in Crete. You can read more about their stories within this issue. Please let me know if you have positions in geological fields (during summers or as blocks during the academic year) that might be appropriate for student interns or if you know people who would like to mentor young students. We really appreciate all you can do for our students.

Best wishes,

Jeff Noblett, Geology
Department Chair



Photo by Steve Weaver

Hold That Date!!

Saturday, October 26, 2019

FOUR DECADES OF GEOLOGY AT
COLORADO COLLEGE

Eighties, Nineties, Aughts, Teens

Jeff Noblett arrived at CC in fall 1980 and will be retiring after 40 years at the end of the 2019-2020 academic year.

Eric Leonard arrived at CC in fall 1981 and retired after (only) 38 years in Spring 2019.

About a zillion of you were majors (and/or were a tenure-track or visiting faculty member, paraprof, or just a friend of the Department) during those four decades. We will be having an all-day celebration of all of you and of Jeff and Eric's CC careers next October 26 and we would love it if all of you returned to be part of it. So ... HOLD THE DATE!

More information will be forthcoming over the next couple of months. If you need some (tentative) details now, please contact Departmental Administrative Assistant Mandy Sulfrian – msulfrian@coloradocollege.edu



PAUL MYROW
(Sedimentology/Stratigraphy)

Greetings and best wishes to all. As usual, the last year was busy and full of adventures, although I did a bit less field work than usual this past summer. I did spend a few weeks in Inner Mongolia with my long-term colleague Jitao Chen, our present paraprofessional Tianran Zhang, and undergraduate Peter Mow. We split our time between Mesoproterozoic and Cambrian rocks. Working on the latter was

great fun as we hammered out an enormous collection of very well-preserved trilobites. Jitao was at CC for a few months in the fall as a postdoctoral fellow, and we had a wonderful and productive time working on a range of projects, including collaborating with Tianran to transform her senior thesis into a manuscript.

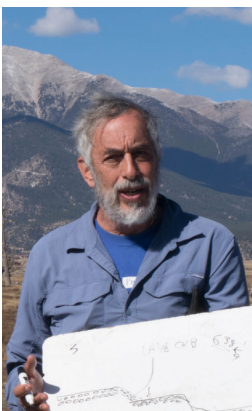
I also spent time in the field with student Michael Hasson, working on Devonian rocks in northwest Colorado and northeast Utah. We spent time at a location called Cross Mountain, and made a brief sojourn into Dinosaur National Monument. Michael is working on a number of small, enigmatic fossils preserved in coarse sandstone in what we think are Devonian rocks of the Parting Formation. Michael traveled to Yale, and we are presently collaborating with folks at the University of Chicago, in order to identify these fossils, but they are fragmented, unusual, and difficult to work on.

This is the first year of an International Geoscience Program five-year project (IGCP-668) that I am a co-leader on. The project is titled: "Equatorial Gondwana History and Early Palaeozoic Evolutionary Dynamics". We held a meeting in Thailand in December, but unfortunately, I was unable to attend, as I was teaching Invertebrate Paleontology at the time. This project will be an extension of work already begun in Thailand and Myanmar, and which was the subject of a thesis completed last year by student Tristan White.

Also, on the research front, my research advisee from last year, Everett Smith, has a paper in press with the *Journal of Sedimentary Research* based on the results of his thesis, which completed at the University of Texas, Austin in David Mohrig's lab. This is a study of the behavior of turbidites subjected to a weak oscillatory flow, which is essentially modeling the behavior of hyperpycnal flow superimposed by waves.

This year marks the publication of number of papers that I have had in the works for quite a while. Most exciting is a paper on Snowball Earth deposits of south Australia that we published in the journal *Science*. We calculated a rate of sea level rise of ~20–25 cm per year(!) during deglaciation of the ice-covered Earth. Another paper (in the journal *Geology*) that I am grateful to have in print is one written by co-author Taylor Perron (MIT) on the results of our flume work on the adjustment of wave ripples to changes in flow conditions. The cover photo of the December issue of the journal is one that we submitted, which shows wave ripples with a variety of “defects”, which result from the response of the ripples to variations in wave parameters. Finally, I am excited to have written a perspectives paper for the *Journal of Sedimentary Research* with Perron and Doug Jerolmack (U. Pennsylvania) on the topic of bedform disequilibrium, in which we discuss what happens when flows change faster than bedforms can adjust.

For some reason or other, I asked to take a leave of absence next spring (2020). I am not sure where I will be, but it will likely be outside of Colorado. I will probably teach for a semester at another institution, which will be fun. On the home front, I have been writing music, playing golf, and working on various projects on my house. I am always happy to hear from alumni, and if you are ever in town, I would love to see you!



ERIC LEONARD
(Geomorphology)

Well, it is hard to believe that this is my last year in the department. It seems not long ago that Patrick Williamson came in on the first day of my very first class (Intro Geology) and wrote

on the board “Pikes Peak is a pink volcano ... don't take it for granite”. But I guess that was thirty-seven plus years ago. I had hoped to outlast Jeff, but he is so youthful that he is going to hang on for one more year.

The past twelve months have been a lot of fun, and even moderately productive. Last spring I taught glacial geology (now there is a class I will really miss teaching), Intro, and then a course on Past Climate and Human History in the Southwest with Scott Ingram in the Anthropology Department. The latter course took us out to attempt some lake and meadow sediment coring work as well as dendrochronology/dendroclimatology (tree-ring work) in the San Luis Valley and the Sangre de Cristo Mountains. We did encounter some “interesting” weather but the class was great. In June, Lisa and I took a quick tourism/hiking trip to Slovenia and Croatia. Spectacular topography and we got to visit the type-locality Karst region. Then, after a month or so in front of the computer, working on imaginary glaciers, I returned to Norway for a rainy field stint in the north – really spectacular topography and real glaciers, but too often obscured by clouds – and some time working with folks at the University in Bergen getting them set up with new glacier modeling programs. From there I flew to Reykjavik to meet Jeff, Steve Weaver, and many of the junior and senior majors for the block 1 field course in Iceland (see article elsewhere in this issue). Suffice it to say that the class was great, and that the only days of really bad weather we had were Jeff's days looking at igneous rocks. Amazing glaciers and glacial geology!

What's next? Well, I finish up teaching with a block 8 Intro class (old folks, remember that there are only eight blocks a year now, and that Intro is now a one-block course. I am not sure how I can hit every field stop I love in only one block during that last course, but I will certainly try). After that I will be lead-

ing a June alumni trip focused on geology and hiking in the Scottish Islands (Mull, Skye, Lewis and Harris). Later in the summer I will be heading back across the Atlantic to the INQUA (International Quaternary Association) Congress in Dublin, possibly followed by another short stint in Norway. My plans to return to the Spruce Creek Rock Glacier last year to complete a final (?) resurvey were thwarted by a badly strained hamstring (always watch your feet while hiking on rocky/rooty trails in Slovenia), so I plan to return to complete that survey this coming August. All alums of the project, from 1985 on, plus anyone else interested in a rocky approach drive leading to a brutal hike with a heavy pack to an amazingly beautiful place in the Colorado mountains, are encouraged to join us for the work.

After the summer I guess I will really know that I am retired. As you'll see in an announcement elsewhere in this PCB, the Department is planning a big get together on Saturday, October 26, to mark my retirement and Jeff's. We will be having a symposium with several alumni speakers from different decades (80s to 10s) and a reception and dinner with appropriate stories (heavily redacted, I hope) about the last four decades of CC Geology. You will all be getting formal invitations soon.

And what after that? Good question. I will certainly be continuing with my research work. There are several in-process papers that need to be completed, more fieldwork to be done on ongoing projects in the Rockies, fieldwork and modeling work on the new Norwegian project, and some potential other new work to be detailed in future PCBs. Lisa and I also plan to travel more -- unencumbered by field books, rock hammers, GIS software, and students (sorry).

Speaking of Lisa – she is doing well. She's still working at Westside Cares trying to ar-

range medical care and other services for homeless folks and others with limited or no resources. Tough work, but really important. Julia (28!) and Susan (23!) are both on the East Coast – Julia in DC working as a political media consultant, Susan in Boston, working as a paralegal.



JEFF NOBLETT
(Igneous Petrology)

Greetings,

This has been a great year for learning the geology of Iceland.

I was the resident faculty person for the alumni-parent tour of Iceland (with four days in western Greenland- lovely migmatites (and a glacier or two)) last summer. Participants suffered through three evening (with wine) lectures on volcanology, plate tectonics, and the geological history of Iceland (which our Icelandic tour guide asked for a copy that he could use in other tours!). We arrived and immediately soaked in the blue lagoon (not your typical geology class hot spring) before watching the Mid-Atlantic ridge rise out of the sea. The trip included a variety of cool cultural sites and stories from the Sagas, along with great volcanic products and even a journey inside a glacier.

Then a month later Eric Leonard and I teamed up to take eleven upper-level majors to Iceland for three weeks in Block 1 (end of summer weather was generally in the 40s with some fierce winds and a few drizzles-altogether a good summer in Iceland). We started with a day on the Golden Triangle (rift valley where the world's oldest continuous parliament met, field of geysirs where the first geyser was described, and the great Gulfoss waterfalls). In between these stops we examined pillow basalts and indicators of submarine eruptions, and gathered on a

lava field under a full rainbow. Then it was a trip around the Ring Road with numerous detours to see all sorts of volcanic materials, recent landslides, glacial features, knick-point migrations, geothermal features (and the horses with the fifth gait). Read about the student's perspectives elsewhere in this issue. No one got arrested and everyone made it back to campus, so it was a success.

These trips followed up on a delightful family spring break week with my wife's brother in Costa Rica and Panama. The best geology was clearly to be found in the water.

Lexie Millikin's ('17) thesis and geochemical study of the shoshonitic lava flows on top of the two mesas outside of Golden, Colorado (above the Coors Brewery that some of you may recall) was published in Rocky Mountain geology. For all of you who ever toured Coors brewery, these are the flows above the plant that no one had ever run full geochemical analyses on. The Ar dates demonstrated that part of those flows was 20 million years younger than, but petrographically similar to the rest of the flows. Aaron Farquhar's ('18) thesis examining the physical properties of hydrothermally altered volcanics on Whakaari island in New Zealand produced great results that are being worked into a paper. I continue to be interested in working with students on local projects including the examination of trace elements in flows within the Rio Grande Rift, work on the multiple generations of dikes in the Wet Mountain area and ways we might sort out their history, on the infilling of a magma chamber within the Pikes Peak Batholith that created layered granite, or on mineral control of the magma mingling within Proterozoic sites in Colorado, etc.

My wife, Jenny, is still engaged as Director for the Math Excel Center and teaching graduate math classes in topology and geometry at UCCS. We lost one of our three cats this

year. My son-in-law's fancy concrete patio/driveway business continues to grow and my daughter Jenny is happily working as a housewife taking our nine-year old granddaughter, Arden, to third grade, trying to keep up with the very active five-year old Daphne and two-year-old Eli who is expressing his own opinions vociferously. Hope you are all well and will drop in anytime! Jeff



EMILY POPE

(High-Temperature Geochemistry)

Well, this is a very strange experience, to be writing in the PCB two years in a row. A year ago, I was nestled in my 18th century Geological Museum office in the heart of downtown Copenhagen, reflecting on how a turn as a geo major in the basement of Palmer began my journey across the Atlantic, teaching and doing research at the Natural History Museum of Denmark. Now I find myself in room 107 of the Tutt Science Center at Colorado College, working with students to unravel the secrets of petrogenesis that can be found in igneous minerals and textures. Needless to say, it has been a year of surprises.

I am enjoying a two-year visiting professorship in the Geology Department, and am so excited to be working again with CC students and faculty, and exploring the fantastic geology of Colorado. My husband Solomon, a structural geologist, is also excited to be back in the U.S. and in the vicinity of mountains. By co-teaching Earth as a Physical System with Paul this last autumn, he received a crash-course in the block plan and Front Range geology. Iris, our two-year-old daughter, is happily settling in – loving being closer to her grandparents who live locally, and getting to see rabbits, deer and bears (oh my!) roaming through town. She is learning that she loves to hike, climb rocks,

and shovel snow, which makes her parents very happy.

Our decision to return to the U.S. was rather sudden, so I still have one foot in my old research activities at the University of Copenhagen, as I dip the other in teaching at CC and investigating new research questions to explore in the Rocky Mountains. Two master's students are working with me remotely from the University of Copenhagen.

Ann Marie di Stefano is analyzing in situ carbon and oxygen isotope and elemental chemistry analyses of hydrothermal calcite from active geothermal systems in Iceland. She is investigating what conditions (pressure, temperature, fluid composition) optimize carbonate precipitation during natural water-rock reactions, in hopes of informing research aimed at artificial CO₂ sequestration in minerals to mitigate climate change. Marie Traun is working on a regional study of the role of magma assimilation and fractional crystallization processes on variation in thallium, lithium, hydrogen and oxygen isotopes in a small suite of Andean volcanoes. She then plans to combine this with a meta-analysis of the relationship between these isotope systematics and different physical parameters in subduction zones globally (i.e. speed and angle of subducting slab, age of crust, etc.). The hope is to improve our understanding on the relationship between type of subduction zone, how much water is entering the subduction zone, how much is retained in the subducting slab past the arc, and what material within the slab hosts that water. We are hoping that Marie's work on how fluids get into the mantle dovetails nicely with that of my recent postdoc, Quinten van der Meer, who is studying what fluids are coming out.

Quinten performed a detailed investigation of a well-preserved Oligocene alkaline intrusive complex (think of the kind of magmas

that form diamond-bearing kimberlites and/or carbonatite volcanoes) in east Greenland, and found that the hydrogen isotope composition of these rocks are not affected by assimilation/fractional crystallization processes, and thus likely preserve their mantle value. We just obtained the last pieces of data for this project in December, and are looking forward to compiling, interpreting, and publishing the results in the coming year. The next steps: to see if we can apply what we are learning about water in the mantle of modern (okay, recent) Earth to what was happening in the ancient (i.e. 2, 3, 4 billion-year-old) Earth, and use these tools to trace the role water in the mantle has had on geodynamic processes over Earth history. Maybe this is something a few CC students can help me out with!



HENRY FRICKE
(Geochemistry)

Hello Everyone! If you've ever read the PCB, you know that what I am supposed to do here is give you a brief review of what I've been up to over the last 12 months. This year, however, marks a fundamental change in the department, with Eric Leonard retiring after 39 years of service. So I'd like to dedicate this space to him, in appreciation of his being an exceptional neighbor, colleague and friend.

I first met Eric when he picked me up at the airport for my on-campus job interview, back in January of 2000. Eric was driving this beat up old blue Honda, and I remember thinking "they must not pay faculty very well at CC". As we made small talk on the drive to campus Eric mentioned he'd been in the department for 20 years, and I remember thinking "holy shit that's, like, forever; this guy could be my dad".

Fast-forward 19 years and Eric finally sold that car, now I have been here forever, and over time Eric has in fact become something of father figure to me. Like many a parent, Eric hasn't influenced me by providing a strict set of rules to follow, rather he's done so by being a good role model. For example, I've sat in over a hundred department and Chair's meetings with Eric, and in the process I've learned to value the importance of having your facts straight, of stating your ideas clearly, of listening to others, and of staying calm and patient. Now I'm sure Eric - and everyone else in the department - will tell you that I have a hard time living up to these values, but that's not his fault (also remember that I'm still a relative youngster).

I also learned from Eric that a person's priorities change as circumstances change, and there is a time to focus on teaching, to focus on research and to focus on family. Because of this it is OK if there is a dip in your publication output or in your teaching evaluations if, say, your daughter refuses to sleep through the night until she turns 3, or if your off-campus hours are spent driving kids to this practice or that. Eventually things will change; the kids will learn to make themselves breakfast, to drive themselves to school, and time will again materialize to work on a manuscript, revise a syllabus or lead a Regional Studies field trip.

Of course, not everything about your dad is inspirational, or even cool. Eric's encyclopedic knowledge of certain topics could be amazingly useful, and a department meeting rarely went by without Eric reminding us of past precedents, failures and successes. It could also be very geeky. I'll never forget the Roberts Lecture dinner in which he and Paul Hoffman went punch-for-punch reciting the names of Olympic marathon winners going back a century, or how when the NCAA basketball tournament rolls around Eric never fails to remind me which college bas-

ketball team won the most championships, when they did, and who the players were (some team from California, maybe in the 60's, with a tie-dye wearing hippy playing center? My eyes glaze over when it comes to this stuff). The most endearing form of Eric's geekiness, though, takes place when he's been puzzling something out in his office and has an 'ah ha' moment. He walks out into the hallway, past your door slowly until he catches your eye, and then - bam - he's in your office filling you in on the details. It's Classic Eric (you can ask Paul), and though it's geeky, I've learned a lot of interesting stuff this way!

Over the last couple months Eric has begun to clean up and clear out his office in anticipation of his retirement from the college, a process that is as unsettling to me as it no doubt is to him. After 19 years of knowing that if I needed help or advice I could just go next door and get it, I'm losing that safety blanket. Even worse, Sarah is going to be moving into that space, no doubt with the "holy shit this guy has been here forever, he



He's not quite a geezer yet!

could be my dad” look in her eye, assuming I know what the hell is going on. Yikes. Well I can only hope that I live up to Eric’s standards, and do half as good a job mentoring Sarah as Eric did mentoring me. And if all else fails, I know I can send Sarah down to the Eric’s Emeriti Office, where she can have a glass of wine, relax, and learn straight from The Man himself.

If you aren’t already planning on coming to the “Eric & Jeff-Fest” next fall, please consider it; it will be great opportunity to celebrate both of these folks. In any case, I hope all is well out there in Alumniland, and I hope you stop by and visit the department if you can!



CHRISTINE SIDDOWAY (Structure)

Christine Siddoway spent Fall Semester on leave in Bozeman, Montana working on research and publications, and advising four thesis advisees on research that they began last summer. She spent many hours on web calls each

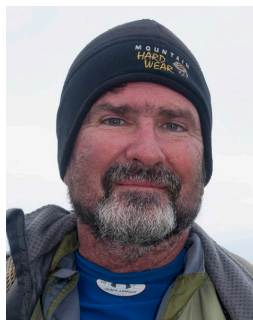
week, to carry all the tasks forward! Two of the pubs just accepted for publication include recent CC grads in the author list: see names in bold in Siddoway et al. and Tinto et al., listed below. During the Fall, Christine returned to campus a couple of times: to lead a Geodesign workshop in Block 3, that took place in the GIS lab, and to take part in the faculty search in Block 4.

Her Spring Semester is unconventional, as well: In January Christine flew down to the southern tip of Chile to get on board the JOIDES Resolution, the flagship vessel of the IODP (International Ocean Discovery Program; <https://iodp.tamu.edu/scienceops/ex->



[peditions/amundsen_sea_ice_sheet_history.html](https://iodp.tamu.edu/scienceops/expeditions/amundsen_sea_ice_sheet_history.html)). She will be at sea for 10 weeks, sailing down to the Amundsen Sea of Antarctica to obtain sediment cores. Christine is in the Core Description team, and is becoming an expert handler of Norland Adhesive 61 (used to make smear slides for micropaleontology and mineral ID!). A few of the expedition goals are to reconstruct the climate history between the Paleogene and Holocene and better understand the relationship between warm water masses and the stability of the ice shelf.

When she returns to CC in March, Christine will team-teach Structural Geology with Nick Roberts, a near-completion PhD student from University of Madison, Wisconsin. Christine and Nick got acquainted in Madison when Christine spent time on sabbatical there. During 8th block, she will shift back in to environmental action mode, co-teaching Introduction to Geodesign with Prof Carl Read from the Art Department and Matt Cooney, GIS professional extraordinaire.



STEVE WEAVER (Technical Director)

It has been another great year as Geo Tech Director supporting faculty and students in many class and re-

search endeavors. Student and faculty field and lab based activity remains high with the analytical facilities getting lots of use. It is very gratifying to see the quality of research our students continually produce.

I continue to be active with my photography with my usual annual summer trip to Wyoming and Montana , as well as continuing teaching two photography workshops at the Zapata Ranch. Another highlight was being able to go on the Regional Studies trip to Iceland during block one ! Eric Leonard, Jeff Noblett and I took 11 students to Iceland and we saw and studied some amazing geology, and I was able to photograph some of the incredible beautiful Icelandic landscapes! As always you can check out my work at my website: www.stephen-weaver.com, and follow me on Facebook (@StephenWeaverPhotography.EarthSystemsImaging), and Instagram (weaveresi)

MANDY SULFRIAN

(Administrative Assistant)

Can't believe how quickly this academic year has gone by! Fall semester was very busy with a tenure track search and general goings on. I know the Spring semester will zip by – it always does.



We have two new paraprofs – Tianran Zhang '18 and Matt Tankersley '18. They've been a huge help with all the logistics! Hannah Marshall '16 returned to paraprof during 1st block this year. She fit in seamlessly and helped with the GY212 class with Paul and visiting professor Solomon Seyum. Thanks Hannah!

Charlie & I took a vacation to Maine, New Brunswick, and Nova Scotia in October. What beautiful country! We had fun driving up the coast, staying in small towns, and meeting very interesting people. I had never been there before so it was a wonderful discovery for me. We will be back!

I had shoulder surgery in December and am looking forward to getting back to my "normal" (?) self. It's been pretty good so far. Doing physical therapy and hope to get my sling off the first of February.

Hope all's well with you and yours! Do stop by and visit if you're here – it's fun to hear what you're doing and how everything is going.



Photo by Steve Weaver

Obituary

John Hubbard Lewis April 13, 1929 — August 2, 2018



John Hubbard Lewis, “Doc” to many, beloved Colorado College geology professor, 60 year resident of Colorado Springs, woodworker, musician, Hanomag (aka “lost cause”) tinkerer and true renaissance man died in his sleep of lung cancer on Thursday August 2, 2018 at 5:20 am. His daughter Patty was with him in Seattle when he died.

John was born in Jamestown, NY on April 13, 1929 to Hal and Margaret Lewis. The family lived on a farm outside Warren, PA as John’s father loved riding and showing horses. John was fascinated by all things mechanical from an early age, and this fascination was fed by being able to visit oil refineries. He was befriended by the family’s handyman/jack of all trades, who taught John not only how to fix things but how to manufacture them. This relationship helped John gain an early and life-long appreciation for blue collar work.

John was sent to Kent Prep School in at age 12 where he excelled in crew, hockey and football.

One of his proudest achievements was his crew’s winning of the Thames Cup at the Henley Regatta in 1947. He lettered in crew and hockey and was later named to the Kent School Hall of Fame. As well, on family vacations, John learned how to ski both Nordic and downhill and he took flying lessons, earning his pilot’s license at a young age. Flying was another lifelong fascination.

John entered Dartmouth College in 1950 and was put on probation and finally “separated” due to low grades and his propensity for partying heavily and missing classes. On the heels of this disappointing performance, his father sent him to work in the oil fields of West Texas which did little to tame him, but did a lot to give him a further education in things mechanical and developed his work ethic.

John was drafted into the army in 1954. Stationed in Germany, John served as a medic and as a member of the US Army ski team. A terrible crash during a downhill race shattered his ankle and left him with a lifetime of foot and leg issues. Upon his discharge from the Army, John earned a degree in geology from Allegheny College and married Marilyn Rutledge of Warren, PA in 1956. John and Marilyn moved to Boulder, Colorado so he could pursue a PhD in Geology at the University of Colorado. John and Marilyn had four children: Patty, Mark, David and Tim.

John taught geology at Colorado College from 1958 to 1981, inspiring countless students with his dynamic and exuberant style. As a professor, his classes were full of hard and demanding work, extended camping trips, and long nights of beer consumption, followed by early mornings of campfire cooking and the cry to “wake up and wee wee, the world’s on fire!”.

In 1968, John was selected by the National Science Foundation to help map a section of the Fosdick Mountains in Antarctica, and a nearby series of outcrops (Lewis Rocks) was named for him though he never saw them.

In 1974, John divorced Marilyn and married Barbara Baird, and they set out to restore a dilapidated house in what was a less than desirable neighborhood. One of his favorite quotes, “If you ain’t got a education, you gots to use your brain” was put into practice in 1981 when John threw out his career in academia and focused his sights on a new career in fine wood-working. John designed and built a passive solar heated shop in his backyard and spent many hours designing and crafting his pieces. John was a founding member of the Wood-workers Guild of Colorado Springs and produced annual shows which highlighted the work done by craftsmen and women all along the Front Range.

John divorced Barbara in 1997 and married Lizzie Smith. John and Lizzie moved to Bellingham, Washington in 2003 to be closer to family. The climate of the NW was not to his liking and he missed Colorado, and he and Lizzie moved back to Colorado in 2006 where John practiced being “retired” by making model airplanes. John and Lizzie were divorced in 2016 and John moved back to Seattle to be closer to most of his kids.

John is remembered as being cantankerous, loving, iconoclastic, ingenious, and as a talented teacher and craftsman. He was predeceased by his sister Meg Woodard and is survived by his brother Harry Lewis, sister Anne Creal, daughter Patty Lott and sons Mark, David, and Tim Lewis as well as 7 grandchildren and two great grandchildren.



1970 Intro Geology Class led by John, one of the first field trips on the Block Plan.

Memories and Comments from Alumni

In my years at CC there were only three professors of geology: Dr. Fischer, Dr. Lewis, and Richard Pearl. John handled all of the structural, igneous, and metamorphic stuff. He was such a fun and great teacher. His water divination lecture was perennial favorite. Then he went to spend a semester in Antarctica and something happened and he

quit teaching shortly thereafter. We never knew what happened. He became an incredible furniture maker. Rest in peace, John. I will miss you.

- Bonita Lahey, '69

If I were to point to the one person responsible for my 40-year teaching career in Geology it would be John Lewis. His unbridled enthusiasm for teaching, love of geology, and barely contained glee at life in general imprinted my mind during those first two Geology courses. I owe him a debt I cannot repay. Fortunately, I had the opportunity to tell him exactly that several years ago.

- Steve Spear, '69



Doc Lewis was an inspiration to budding geoscientists like myself, not only in his knowledge and dedication to the field, but also in his somewhat roguish demeanor. Specific incidents I remember -

- * Throwing chalk and erasers at people trying to interrupt his lectures- Dave Nash (who went on to teach geomorphology at U. of Cincinnati) being a frequent target.

- * Taking a bite out of siltstone to judge the silt vs. sand content.

- * John liked to participate in pickup hockey games- once saw him put on his skates, light up a cigarette, go on the ice, grab the puck, skate around several defenders, score a goal, go back to the bench, take off his skates, and walk out. Mission accomplished.

After his retirement from CC I occasionally visited him in the Springs, and he was always welcoming, glad to have visits from former students. He would show me his woodworking projects, and slides of his adventures in Antarctica, and we would trade stories. I still feel privileged to have had him as a mentor and role model.

- Roland LaForge, '72

When I began teaching classes in geology at CC, John Lewis was on leave, finishing his Ph.D. at the University of Colorado, so I didn't know who he was. One day towards the end of the semester, Dr. Fisher was lecturing and this crazy guy, tall, with dark hair and horn rim glasses, bolted into the class holding a dowsing rod. He kept running around the room, shouting, "I know it's here, I'll find it. I'll find it." Finally, he stopped over the wastepaper basket at the front of the room, with the rod pointing down. He then reached down, rummaged through the papers, and pulled out a bottle of beer, shouting, "I knew it was here." That was my introduction to John Lewis.

Later, Dr. Larry Gould, dean of Antarctic geologists, gave a talk at CC. (Hard to believe he visited a small college like ours.) Dr. Lewis was so fascinated that he agreed to spend 6 months in the Antarctic. One story he brought back: How to spend 6 months in the Antarctic with only two shirts. Wear one shirt for the first week. Wear the second shirt for the next

two weeks while the first shirt airs out. Since the first shirt is definitely cleaner than the second, wear it for 3 weeks while the second shirt airs out... (You get the idea.)

Drs. Fisher and Lewis had a tremendous impact on me, especially in supporting me as a female in geology. Because of them, I felt I could succeed in the man's world that geology was then. And I did.

- Jamie Lytle King, '68

I'll always remember the first day of our introductory Geology class. When John and I visited the outcrop 40 years later, he referred to it as 'stop one' day one'. It was a road cut on the north side of Uintah St just west of Fountain Creek where the east dipping Pierre Shale is cut by the overlying Fountain gravels. John's only instructions were; 'We've got all afternoon; now work out what is going on here with the Geology'. John then disappeared but he checked on us every hour or so just to see that we hadn't left for the pub. He also would check on our progress by calling up together for a group discussion where we would put forth a wide range of theories. John would tease out the right stuff and slowly lead us towards understanding the road cut. It is mind-boggling when I now think of how simple the geology was and how many geologic principles could be learned from the exercise.

In most geology classes around the world, it would take an instructor about 5 minutes to explain a similar unconformity. Most students would understand the concept, but they would not truly learn it the way we had learned it with John. It was a classic exercise in the Socratic method of teaching. However, to be fair, the Block Plan was perfect for such a style as it allowed plenty of time for this kind of discussion. After that, John led us through the sedimentary section in Colorado Springs; we chose the formation boundaries, measured the formation thicknesses and then named them. Later, John took us on a 2-3 week field trip for a cross section through Colorado.

We had to keep track of the formations and in the end we drew an east-west cross section of the geology through Colorado and put together a geologic history of Colorado. In retrospect, I the Block Plan, John, and Colorado geology all colluded in a perfect storm for breeding a love of geology.

- Warren Dickinson, '71

John Lewis had a HUGE impact on my life. I arrived at CC not knowing what the hell I wanted to do in my life, and his Intro Geology class was the first that really woke me up and inspired me. Through his crazy lens on life, his passion for the natural world, and his unwavering high standards for his students, I also gained a love of Geology that has fueled the journey I've taken in the rest of my life. He was a master at making classes both fun AND incredibly challenging. He never just gave you the answer ... you had to do the hard work to figure it out yourself. Field trips with him were THE BEST.

- Bill Chadwick, '81



A visit with John and Warren

As a student teaching assistant in 1961-62, I had the opportunity to work closely with Bill Fischer and John Lewis. I remember one day, Dr. Fischer was teaching a first year geology class and his topic was groundwater. I was standing in the hallway just outside the classroom and he was in the middle of his lecture, when all of a sudden, a burly figure with a phony mustache and thick German accent appeared at the door. Dr. Fischer announced to the class that he had invited Dr. Stoopnagle (or something like that) to demonstrate the "science" of dowsing. "Dr. Stoopnagle" entered the class with a forked stick and commenced to walk about the class room declaiming that his dowsing stick will find water wherever it exists and gave a number of idiotic reasons why his dowsing stick was infallible. I was transfixed by this absurd bit of theatre, but I also noticed several students were busy taking notes. Eventually the good doctor wandered over to a wastebasket in the corner of the classroom and his stick suddenly and miraculously began rapidly dipping .

"Ach, I zinc I haff found der Mutter Lode" Dr. Stoopnagle proclaimed loudly. He then reached into the waste basket and brought forth a 12 ounce can of Coors Beer, much to the delight and surprise of his audience. He then excused himself and left the classroom no doubt to consume his discovery elsewhere.

As he passed me in the hallway, he gave me a big wink and reverted to his original self: Dr. John Lewis.

I thought it was a hilarious bit of nonsense, but Bill Fischer and John Lewis had just demonstrated to the class the folly of faith in pseudo sciences like water witching.

-Emery Bayley, '62



Regionals Studies 2018



Photo by Steve Weaver

In the capstone Geology class 370 Advanced Studies of Geology: Glaciation and Volcanology of Iceland, Jeff Noblett and Eric Leonard took eleven students into the rugged terrain of Iceland first block of the 2018-2019 academic year. The class drove the circumference of the island, staying at a different cozy hostel every one to three nights. Each student was required to do an individual research project before the class began, and the students would present their research in the field once the class reached their research location. Examples of research projects included: the Iceland Hotspot, Volcanology of Iceland (Krafla and Vestmannaeyja Volcanoes), Jokulhaups (glacial outburst floods), and Iceland's petrological, geochemical, and climate histories.

Students also participated in daily outdoor lectures from Jeff and Eric and were lucky enough to even have Christine and CC Alum Marli Miller ('82) along for a few days towards the end of the trip. Some days were Jeff days, where the class learned about Iceland's volcanology and visited different volcano types, and others were Eric's, where students investigated glacial and geomorphological structures and phenomena. Coming from a rigorous outdoor Geology program at Colorado College, students thought they knew what to expect

when learning outside, but Iceland created a completely new and intriguing classroom for them. Iceland's ecosystem and rock types are something that the students had never experienced in the American southwest, so every-day was a new, exciting adventure.

The first few days were spent in the Reykjavik area, doing what Jeff expressed as "geo-tourism" expeditions. The group learned about Viking culture and history, while also observing famous geologic structures and rocks. Once the middle of first week rolled around, the group took off to the north to start the grand geologic adventure. Progressing counter clock-wise around the island, the students visited the Western Fjords, moved towards the north coast of the island and almost touched the Arctic Circle, and then swung around to the east and south visiting volcanoes, geothermal power plants, and glacial lagoons.

Academically, the trip was fascinating, and most students would agree that it was the paramount learning experience they had with the geology department. The students tackled geomorphological projects on knick-point migration at Dettifoss, using topographic relationships of fluvial terraces, local geomorphology, and cosmogenic ^3He surface exposure dating to recreate a geologic history of the area in question, and on glacial histories on the southern coast of the island, combining



Photo by Steve Weaver

use of terrain features like moraines and lake deposits with cross cutting relationships to model the history of glacial advance and retreat since the Little Ice Age. Geomorphology wasn't the only geological subject explored, however, as students studied the volcanic history on Iceland's SW Reykjannes Peninsula, physically mapping volcanic features observed in the field, and using knowledge of how lava responds subaerially, subglacially and under water to determine the nature of the sources of features that were observed in the field.



Photo by Steve Weaver

enough to relax in the geothermal hot springs at Lake Miyvatn, the group toured a geothermal power plant, witnessed the unique gait of Icelandic Ponies at a horse show, and visited a Big Lebowski themed bar together in Reykjavik. Three students even peeled off for an afternoon of golf in the island's Eastern Fjords! Although certain trips and locations will forever stand out, some of the best times were simply cooking, eating, watching movies and laughing with what became an incredibly tight-knit group of friends. Even though the trip was intense and rigorous, the students will hold the bonds made with the professors and with each other close to their hearts, and will forever remember the geologic trip of a lifetime. The CC geology class of 2019 (and a few members of the class of 2020) wish to extend our utmost gratitude to the entire geology department, and specifically to Eric and Jeff for making this unparalleled trip possible, and for guiding us through these past four years.

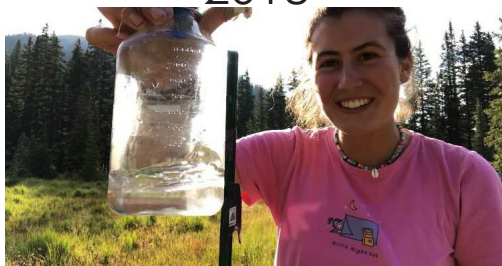
The students conducted many other smaller yet equally interesting projects, but the highlights of the trip weren't limited to intriguing academia. Many students were fortunate

Written by Lille Haecker, Zak Armacost, and Ellie Meyer



Photo by Jeff Noblett

Summer Student Research 2018



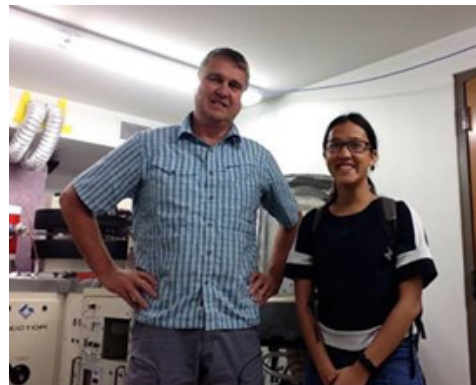
Thanks to the McKenna Family Scholarship and Witter Family Fund, I got to spend my summer in the headwaters of the Animas and San Miguel Rivers above Telluride, CO. Dr. Rory Cowie from Mountain Studies Institute taught me EPA sampling methods for draining mines, seeps, and springs at Bonita Peak Mining District. I applied those methods to my thesis field work and scampered around the San Juans in my sneakers.

- Annabelle O'Neill '19



I had the opportunity to go to Greece and work with geoarcheologist Floyd McCoy, assisting with projects that he has been working on. My summer as a research assistant was divided into three main portions: first, I spent a month on Crete working at the INSTAP (Institute for Aegean Prehistory) Study Center helping to collect data and consolidate geologic maps. The next couple of weeks were spent on Santorini searching for and collecting samples from a precursor volcanic eruption, followed by a couple weeks back at the University of Hawaii organizing samples, finishing up analysis, and updating a database.

- Nerissa Barling '21



During this summer, I spent ten weeks in a geochemistry research lab, at the University of Illinois Urbana-Champaign with Professor Craig Lundstrom, who is a CC alumnus. My target rock formation is Fish Canyon Tuff (FCT) from southwest Colorado. I have learned how to use several geochemistry instruments and their principles.

- Fai Chanchai '20

I spent ten weeks of this past summer interning for Dirk Rasmussen (class of 2012) at the Leadville Colorado Mountain College Natural Resource Management Field Institute. In Leadville, I focused on surface and ground water sampling, water quality analysis, vegetation monitoring, and soil sampling and analysis. A lot of our work was centered around abandoned mine land reclamation.

- Helen Carter '20

I was working up in boulder for LongPath Industries with a team of mechanical engineers to develop the first laser-based detection system for methane gas leaks. My main job was to research the natural gas production process, so understanding the associated geology, where natural gas is stored, and the refining process from well head to burner. I was also in charge of determining the major contributors of methane emissions throughout that process. Other than that I did a lot of map making, choosing sites for deployment, and basic data entry and analysis.

-Zak Armacost '19

A Few Current Senior Theses & Projects

My thesis involves quantifying strain in the Five Points shear zone, in the Wet Mountains, Colorado. I am using quartz-sillimanite pods found in metamorphic rock as ellipsoidal strain markers and manipulating these measurements with matrix algebra to quantify strain from a 1.4 Ga deformation event.

- Kevin Patterson '19

This fall, I've been using a wonderfully completed ROSETTA dataset of magnetic and gravity flyovers to test hypotheses of the unknown lithospheric structure beneath the Ross Ice Shelf in Antarctica. Using GM SYS 2D modeling, I've been locating and testing possible metamorphic core complexes, mafic underplates, and extensional fault structures. The completed dataset is giving us an opportunity to fill in a missing piece of tectonic history!

- Zoe Krauss '19

For my thesis, I am studying the Cambrian through Mississippian units of two field sites in Cross Mountain Canyon, CO and Jones Hole, UT by way of analyzing the physical and chemical stratigraphy, sedimentology, and paleontology. In doing so, I will reconstruct the depositional history, provide a better estimate of the age of the units, and determine whether there is an unrecorded Devonian unit preserved in this area.

- Michael Hasson '19

In the San Juan Mountains, hundreds of abandoned mines drain acidic waters called acid mine drainage into the Animas and San Miguel watersheds, which provide water to 12.5 million people in the West. Last summer, I worked with Dr. Rory Cowie (CC '08) in four groundwater-fed wetlands called fens above Silverton and Telluride, CO to investigate whether they may serve as



flow inhibitors or bioremediators of acid mine drainage. My thesis seeks to interpret trends in heavy metal concentrations across the fens.

- Annabelle O'Neill '19

I'm attempting to define the proposed "Danian 2" hyperthermal event using geochemical and paleobotanical methods, and correlate changes in the carbon cycle with Deccan volcanic eruptions.

- Ben Lloyd '19



Photo by Will Rundquist

Terri Olson '80



As part of the class of 1980, I was at CC during the era of Bill Fischer, John Lewis, and Bruce Loeffler. Jeff Noble was just arriving my last summer there, when I was the TA for Geology in the Rockies (ACM course taught by Shelby Boardman and Eiler Henrickson). Vivid memories from CC include field trip mis-adventures (a bus getting stuck in the sand at Lake Powell on a structural geology trip, getting snowed on in the San Juans in September on a petrology trip) and my first raft trip (on the Colorado River near Moab during block break). Enjoyed mapping Dead Man's Canyon with Lauren Morse and Jocelyn Gamble despite the rattlesnakes. Also memorable was John Lewis rounding up our structural geology class from the library the night

before the final, saying "Pack it up, we're going to Murph's!"
Examining a sandstone dike in the Upper Arkansas Valley. (2018)

After graduation I went to Dartmouth for a master's in earth science, where I got to do my thesis on very young, deformed sedimentary rocks along the Indus River in the Himalayas (Northwest Frontier Province of Pakistan). I was interested in sedimentary rocks and the effects of tectonics on depositional facies and patterns, and it was a great experience, both culturally and scientifically. I recently reconnected with my female Pakistani field assistant, a geologist who still lives in Peshawar.

Some of my fellow undergraduate and grad students were idealistic enough to prefer not to work in the oil and gas industry. My feeling was (and still is) that it's better to have environmentally-minded, outdoor-oriented, wilderness-loving people on the inside of oil companies. Plus, industry had the money to apply technology to solving interesting technical problems, and to hire great people who have been fun to work with. Because the fortunes of companies focused on the industry are so tied to commodity prices, there have been plenty of ups and downs in my 36 years in the business, but I don't regret choosing that path. Other geologists of my era who worked for hydrology or environmental companies have had much less stimulating careers, as some readily admit.

A few weeks after successfully defending my thesis in Hanover I went to work for Amoco in Denver. In those days (1982), Denver was a thriving hub for the industry; all the major oil companies had offices there. Many of those companies no longer exist, having been absorbed in the mergers and acquisitions that have occurred. I had friends at Texaco, Petro Lewis, Gulf Oil, Mobil, Arco, Tenneco, Cities Service—none of which exist anymore. Amoco lasted longer than most—I was there for 17 years before it got bought by BP.



Terri in front of the first female president of RMAG, Ninetta Davis from 1941.

While at Amoco I worked mostly on natural gas plays, both in exploration and development. Experience came in many forms. While working on the California team we got chased off an outcrop while doing helicopter-supported field work; apparently we had strayed too close to an illegal pot farm. While sitting an exploration well in Nevada, it was possible to drive 5 miles east from the basin we were drilling to the adjacent range where the rocks we were drilling through were exposed. I also got experience in the San Juan, Paradox, Arkoma, and Anadarko basins. I spent several years, and got my first major publication (Olson et al., 1997, AAPG Bulletin), from working on Hugoton Field in southwest Kansas. Highlights of my time with Amoco involved relocating—first to Tulsa for a year to attend Amoco's renowned Petrophysics School for a year of training complete with a business-unit-based project and report, essentially a second master's degree. Petrophysics appealed to me because it is very interdisciplinary, drawing on geology, geomechanics, geochemistry, reservoir engineering, and geophysics. While in Tulsa I met my husband Christof Stork, a research geophysicist who started work at Amoco's research lab while I was in Petrophysics School. Another relocation to Stavanger, Norway, involved doing petrophysical analysis on Valhall, a big oil reservoir in Cretaceous chalk. I got to go (by helicopter) out to Valhall in the middle of the North Sea when we drilled a replacement well on the crest of the structure, taking core and running the first NMR logs in a chalk reservoir. Christof and I and our son (now in grad school in Boston) were in Norway when BP bought Amoco. BP offered me a job in Houston, but I turned it down and took the package to move back to Denver in late 1999.



Terri and her husband in Iceland (2016).



In 2000 I got a job with Tom Brown Inc., an independent producer with offices in Denver and Dallas. A former Amoco colleague (another petrophysicist) recommended me to the Chief Reservoir Engineer at TBI who was the hiring manager. I came to understand from that and later job-change events that who you know really is important for career (and consulting) opportunities. I was at Tom Brown until it was bought by Encana in 2004.

Besides my Amoco networks (Denver colleagues and fellow petrophysicists), volunteer experience provided a great foundation for getting known in the local industry and beyond. Serving on the Publications Committee of the Rocky Mountain Association of Geologists (RMAG) eventually resulted in invitations to co-edit publications: the RMAG Outcrop (a monthly newsletter) and a book of papers on the Piceance Basin. My volunteer work in the publications arena locally led to serving on the AAPG Publications Committee, which I eventually chaired. Connections from these committees led to a request to edit a book for AAPG and even a job at EOG Resources when I was ready to leave Encana.

At Encana, I worked in New Ventures for a few years, with the most interesting project involving drilling through 10,000' of basalt in the Columbia River Basin in search of hydrocarbons in the Eocene sedimentary basin beneath. I also served as the lead in geoscience development; that position entailed recruiting, putting on training, and mentoring the next generation of geoscientists. Coordinating that development program got me acquainted with a few dozen geoscientists who were just starting out, many of whom are still friends 12 years later. (And most of whom are in the middle of exciting careers, whether as managers at Encana or BP, or doing technical work for SM Energy or various startups).

EOG Resources was a pioneer in producing oil from shale reservoirs. It was an exciting place to work, especially the first 5 years, with money spent on data acquisition geared to understanding controls on hydrocarbon production, and interdisciplinary teams to integrate and interpret the data. There was a lot of technology transfer, between divisions and among all the petrophysicists. The VP of Exploration asked me to coordinate efforts in the various offices around pore-scale imaging, which was shedding light on issues of reservoir quality including hydrocarbon storage and flow capacity in numerous "shale" reservoirs. Along the way I organized workshops, short courses, topical conferences, and sessions for professional society meetings (Denver Well Logging Society, Society of Petrophysicists and Well Log Analysts, American Association of Petroleum Geologists, RMAG, Unconventional Resources Technology Conference, etc.).

In 2014 I left EOG to join a technology company, a group focused on pore-scale imaging and related digital rock services. The company, FEI, had digital rock labs in Trondheim, Canberra, and Houston, all of which I visited. One of my roles was to expose the analysts and marketers to oil industry problems and processes. I also gave a lot of talks to promote the technology within industry. I'm an introvert, so that did not come naturally, but it helped to be passionate about the topic. The experience I gained and the people I got to know who were using imaging techniques lead to editing a book for AAPG: Memoir 112, Imaging Unconventional Reservoir Pore Systems. The Rocky Mountain Section of AAPG gave me their publications award in 2018, for a "publication that has had exceptional influence on developing new hydrocarbon plays within the Rocky Mountain region."

When FEI was in the process of being bought by an equipment company that was not interested in providing digital rock services, I got laid off for the first time in 34 years. While a shock at first, I appreciate the opportunity to work for myself on my own terms. I've been consulting (Digital Rock Petrophysics LLC) for the last 3 years. Most of my clients are former colleagues or referrals from former colleagues. Current projects include



Terri and her family in 1998

petrophysical analysis of mostly unconventional plays for private-equity-backed companies, SEM image interpretation for large independent oil companies, and a research project for a French multinational company. Working part time has allowed me to continue volunteer work, most recently serving as the 2018 President of RMAG, giving occasional guest lectures and serving on a master's thesis committee at Colorado School of Mines.

Matt (the CC paraprof) suggested I add some advice around the challenges of working in an unstable industry like the oil business. Speaking from experience, I recommend:

- * Live well within your means. We planned to live (mostly) on one salary, which gave us flexibility to pursue options (like moving to Norway) and prevented a crisis if one of us got laid off.
- * Network! Within a company, through professional societies, with friends from school—you never know where the next opportunity will come from. Find a mentor who can provide career advice and connections.
- * Choose stable companies to develop your experience and knowledge base. Startups may be fun but can suffer from a lack of experience (this is true in all fields), not to mention brutal hours.
- * Put yourself out there—give talks, write papers, solicit feedback—you will probably learn a lot, and get known as having skills and knowledge that other companies or institutions may want at some point.
- * Stay current. As my friend and mentor Matt Silverman says, not all the fossils are in fossil fuels. Go to professional society meetings (local, national, international if relevant). Read the literature. Do your homework when you start new projects.
- * Maintain a work/life balance. You need your sanity, whatever happens.

Devon Cole '13

I had the pleasure of speaking with CC alum Devon Cole, class of 2013, about her exciting geologic career. Here are some of her stories!

Matt Tankersley (MT): Could you give us a quick summary of your path to get to CC and how you became a geology major?

Devon Cole (DC): I took Earth Science in grade school which I remember being pretty into, so after showing up at CC with almost no plan, I added geology to the roster of things to check out. My first geo class was 4th block intro and on the field trip it was extremely cold and snowy—I-25 got shut down in New Mexico. We ended up staying in the basement of a church in Raton, NM. I think the high temp that whole trip was about 20. Later border patrol snuck up on us in southern, NM outside of El Paso. After that trip I was pretty convinced that getting a degree that involved these sort of trips was the right choice. My choice was confirmed in my second geology class which involved a week-long fieldtrip through Colorado's

ore deposits and hot springs. I was sold.

MT: Did you have any field trips during your time at CC that were the most memorable?

DC: After those mentioned above, other field trips continued to keep a pretty high standard. I'd say my first attempt at a strat section straight up a cliff near El Paso was memorable in that my fieldbook ended up totally blank after it got super steep. My igneous petrology class went to Big Bend which might be one of the most underrated National Parks with some unbelievably impressive geology that almost convinced me to be a high-temp geochemist. Our regionals trip to the PNW was the best way I can think of to end 4 years with an incredible group of people.



Great Slave Lake, NWT, Canada. Devon was based on a boat for this fieldwork and was looking at one of the best preserved depth transects across a Paleoproterozoic carbonate platform, slope and basin.

MT: What were some of your best memories at CC outside of geology?

DC: That's tough.. geology was just such a crew. The Aspen bike trip was one of my favorite block breaks for sure. It seems obvious, but living in the Rockies and getting to wake up and look at Pikes every morning is pretty tops. I also definitely miss the block plan and getting to think about a single subject/topic in depth for a month, instead of constantly being pulled in a thousand directions (with no block breaks!).

MT: What did you do after finishing at CC?

DC: I took a job as a geologist for a structural engineering company in Greeley, CO. I pretty quickly discovered that drilling and sampling soil around Greeley wasn't the most stimulating way to spend the day and decided to start applying to grad school. I also had the opportunity to come back to CC to paraprof a couple classes and finish off some papers with Paul.

MT: Congrats on finishing your PhD! What were some of the highlights of your experience at Yale?

DC: Thanks! I'd say the main highlight has been the (sometimes over the top) amount of traveling I've been lucky enough to do. I've done fieldwork on six continents ranging from roadcuts in



In the field in Patagonia, Chile, with an undergraduate field class.

India to remote helicopter-served locations in the Arctic. I've been a TA for classes that have gone to Patagonia and Great Slave Lake, Canada, and helped a student sample rivers in rural Thailand for her thesis. The fact that my work has taken me to places that I (and most people) would probably never see for any other reason is absolutely one of the best things about doing geology. I've also had the opportunity to be involved in a number of really diverse projects beyond the focus of my thesis which has kept things exciting; this includes work on modern carbonates in the Bahamas, geochronology in Zimbabwe and Botswana, and a statistical project on Ediacaran fossil assemblages. While this has been the chaotic antithesis of the block plan, I've never been bored.

MT: Where do you see your geologic career going in the future?

DC: I'm currently planning to stay in academia – I just started a post-doctoral position at Georgia Tech in January. This position will involve more computer modeling than I've done in the past and I'm going to be thinking a lot about how we look for planets outside our solar system that could host detectable biospheres. Eventually though, I hope to integrate a strong field component — actually going out and looking at rocks — with geochemical and modeling techniques to understand the broader biogeochemical evolution of our planet, and how that shapes our approach when we go out to look for life on other planets.

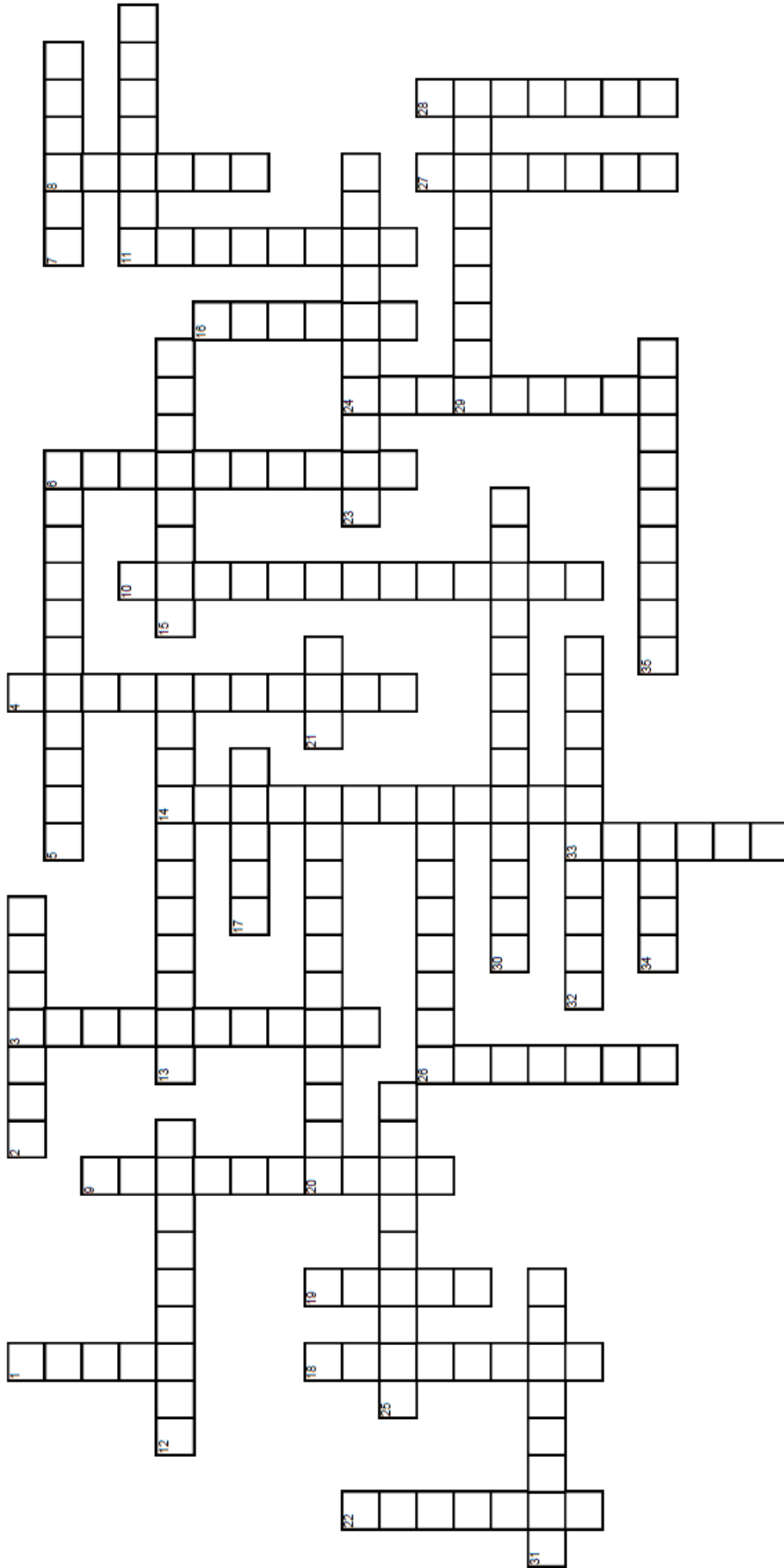
MT: Do you have any advice for current students or alumni who are thinking about going into a PhD program?

DC: The people you work with and for are incredibly important. You will spend a significant amount of time completing a PhD, so it's a good idea to seek out an environment where you'll actually enjoy doing so. Find a supervisor you can work and communicate with who is truly interested in your success. Ask other grad students in the program about their experiences—they will almost always give you honest answers about both the good and the bad. Also, reach out to CC alums! Geo has an incredible network, and there are a surprising number of us in academia right now at all levels. Everyone I've interacted with would be happy to chat about grad school. I am honestly thrilled when CC folks get in touch. Finally, the last thing I would say is keep some balance in your life. Depending where you are, some (most?) people will probably be workaholics... but take a look and see if they are really accomplishing any more in a week than you would if you worked for five days then took the weekend off to go mountain biking.



Devon and her PhD advisor, Noah Planavsky, getting snowed out on a llama packing trip in the Uinta Mtns, UT, where they were looking at some mid-Neoproterozoic shales.

Rocks!



ACROSS

- 2) Characteristic mineral of Marble
- 5) Big inside of small
- 7) Course-grained equivalent to basalt
- 11) ____ Correction, gravity correction that removes effects of local topography
- 12) Sedimentary deposit discovered through the damage of telegraph cables
- 13) Large igneous province some believed played a role in the K-T extinction event
- 15) Sedimentary structure formed by shaking
- 17) Raised fault bounded block
- 20) Major geologic feature of the Southern Alps of New Zealand
- 21) Small cavity in a rock filled or lined with minerals
- 23) Poorly sorted, matrix supported sedimentary deposit with large clast size
- 25) Type of rock that sparks when hit with a rock hammer
- 26) > 256mm
- 29) Opposite of syncline
- 30) hardest type of unconformity to locate
- 31) Layer of unconsolidated rocky material covering bedrock
- 32) Delamination of lowermost lithosphere from a tectonic plate
- 34) Last name of German geologist who created the scale for mineral hardness
- 35) Geomorphic feature in the Pikes Peak Granite found along Gold Camp Road

Answers on page 37

DOWN

- 1) Mudflow resulting from volcanic eruption
- 3) Type of tectonic boundary between Austria and Italy
- 4) Geologic feature with a dip of less than 45 degrees
- 6) ____ Dating, often used by geomorphologist
- 8) BaSO₄
- 9) Almost feldspar-free
- 10) "F" member of a QAPF diagram
- 11) Period after the Permian
- 14) Famous rock slab used to help decipher Egyptian hieroglyphs
- 16) Rock used for exfoliation
- 18) Arkosic conglomerate formation; think bacon
- 19) Large flows of basaltic lava on the Moon corresponding to low-albedo surfaces
- 22) Group of minerals containing a metal and a halogen element (Cl, Br, F, I, At)
- 24) Neogene species of shark recently featured in a 2018 thriller movie
- 26) Coarse-grained clastic rock with angular fragments of existing rocks
- 27) Second most abundant element of Earth's crust
- 28) Type of strike-slip fault with right-lateral motion
- 33) Last name of 19th century geologist who was onboard the "HMS Beagle"

Geology Day

April 7, 2018, Olin Lecture Hall

Student Presentations

Kayla Bronzo '18 "Using oxygen and strontium isotope ratios of tooth enamel from dinosaurs to infer patterns of movement over the late Jurassic landscape of CO and UT"

Bella Bussian '18 "Looking for post-PETM hyperthermals in the Piceance Basin, CO"

Kuba Chandler '18 "Soil conditions in the Piceance Basin, Colorado, during the early Paleogene period"

Ian Culver '18 "Oxygen Isotope Analysis of Hematite and Quartz in the Neoproterozoic Tava Sandstone as a Proxy for Paleoenvironment"

Mason Culver '18 "Multi-scaled Geometric and Textural Analysis to Determine the Transport and Emplacement Mechanisms of the Tava Sandstone"

Aaron Farquhar '18 "Ballistic Analysis Inferring Subsurface Hydrothermal Alteration and Mineralogical Seal Control on Eruptions at Whakaari Volcano, New Zealand"

Everett Smith '18 "Experimental Investigations of Surface Wave-Modified Turbidity Currents"

Skye Keeshin '18 "Shallow Ice Radar Analysis of the NW Ross Ice Shelf: Quantifying Ocean-Cryosphere Interaction"

Matt Tankersley '18 "Crustal Structure of the Ross Ice Shelf Region from Aeromagnetic Data"

Cole Thompson '18 "Mode of Emplacement of Tavakaiv Quartzite Injectites Using Dike Geometries and Detrital Zircon Provenance Analysis"

Tristan White '18 "Geochronology of Cambrian rocks of Thailand and Myanmar"

Tianran Zhang '18 "Sedimentology, lithostratigraphy and chemostratigraphy of Mesoproterozoic strata, Ningxia, China"

Sierra Melton '18 "Response of Carbon Fluxes to

Soil Moisture Variability across an Alaskan Tundra Landscape”

Turner Brett '18 “Numerical Modeling of LGM Glaciers & Implications for Late Pleistocene Climate San Juan Mountains, CO”

George Fowlkes '18 “New Bugs Found In The Lodore Formation, Jones Hole, DNM, Utah, USA”

Rowan Kowalsky '18 “Mapping Geothermal Production Potential”

Zoe Krauss '18 “Application and Evaluation of RAMMS Rockfall Modeling Software in Purau, Banks Peninsula, New Zealand”

Venture Grants

Year: 2017-2018

Susie Simmons '18 and **Everett Smith** '18
“Food Sovereignty and the Quinoa Boom: Exploring the Commodification of Quinoa in Bolivia “

Location: Bolivia: La Paz, Copacabana, Isa Del Sol, Santiago de Okola,

Advisors: Jeff Noblett and Chantal Figueroa

Senior Awards

Annual Awards

Year: 2017-18

Rocky Mountain Association of Geologists

Award:

Sierra Melton '18

Estwing Outstanding Senior Geologist:

Everett Smith '18

Matt Tankersley '18

Association of Women Geoscientists:

Tianran Zhang '18

William A Fischer Special Recognition:

Aaron Farquhar '18

Rocky Mountain Association of Geologists McKenna Scholarship (for a junior the previous year):

Kayla Bronzo '18

Buster Scholarships:

Aaron Farquhar '18

Tristan White '18

Tianran Zhang '18

Ian Culver '18

Mason Culver '18

Gould Scholarship Recipients:

Mason Culver '18

Aaron Farquhar '18

Ian Culver '18

Putman Scholarship Recipients:

Tristan White '18

Lille Haecker '19

Aaron Farquhar '18

Andrew Ceglinski '19

Isabella Bussian '18

Rhoades Scholarship:

Sierra Melton '18

William Fischer Endowed Fund:

Matt Tankersley '18

Everett Smith '18

Hannigan Family Fund:

George Fowlkes '18

Witter Family Fund for Geology Internships:

Student	Organization
Ellie Meyer '19	Denver Museum of Nature and Science
Drew Ceglinski '19	Denver Museum of Nature and Science
Ben Lloyd '19	Denver Museum of Nature and Science

Laura Davison '20	Denver Museum of Nature and Science
Annabelle O'Neill '19	Mountain Studies Institute
Helen Carter '20	Natural Resource Management Field Institute - Colorado Mountain College
Jun Miyama '18	Neptune & Co
Ian Culver '18 & Mason Culver '18	The Nature Conservancy
Fai Chanchai '20	University of Illinois
Zak Armacost '19	LongPath Technologies
Nerissa Barling '21	University of Hawaii

Student Conference Presentations 2018

GIS in the Rockies, Fall 2018

Dave Sachs '19 "Geodesign applied to an urban campus and its river reach: Colorado College and Monument Creek." 3rd place for best student poster presentation

Will Rundquist '19 "Monument Creek Project, Phase II: Enhancement of the Natural-Urban Interface through Geodesign"

AGU in Washington DC, Fall 2018

Matt Tankersley '18 "Aerogeophysical Analysis of Crustal Structures under the Ross Ice Shelf"

Zoe Krauss '19 "The Northern Gulf Anomaly: characterizing a continental-edge asthenospheric upwelling using seismic velocity perturbations"

Seminar Series Spring 2018

February 2, 2018 -- **Dr. Karen Alley**, University of Colorado Boulder, Institute of Arctic and Alpine Research, "Perspectives on ice shelf stability: Melting from above and from below"

April 13, 2018 -- **Dr. Francis Rengers**, Geomorphologist at U.S. Geologic Survey, "Recent Progress in Debris-flow Research"

April 30, 2018 -- **Dr. Jason Price**, California Institute of Technology, presented "Cooling ages change a paradigm: Normal fault movement on the Austroalpine 'overthrust', Central Alps, Switzerland"

May 4, 2018 -- **Roland LaForge** '72, LaForge GeoConsulting, presented "Seismic Hazard Assessment: Colorado in Particular"

Seminar Series Fall 2018

October 26, 2018 -- **Dr. Craig Lundstrom**, University of Illinois, "Don't take it for granite! Historical and new perspectives on making silicic igneous rocks"

February 8, 2018 -- **Dr. Justin Strauss**, Dartmouth College, presents "An Alaskan Perspective on the Evolution of the Arctic"

Recent Faculty Publications

Bold indicates Colorado College student/faculty

Myrow

Colleps, C.L., McKenzie, N.R., Stockli, D.F., Hughes, N.C., Singh, B.P., Webb, A.A.G., **Myrow, P.M.**, Planavsky, N.J., and Horton, B.K., 2018, Zircon (U-Th)/He Thermochronometric constraints on Himalayan thrust belt exhumation, bedrock weathering, and Cenozoic seawater chemistry: Geochemistry, Geophysics, Geosystems, v. 19, p. 257-271, <https://doi.org/10.1002/2017GC007191>.

Hughes, N.C., **Myrow, P.M.**, Ghazi, S., McKenzie, N.R., and DiPietro, J.A., in press, The Cambrian geology of the Salt Range of Pakistan: linking the Himalayan margin to the Indian craton: Geological Society of America Bulletin.

Hughes, N.C., **Myrow, P.M.**, Peng, S., and Banerjee, D., 2018, The Parahio Formation of the Tethyan Himalaya: the type section, thickness, lithostratigraphy and biostratigraphy of the best characterised Cambrian succession in the Indian subcontinent: *Journal of the Palaeontological Society of India*, v. 63, p. 1-18.

Kämpf, J., and **Myrow, P.M.**, 2018, Wave-created mud suspensions: a theoretical study: *Journal of Marine Science and Engineering*, v. 6, p. 1-21.

Myrow, P.M., Fike, D.A., Malmskog, E., Leslie, S., **Zhang, T.**, Singh, B.P., Chaubey, R.S., and Prasad, S.K., in press, Ordovician–Silurian boundary strata of the Indian Himalaya: Record of the latest Ordovician Boda Event: *Geological Society of America Bulletin*.

Myrow, P.M., Hughes, N.C., and McKenzie, N.R., 2018, Reconstructing the Himalayan margin prior to collision with Asia: Proterozoic and lower Paleozoic geology and its implications for Cenozoic tectonics, in Treloar, P.J., and Searle, M.P., eds., *Himalayan Tectonics: A Modern Synthesis*: Geological Society of London, Special Publication 483, doi.org/10.1144/SP483.10.

Myrow, P.M., Jerolmack, D., and Perron, J.T., 2018, Bedform disequilibria: Recent advances and geological applications: *Journal of Sedimentary Research*, v. 88, p. 1096-1113.

Myrow, P.M., Lamb, M.P., and **Ewing, R.**, 2018, Rapid sea level rise in the aftermath of Snowball Earth: *Science*, v. 360, p. 649-651.

Palacios, T., Jensen, S., Barr, S.M., White, C.E., and **Myrow, P.**, 2018, Organic-walled microfossils from the Ediacaran–Cambrian

boundary stratotype section, Chapel Island Formation and Random Formation, Burin Peninsula, Newfoundland, Canada: Global correlation and significance for the evolution of early complex ecosystems: *Geological Journal*, v. 53, p. 1728-1742.

Perron, J.T., **Myrow, P.M.**, Hupper, K., Koss, D., and Wickert, T.C., 2018, Ancient record of changing flows from wave ripple defect: *Geology*, v. 46, p. 875-878.

Smith, E., Daniller–Varghese, M., **Myrow, P.M.**, and Mohrig, D., in press, Experimental investigations of combined-flow sediment transport: *Journal of Sedimentary Research*.

Leonard

Leonard, E.M., Laabs, B.J., Schweinsberg, A.D., **Russell, C.M.**, Briner, J.P., Young, N.E., 2017. Glaciation in the Colorado Rocky Mountains, USA, following the last glacial maximum. *Cuadernos de Investigación Geográfica* 43, 497-526. <http://doi.org/10.18172/cig.3234>

Leonard, E. Winkler, S, Skoglund, R. Ø., 2017, Doctoral thesis review - Jansen, Henrik Løseth. 2017. Late Glacial – Holocene glacier fluctuations and climatic implications in sub-arctic northern Norway *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*. <https://doi.org/10.1080/00291951.2017.1416425>

Siddoway

Siddoway, C., Palladino, G., Prosser, G., **Freedman, D.**, and **Duckworth, W. C.**, 2019 accepted, Basement-hosted sand injectites: Use of field examples to advance understanding of hydrocarbon reservoirs in fractured crystalline basement rocks, in Bowman, M. (ed.), *Subsurface Sand Remobilization and Injection*, Geological Society of London Special Publication 18-140.

Colleoni, F., De Santis, L., **Siddoway, C.S.**, Bergamasco, A., Golledge, N., Lohmann, G., Passchier, S. and Siegert, M., 2018 in press, Spatio-temporal variability of processes across Antarctic ice-bed-ocean interfaces, *Nature Communications*, v. 9, 2289, <https://rdcu.be/ZLBI>.

Jensen, J. L., **Siddoway, C.**, Reiners, P. W., Ault, A., Thomson, S. N., MacInnis, M. S., 2018, Single-crystal hematite (U-Th)/He dates and fluid inclusions document widespread Cryogenian sand injection in crystalline basement: *Earth and Planetary Science Letters*, 500: 145-155.

Tinto, K.J., Padman, L., **Siddoway, C.S.**, Springer, S.R., Fricker, H.A., Das, I., Caratori Tontini, F., Porter, D.F., Frearson, N.P., Howard, S., Siegfried, M.R., Mosbeux, C., Becker, M., Bertinato, C., Boghosian, A., Brady, N., Burton, B.L., Chu, W., Cordero, S.I., Dhakal, T., Dong, L., Gustafson, C.D., **Keeshin, S.**, Locke, C., **Lockett, A.**, O'Brien, G., Spergel, J.J., Starke, S.E., **Tankersley, M.**, Wearing, M., Bell, R.E., 2018 accepted, Tectonic imprint on bathymetry drives Ross Ice Shelf response to changing climate: *Nature Geoscience*.

Noblett

Millikin, A. E., Morgan, L. E., **Noblett, J.**, 2018 in text, $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology and petrogenesis of the Table Mountain Shoshonite, Golden, Colorado, U.S.A: *Rocky Mountain Geology*, v. 53, 1: 1-28.

Pope

Pope EC, Boyd AJ, Rosing MT, Connelly JN, Bizzarro M. Earth's oldest meteoric water. In review.

van der Meer QHA, Scott JM, Le Roux P, Whitehouse MJ, Serre SH, **Pope EC**. Low d18O zircon xenocrysts from alkaline basalts; a window into the complex metasomatic history of the lithospheric mantle. In review.

2018, van der Meer QHA, **Pope EC**, Nielsen TDF, Sharp Z, Coble MA, Waight TE, Weatherley S. Light stable isotope (H-Li-O) investigation of hydrous minerals in the Gardiner Complex; preliminary insights in the roles of fractionation, outgassing and contamination and the quest for the water composition of the mantle source. Goldschmidt Meeting, Boston, Massachusetts. 14 Aug 2018, Poster.

2018, **Pope EC**. Greatest Theories in the History of the Universe: Continental Drift. Invited talk at Bloom: The Copenhagen Outdoor Science Festival.

2017, **Pope EC**. Tracking Earth's Disappearing Oceans and What it Tells Us About Conditions for the Origin of Life. Invited talk at the Natural History Museum of Denmark Annual Science Gala.

2017, **Pope EC**. The co-evolution of seawater d18O and dD. American Geophysical Union Fall Meeting, Abstract PP43-04, Talk.

Pope EC, Bird DK, Arnórsson S, Giroud N, 2016. Hydrogeology of the Krafla geothermal system, northeast Iceland. *Geofluids* 16:175-197. DOI: 10.1111/gfl.12142

Thanks to all the awesome alumni who have sent updates this year! We sure do appreciate it. You can always send us updates at precambrianbsmt@coloradocollege.edu



Cathy Whitlock '75

Congratulations Cathy (above) for being awarded the Distinguished Career Award for 2017 by the American Quaternary Association (AMQUA)!

Doug Haller '88

Doug recently co-chaired the Poster Session of the GIS in the Rockies (GISITR) annual conference. As co-chair, he instituted a peer review process whereby GIS professionals partner with student poster presenters to provide constructive critiques of the individuals' submission. This addition to the GISITR program was warmly received by both professionals and students and will become part of the annual event. The 2018 GISITR poster session included submissions by CC students:

- * Jordan Ellison: How Does Proximity to Predator Activity Centers Affect Nest Site and Success in Flammulated Owls (*Psiloscops flammeolus*)?
- * Alexa Hoffman and Francis Russell: Neighborhood Facilitation and Inhibition Drives Spatial Distribution of Seedlings and Saplings at an Abrupt Treeline
- * Kathryn Kummel (Palmer HS) and Michelle Kummel: Using 3D Drone-based Digital Models to Investigate the Fluvial Geomorphology of an Actively Eroding Arroyo

* Richard Yates: Shifting Representation: Rocky Mountain Fur Company Trade Network (1823-33)

* David Sachs and Will Rundquist: Geodesign applied to an urban campus and its river reach: Colorado College and Monument Creek

Doug also serves as member-at-large of the GISCO scholarship committee (GIS Colorado). Each year this committee awards a total of \$5000 to undergraduate and graduate students seeking funds to help meet the cost of education.

Ron Timroth '54

In 2008 I contacted 3 of my C.C. schoolmates on the 50th anniversary of our summer in Alaska prospecting for gold (1958). One of the 3 was able to go to Alaska with me, Maury Hammond, to look at areas favorable for gold mining. I bought 2 claims and staked other acreage and in 2009 went to Alaska for the summer with crew and equipment; I was the geologist, Maury was the geological engineer. This past November XII Caesars Gold received the BLM 2017 Hardrock Mineral Small Operator Award which recognizes achievement in reclamation. I went to the National Mining Convention in Washington, D.C. to accept the award. Unfortunately, Maury was unable to attend. It would have been even better for me to have had my old C.C. friend there who was so important in the initial phase of the mine and a dear friend.

Rose Vail Bloom '08

I've left the "big city" of Denver and headed south to Northern New Mexico, where some stops of my first (and last!) CC geology field trips happened to be. I am working at the Los Alamos National Laboratory, making power cells for the NASA Mars Rover. My husband, daughter, and I now live in White Rock, NM. Next time any

CC alumni (or current students!) want to visit what I think is one of the most beautiful places in the U.S., please let me know! I may not be practicing geology anymore, but I'd love to show off the geologic landscape.

Jamie Lytle King '68

My husband, Jim, and I live in Tucson 9 months of the year, and at our cottage on a small inland lake in Michigan during the summer. We are both fully retired and enjoy reading, listening to classical music, playing golf, and cooking. We've taken some wonderful trips related to geology. Going down the Colorado River through the full length of the Grand Canyon in dores was the trip of a life time for a geologist, as was the eclipse cruise in the Mediterranean. This last October I participated in our 50th reunion at Colorado College. Jim Wadell, another geology graduate also attended, and we had some time to catch up. I was invited to present one of the Tiger Talks for the reunion; my topic was "The Missing Gender, Women in Higher Education." For example, did you know that in 1968 there were 5 women professors (not lecturers) out of about 40 on the CC faculty? Now women comprise 48% of the faculty at CC. Big change!

Virginia Hill '15

I am enjoying my second year at Columbia Law School and looking forward to getting back to Colorado for part of this summer—I will be working in Denver. 2019 is a big year for Daniel Butler and me, because we will be getting married in May! We hope to be able to give the Smooth Move Award to a deserving geology alumnus at the wedding.

Dan Woodell '09

Dan and his wife Ivanka (also a geologist) continue to enjoy living in Vienna, finishing their PhDs, and watching their now

one year old son Teodor grow up, much more quickly than expected! The three of them are having a blast exploring Europe as a family.



Lou Derry and French President Emmanuel Macron.

Lou Derry '81

When Louis Derry walked out of Palmer Hall in 1981 he did not intend to study climate change, nor spend time with international politicians. Yet opportunities along the path of a career in earth science led Lou to Paris, where, in 2017 he accepted an award from French President Emmanuel Macron. Lou is one of 13 US scientists selected to "Make Our Planet Great Again," a research initiative of the French government to counter the US withdrawal from the UN-sponsored Paris Climate Agreement. "For me, the chance to work on some very exciting science questions with my French colleagues is very attractive," Lou says. "I will be collaborating with scientists at the Institut de Physique du Globe de Paris, where we will be looking at surface water quality and how it is affected by climate change. Climate change is having many impacts on the Earth, and one of them is increasingly variable and intense precipitation. Extreme rainfall events are becoming more common. This trend is expected to continue over the next several decades, and will lead to flooding in ways that our society has not seen before. While flooding is dangerous and damaging, smaller changes in water runoff can have impacts on water quality. The chemistry of stream and ground water that we use for drinking, washing, and irrigation is set by the

paths that water takes from land to sea. Understanding these pathways will enable us to understand and predict impacts on water quality in a changing climate."



Kuba Chandler '18

Bella Bussian '18 and I hiked the PCT after graduation and I am now living in Denver interning at the National Renewable Energy Lab. The photo is of the two of us on top of Forester Pass, the highest point of the PCT!

Emery Bayley 62'

In the fall of 1961 I arrived in Colorado Springs as a senior transfer student from Whitman College in Walla Walla, Washington. I had decided that I wanted to be a geologist after taking a number of courses from Dick Clem, the single instructor in geology at Whitman. At the time Whitman did not have a geology department and so, looking for a small college in the west with a good geology degree program, I settled on Colorado College for my final year of undergraduate work. Little did I know at the time, that my grandfather an great aunt had attended CC in the 1890's and, apparently, it was my great aunt Francis Bayley, that founded the Phi Beta Kappa chapter at the school.

In any event, I was absolutely delighted to

find a place where I could continue my education in earth sciences in the most perfect natural setting imaginable. In those pre-block plan days, the geology department was staffed by three marvelous individuals: Bill Fischer, Richard Pearl, and the late, great, John Lewis. This triumvirate were to give me a great basic education in stratigraphy, paleontology, structural geology, sedimentology, geomorphology, field mapping and the history of the science of geology.

I thrived. In fact, I even made the dean's list for the first time in my academic life. In due course, on June 4, 1962, I received my Bachelor of Science degree along with five classmates. I sometimes tell people that I got my geology degree from Colorado College in only one year, and it was the best year of my entire academic life.

Following graduation, I took a summer job with Bear Creek Mining Company doing mineral exploration work in southwestern Colorado under the direction of Felix Mutchler. I was based in Durango and spent the summer looking at and evaluating the potential of many old mines and prospects. That fall, I returned to my home town of Seattle and entered the University of Washington to study for a Masters in Geology degree.

I received my MS degree in 1965. That same year, I joined the staff of the American Smelting and Refining Company (ASARCO) exploration department based in Vancouver, BC. I spent the next eight years evaluating mineral prospects and managing a wide variety of exploration projects throughout Canada and Alaska. In 1973, I was sent to the Philippines to open a subsidiary exploration office under the name of Mission Exploration Company. We hired a half dozen Filipino geologists and staff and spent nine years conducting mineral property evaluations, and sampling programs throughout the country without any real success. I closed down the office in 1982 and returned to the states, settling in Spokane, Washington and becoming

ing a member of ASARCO's Northwestern Exploration Division staff.

The one truly successful event of my life in the Philippines was meeting and marrying my wife Lilly May, a college English instructor. We have been married for 43 years and have three children and three grandchildren with another due soon.

In Spokane, I worked on a variety of exploration projects the most important one was at Rock Creek in northwestern Montana. ASARCO had successfully develop the Troy Mine near Libby, Montana in the early 1980s and had discovered similar copper and silver mineralization in the Precambrian Revette formation about 30 miles to the southeast. A major problem was that the mineralized zone was beneath the Cabinet Mountain Wilderness near Noxon, Montana and that under the Wilderness Act of 1964, ASARCO had until the end of 1983 to prove commercially viable ore was present on each of its mining claims in the wilderness in order to preserve its rights to develop a mining operation. I was put in charge of designing a drilling program that not only would secure these rights, but also comply with federal wilderness regulations. It was a complex operation involving up to seven drilling machines and two helicopters but by the end of project, over a hundred thousand feet of drill core had been collected and commercial ore discovered on most of the company's wilderness mineral claims.

Today, the Rock Creek deposit is owned by Hecla Mining. It has inferred reserves of over 100 million tons of ore containing almost 149 million ounces of silver and 658 thousand tons of copper. Truly, this is a significant ore deposit that has yet to be developed due to intense local opposition and elevated environmental concerns.

The Rock Creek project turned out to be the high point of my mining industry career. In 1985, I was "downsized" from ASARCO and, after a year of "consulting", I changed my career path and became the first geologist with ECO-VA, a start-up environmental bioremediation company located in Redmond, Washington. I moved my family from Spokane to Bellevue, Washington in 1987 and started my life as an environmental geologist. It wasn't long before I discovered that my training in geology plus my experience in subsurface exploration were major assets in this new field.

Over the course of the next 12 years, I worked for a number of environmental firms in the Seattle area. I managed soil remediation projects, removed underground storage tanks, and conducted site evaluations for a wide variety of clients, including the US Army Corps of Engineers. In 1999, I joined the staff of ECOSS, a non-profit organization in Seattle and took over management of their Brownfield program providing technical assistance to King County's Brownfield Program funded by EPA grants. This gave me the opportunity to help many municipal government and non-profit organizations in the county to encourage the cleanup and redevelopment of contaminated real estate.

I also helped reorganize and revitalize the Northwest Geological Society in 1987 which had been moribund for years. I was a board member and president from 1989-90 and helped it to become the substantial forum for geologist and earth scientists in Seattle that it is today. I also rediscovered my teenage passion for collecting agates on the beaches of Puget Sound. This led to my joining the Bellevue Rock Club (BRC) where I could share this interest with like-minded individuals. For the past ten years I have been the Vice President and Program Manager of the BRC and continue to enjoy the excitement of rockhounding throughout the northwest and the company of folks who are interested not only in minerals but also larger geological topics like the Mount St Helens erup-

tion, the Channeled Scablands of eastern Washington, and climate change.

I retired from ECOSS last year and am mostly occupied in supporting my wife's thriving business as a Certified Court Interpreter in Tagalog, one of the principal languages of the Philippines. She is one of a few individuals certified as a court interpreter in that language by the states of California, Oregon, New Mexico and Washington.

Alumni Reunite

AGU Conference, Washington DC



Paraprof Party! 5 current/past paraprofs showed up at the AGU alumni night. From left to right: Claire Lukens, Matt Tankersley, Zion Klos, Kira Olsen, and Tyler Doane.



Students Annabelle O'Neill and Laura Davison standing on columnar basalts during the Iceland Region Studies trip. Photo by Steve Weaver

Rocks!

1 LAHAR
2 CALCITE
3 GABBRO
4 THYRITITE
5 PORPHYRY
6 COSSMITE
7 GABBRO
8 TURBIDITE
9 ULTRAMAFITE
10 FELDSPATHOIDS
11 TERRAESTE
12 TURBIDITE
13 DERGENT
14 RAPID
15 SELDSPATHOIDS
16 PUMICE
17 HORST
18 QUANTAN
19 MARTIA
20 ALPINE
21 VOLCANIC
22 HALIDREGOLIN
23 DNIC
24 AMEGALLODO
25 BRECCEIA
26 QUANTAN
27 SILICON
28 DETRITAL
29 ALLODO
30 DISCONFORMITY
31 REGOLIN
32 FOUNDATION
33 MOHRWINN
34 MOHRWINN
35 CORESTONE



Mud cracks near geothermal area near Myvatn, Iceland
Photo by Steve Weaver

Dear Colorado College Geology Alum:

We hope you have enjoyed the 2018-19 edition of the Precambrian Basement, CC Geology's annual alumni newsletter. We would love to hear what you're up to, where you've been, and where you are now. Please fill out this form and return it to:

The Precambrian Basement
Colorado College
Geology Department
14 E. Cache La Poudre St.
Colorado Springs, CO 80903

OR: email us at precambrianbsmt@coloradocollege.edu

We love pictures!

Last Name _____ First Name _____
Maiden Name or Nickname _____ Year of Graduation _____
Current Address (street) _____
City _____ State _____ Zipcode _____
Home Phone _____ Business Phone _____
Email _____ Website _____

Current Employment or Graduate School Info:

Recent Events, Exciting Adventures, and other Comments

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