

PC Basement

THE COLORADO COLLEGE GEOLOGY DEPARTMENT



2011

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Cover Photo:

Athabasca Glacier, Alberta, Canada

From Regional Studies trip to
the Canadian Rockies, 2011

The Precambrian Basement
2011

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Hello Everyone!

As Chair of the department it is my pleasure to welcome you to this year's edition of the Precambrian Basement. There is a lot of great stuff in here for you to read: updates from alumni and faculty, stories from students, and other goings on in the department. Therefore I'll keep you just long enough to mention a few highlights and to offer a few thanks.

On the faculty side of things, this year saw another member of the department receive an award from the National Science Foundation. This time it was Paul, and strangely enough his research will require extensive travel to Far Away Exotic Places. Christine took full advantage of her sabbatical to concentrate on research and course development, and also to travel the world (although she seems to have a strange preference for Far



Banff National Park, from Regionals 2011. Photo by Vivian Spiess

Away Exotic COLD Places). Megan spent the year delving into her research projects, and she mentored a huge number of students along the way. Eric has been going full-bore on his funded research projects along with modifying his course offering, and Jeff has been doing Deany things that will leave him well prepared to take over the Chairmanship of the geology department someday. As for students, many are involved in research projects, either with CC faculty, with the Keck Geology Consortium, or with other REU (Research Experience for Undergraduates) groups. Many have, or soon will, present their results of meeting of the GSA and the AGU. Seniors took a trip to Canadian Rockies as part of their Regional Studies/Capstone experience, and many other great field trips have taken place over the course of the year (as usual). Read on for more details on all of these topics!!

As for thanks, the paraprofs Beth and Wes have done a great job keeping us in line, and in getting this edition of the PCB to press. Chris Krugh stayed on as a visiting faculty member in the department for a second year, this time utilizing more of his geochronology expertise in his courses, and we thank him for his efforts in offering quality instruction to our students. Claire Lukens ('04) kept the bar high when it came to teaching our summer introductory geology course, and it was great to have her in the department again. And of course no 'thanks' would be complete without mentioning the (endless?) contributions of Steve Weaver and Mandy Sulfran. Steve continues to contribute to a variety of courses and he continues to keep things operating smoothly around the department. His big activity this year was overseeing the replacement of our old XRD with a brand new instrument. Mandy has remained on top of the seemingly endless changes to college procedures and software, while at the same time making sure that I don't run the department into the ground by missing deadlines, forgetting to pay bills, etc. We (!?) would be in dire straights without her.

To conclude this brief introduction to the PCB, let me note that one of the highlights of my year was visiting with alums at the AGU meeting in December and catching up on careers, interests, home lives, etc. I think I speak for all the faculty members when I say that these 'family reunions' are special to us, and I would like to encourage all of you to keep on sending updates – we really do love to hear from you!

Have a great year!

Henry Fricke

Geology Department Chair



MEGAN ANDERSON
(Geophysics)

I have spent the year knee-deep in data analysis and mucking about with interesting interpretations about crustal terrane boundaries in the Seattle area; fault structure, the earthquake cycle, and mid-crustal decollements under the Sierras de Córdoba, Argentina; and Archean-age lithospheric deformation preserved under the Bighorn Mountains in Wyoming. All of these explorations fall under the umbrellas of my major research projects that I've been carrying along for the last few years in collaboration with many current and former CC students. Drew Thayer ('11) presented his results interpreting frequency-dependent shear-wave splitting in terms of Wyoming Archean craton structure at the American Geophysical Union meeting in December. My current research student, Megan Hurster ('12), is finishing data analysis started by Drew and the other Keck students working on the Bighorns project last year. So far all the students have produced 1100 individual shear-wave splitting results for the region—a global record I think for a seismic network of this size. Mindy Solomon ('08) had a poster next to Drew's and we are going to collaborate this spring creating seismic models to match Drew and Megan's data. We again did a happy hour with alumni at AGU this year—it was great fun to see everyone and we had somewhere between 15 and 20 alums attend. Look for us again next year (and those who took pictures, can you send them to the department??).

I taught two FYEs in 2011, including the second iteration of NS160, Mathematics and Geology of the Great American Desert, co-taught with Amelia Taylor in the Mathematics Department. Hopefully we have some majors from that class, after all, how can you say no to a major that takes you to the Grand

Canyon (see picture) and Yellowstone? Kira Olsen ('11) came back to paraprof for the geology portions of the class. I'm also excited to take part in teaching part of a course this coming summer in the MAT program. The course is for teachers in science and math—I will be teaching adapted versions of the projects in NS160, focusing on Front Range fluvial systems and water development issues. This summer I am also undertaking a new small project in collaboration with Esteban Gomez in the anthropology department surveying a field site in Costa Rica for a future excavation. Magnetic anomalies reveal hearths and refuse piles in areas occupied by humans, so we will be creating a magnetic map of the area to help focus excavation on important locations. This is my first project under the umbrella of "geoarcheology", so that should be a fun new learning experience!

Last summer I rode 300 miles across MN with my parents, and though my dad fell and broke his collarbone on the first day (he's ok), we still managed to have fun. I'll be riding again this summer with my husband joining the ride through northern Minnesota. My attempt at a marathon in the fall failed (doh! My knees weren't *quite* ready), but I did a record 19 mile run in preparation without injury. I'm going to try again next fall.



Megan (third from right) with her GY/MA FYE students in the Grand Canyon this fall. Kira Olsen ('11) is second from right.

HENRY FRICKE
(Geochemistry)



Hi All! The fact that you are reading this means that my Chairmanship hasn't yet led to the demise of the department. I am getting a little more comfortable with the ins and outs of the position, and although it is clear that

I am not a born administrator, it can be fun to get a lot of college and department information first-hand rather than through the grape vine.

On the teaching front, I began 2011 by teaching an FYE course with Megan Anderson (she did a GY140 block, while I did EV128 'Introduction to Global Climate Change'). The highlight of my course was developing a project around water use and climate change in the San Luis Valley. This is such a beautiful part of the state, one where the geologic setting and climatic conditions plays a huge role in influencing human activity, and with Eric Leonard's help I look forward to building on this project in the future. I followed this FYE by co-teaching Historical Geology with Paul during block 8. I was glad to have Paul take the lead on all things Paleozoic and older, and I was equally glad to make sure that the students learned something about the Mesozoic and even the Cenozoic! In the fall of 2011 I co-taught one block of GY210 with Paul and kept hearing about something called 'HCS'. I am still not sure of the significance of this mysterious acronym, but I did learn a lot from Paul about carbonate geochemistry! Lastly, I taught a 'regular' (i.e. non-FYE) GY140 for the first time in about three years. The class stayed at the Baca Campus (my first-ever visit), we went to New Mexico, and we even mapped stuff. Teaching this course was a nice reintroduction to students in departments outside of geology, and I really had a good time with a

good group of kids.

When it comes to research, I am happy to report that a paper focusing on the behavior of Jurassic sauropods (finally) came out. I am particularly proud of this paper because it is published in Nature – my first ever in this journal – and it features two CC students as co-authors. I was also part of a team that utilized a new paleothermometer to study the body temperatures of these animals, and so 2011 seems to have been my year of 'sauropod science'. Moving away from the Jurassic period, a colleague and I have completed a manuscript that describes the height and extent of the Sevier highlands during the late Cretaceous, and we are anxiously awaiting reviews. Work that focuses on the impact of Paleogene hyperthermal events on terrestrial environments is ongoing and expanding. This summer students and I undertook preliminary chemostratigraphic investigation of section in the Wind River Basin and the Huerfano basin, and we continued to build on our study of these events recorded in sediments of the Bighorn Basin. It is great to have so many great rocks so close to home, and so many questions waiting to be answered!!

Finally, life outside the department continues to be a joy. My oldest kid is going to middle school next year (!) and we are contributing mightily to the 'boat fund' of our local orthodontist. Both kids are becoming climbing gym rats, and this keeps them busy when not in school etc. Buddy-the-dog is now 13 or so, and is either losing his hearing and eyesight, or he has decided that he no longer has to listen to me (sort of like my kids now that I think about it). I left him at home for the summer field season – the first time ever - and I am not sure he has forgiven me. He still comes along on shorter trips, however, to protect me from the rabbits.

As usual I hope all is well out there in alumni land, that you'll update us with your notable events, and that you'll stop by and visit us if you can!

CHRIS KRUGH

(Tectonics/Structure)

This year, my second as a Visiting Assistant Professor at CC, has been a blast. The fun started with the Regional Studies Course when Paul and I explored the northern US and Canadian Rockies with great students. We saw some fantastic stratigraphy, investigated classic structural geology, and learned several new songs along the way. Upon our return to CC, I thankfully



had a non-teaching block to help get those songs out of my head. I started work on a research project investigating patterns of footwall exhumation and fault growth in the Sangre de Cristo Range and hope to collect samples for thermochronologic analyses later this year.

Fundamental Geological Methods, co-taught with Megan, kept me very busy during third block. Fieldwork in the Huerfano Basin in the second week of the block showed me first hand the benefits of double sleeping bags and the frustrations of frozen water bottles. After finally thawing out, I moved on to teach Geology in the Media fourth block. This course focused on current events in geology including the March 11th Tohoku earthquake and tsunami in Japan, the VA and CO earthquakes, and other topics related to natural hazards, energy, and the environment. A highlight of the course was a visit to Bishop-Brogden Associates, Inc. where we learned about CO water issues from Chris Sanchez ('94) and Tim Crawford ('00). The remainder of my school year is going to be spent applying for academic positions in Structure/Tectonics, teaching two blocks of Physical Geology and getting ready to teach Dating of Rocks, Tectonics, and Erosion in Block 8. I've had a great experience during my time at CC and my dog Madie and I will definitely miss the Geology Department. Right now, Madie is just happy that it is finally

PAUL MYROW

(Sedimentology/Stratigraphy)



Best wishes to everyone. I began last year by teaching Regional Geology to a class of 25 seniors in collaboration with our one-year visitor Esti Ukar. We spent just over two weeks in Death Valley, and then went for a week to San

Salvador, Bahamas. It was a great trip! I also taught the Regional Geology class in the first block of this year, in this case in the Canadian Rockies. I drove close to 4,000 miles in three weeks and ran the students and myself ragged. I am ending the year with Invertebrate Paleontology, and the class trip was epic, camping out in New Mexico and west Texas in December in the snow, hail, and cold rain.

I took two trips to Korea to work with colleagues at Seoul University on Neoproterozoic and Cambrian rocks. One visit included a side trip to north China. The Neoproterozoic study involves a possible Snowball Earth deposit, which I examined with CC student Zach Snyder and Sam Bowring, a professor from MIT. We sampled ash beds and ancient glacial till deposits with the hopes of dating the glaciation, which is probably the first recognized example from the North China tectonic block (N. China and Korea). I also spent two weeks in the Yukon Mountains with my ex-advisee Justin Strauss, who is now a PhD student at Harvard. We brought along a trilobite expert and worked on the sedimentology and trilobite biostratigraphy of his thesis rocks, while trying to avoid grizzlies.

This year my colleagues and I published a paper in the journal *Palaeo-3* with three ex-advisees (J. Strauss, J.C. Creveling (also at Harvard as a PhD student), and Karri Sicard (U. Wyoming PhD student), along with a German postdoctoral fellow, and an emeritus of the USGS who is an expert on the De-

vonian. I developed a project for my student Annie Hanson to continue this work in western Colorado (Ouray and Durango). I took Annie to Poland to work with a geologist I contacted about looking at a Late Devonian extinction event. We met up with Sam Bowring again in Warsaw and sampled ash beds in the White Mountains in order to constrain the timing and duration of the event, which we see recorded in rocks in the western U.S., including Colorado.

I was awarded an NSF grant to continue my Himalayan work, so I will be doing more trips to India. I also tried to get funding for experimental work that I started at MIT, but did not get the grant, so I will try again. That work, which involves the study of the effects of changing wave conditions on small ripples, is being done in a flume that I built with my colleague at MIT. I have a senior student (Tom Ashley) looking at some of the data, which consist of time-lapse movies of the changes in ripple geometry over about 20 hour periods (one photo every 30 seconds).

In August I spent two weeks rafting the Colorado River through the Grand Canyon with a CC alumni group. Met a great group of people and we screamed our way through the many rapids, including Lava Falls. I drew the long strong straw, so I was able to ride through the falls in a wooden dory made by, and navigated by, a legendary boatman of the river. It was exciting, to say the least!

I spent November of this year in Antarctica working with a Swedish and Australian group of paleontologists in the Transantarctic Mountains. I published a paper in 2002 describing fossils that I collected from a Lower Cambrian site there, and they wanted to return to look for more fossils. We found a remarkable suite of fossils on this trip. Our trip was earlier in the summer than I had worked in the past, and it turns out that it is quite cold in Antarctica at this time of year. No one ever told me! The landscape is amazing and it

was a great adventure.

As for my free time, I have been writing more songs and preparing to record a new CD. Other than that, life has been great and fast paced as usual. Please keep in touch and stop by when you are in the Springs.

ERIC LEONARD

(Geomorphology/Glacial Geology)



OK! So this is my 31st year at CC, but I still haven't caught up to Jeff! I spent the year a bit more at home than last year, but I did manage to sneak off to Europe once (see below). I also taught a bunch of courses – some for the nth ($n \gg 1$) and some for the first time. Last fall (2010) I team-taught (first with Henry and then with Paul) our new two-block, second-level, core course entitled “Fundamental Geological Methods and Rocky Mountain Evolution” (scary title, no?). Lots of fun, and I even got to teach structure again for the first time in a decade or so. Since then I've taught a Senior Seminar course on “Tectonics, Climate, and Topography”, and Geomorphology, Paleoclimatology, and a couple of Intro classes. All fun, but no long regional field trips – I ceded those to Paul and visitors Esti Ukar and Chris Krugh for the last two years. However, Megan and I have a great regional trip up our sleeves for next fall.

My research work over the last year was primarily in the Rocky Mountains, and in front of the computer. As part of an ongoing NSF-funded project I spent four weeks in the field this summer in the Absoroka Mountains of Montana, the Teton and Snowy Ranges of Wyoming, and the Colorado Sangre de Cristo, working with four CC students and colleagues from SUNY-Geneseo, University of New Hampshire, and the Idaho National Lab. We mapped deposits and landforms

of the last glacial maximum and sampled moraine boulders and polished bedrock outcrops to try to develop Cosmogenic Radionuclide-constrained chronologies of the last glacial maximum and the subsequent deglaciation in all four ranges. Most of the samples are currently being processed, so in next year's Precambrian Basement we may have a great story for you. The modeling work on the project is also proceeding apace, although sitting in front of the computer isn't quite as satisfying as the fieldwork.

In midsummer I traveled to Bern, Switzerland to present the initial results of the Rocky Mountain project as an invited speaker at the 12th Congress of the International Union for Quaternary Research. It was a great meeting, and afterwards our daughter Susan took the train up from Paris (see below) to meet me for a few days hiking (first in the rain, later in the clouds, but finally in the sun) in the Bernese Oberland. After that, we took the train back to Paris for a few days of shameless culinary and cultural indulgence before heading back to finish the field season in Colorado.

So, who among you actually believes me when I tell you that Julia is a senior in college? She spent her junior year abroad at Edinburgh, taking classes at the University and interning and campaigning with three Labour Party members of the Scottish Parliament. She is now back for her last year studying political science at Sarah Lawrence College trying to figure out what's next. Susan, who is a junior in high school this year (really??), spent the school year in Connecticut and then spent a chunk of her summer staying with a family just outside Paris, before coming to join me in Switzerland. She is trying not to figure out what's next, although we have gotten her to look at a few colleges. More on that in next year's PCB.

Lisa continues working as community outreach nurse for Penrose Hospital, but now, to make her life more hectic, she has decided to start teaching at UCCS as well. Where

does she get that energy?

I returned a few weeks ago from AGU in San Francisco, where we had a get-together with CC alums at the Thirsty Bear (where else?). A bunch of you were there and it was great to see you. I'm always amazed at the great things you end up doing, in spite of our best intentions to derail you from serious pursuits.



JEFF NOBLETT

(Petrology/Environmental Geology)

Greetings,

This is looking like either my final or more likely my next to last year in the Dean's Office. With Susan Ashley returning to the faculty, I may go one more year to assist with a transition. It's strange to discover that I have been in this office longer than many full deans around the ACM. Ah the skeletons!

I have been working with one thesis student on an Iceland Keck project. She has discovered the joys of point-counting but a new geochemical program is making her life easier than some of you all had it, though a very remote field area largely covered by landslides and ice allowed her the real geology experience.

This has been a year of travels - from Deans' meeting in San Francisco to five trips home to my parents as my father succumbed to cancer (at 85 years) kept me moving. Jenny and I also took our real honeymoon a year late to Scotland for 17 days. We spent a couple of days in Edinburgh admiring the volcanic hills (climbing Arthur's Seat) and lovely red sandstone buildings; then grabbed a car and drove to Cairngorms National Park and old birch forests in glacial valleys; up north to Ullapool to see the great thrust and sun that barely set; over to Skye for a week on an old croft - saw Viking

ruins, amazing lava flows on the Quireag, hundreds of meters of the Torridonean sandstone, hiked through a bog in a downpour (the only one) towards but not quite to a magma-mingling locality that we shortcut and retreated to the Talisker distillery (suspect the department did not do that on its field trip to Scotland, but then this was a honeymoon). I had barely returned home before ACM called and asked me to join a study abroad review team of its Tanzania program. So right after Thanksgiving (and six shots later) I spent 66 hours travel time to spend 70 hours in Dar es Salaam for the review! Had a delightful time with some good people - and noticed that the moon was waxing backwards (mirror image) from what it does in the northern hemisphere. Guess I don't spend enough time south of the equator.

Bottom line - a good year to be part of CC faculty and staff are always thinking of ways to enhance the education we provide - and I look forward to being back in the classroom sometime.



CHRISTINE SIDDOWNAY
(Structural Geology/Metamorphic Petrology)

Hey, friends! The past year was a great one, alright - involving a fair amount of world travel, the chance to see a good number of CC Geology alums in one place or another, several utterly new research projects, and a test of winter-season stamina in Canada (sabbatical leave at University of Calgary). It was a very memorable juxtaposition, last January, to finish up field work in Antarctica—where the midsummer daytime temps in coastal areas are a few degrees above freezing, plus there are 24 hours of daylight - then go to Calgary, Alberta, a city steeped in the

depths of winter cold, with barely more than six hours of feeble, low-angle sun illumination. The temps remained securely below -20°F for three weeks, without rising (and did I mention that it was dark?). The temps did fluctuate some, of course, the subzero temperatures continued right through April and into early May! I'm happy to report that my husband Mike and I (both born and raised in the states along the north edge of the Lower 48) still have what it takes... and that our doted-upon Labradors (Pearl and Bessie) toughened right up, too.

Since we were in Canada, anyway, we took a jaunt on over to the West Coast to visit our good friend Steve Quane who has established himself as a founding member of Quest University in Squamish, BC. Quest is a new Block Plan school - but by no means is the institution "copying" CC. What an innovative place, with individualized academic schedule centered around a well-formulated question! A young, energetic faculty, with Steve at the helm... those of you who know Steve can fill in the rest! CC and Quest have an agreement for student and faculty exchanges (I certainly can think of a few people who would take advantage of all that Squamish, BC has to offer). Carrying on down Vancouver way, we had a visit with the UBC contingent (SQ's progeny?) of Betsy Friedlander, Jenny Haywood, and Dan Woodell, together with Vancouver mining executive Matt Rosales. Had a great Geo meal of fresh fish at Betsy's place; thanks, Bets! We next visited Rose Vail Bloom and Julia Labadie at Western Washington U., and also Scott Linneman, another longtime friend who once taught as a visitor in CC Geology (well, that is, we spent the evening shouting to be heard at the thesis-defense celebration we joined in on at the "Copper Hog" in Bellingham).

The field research projects and publications this year have been fun and diverse: I've begun to use hafnium and oxygen

isotopes to fill out the story of deformation-induced movement of granite melt in a transtension zone (Antarctica); undertook a joint effort on a publication that is truly in the liberal arts realm – its title contains such terms as syncretism and anthropization, and it uses Red Rocks Park in the Front Range as an example(!); am on the fence about whether to take on the task of mapping the Precambrian basement in the Bighorn Mountains because it needs doing (do I have it in me to do this again?); and most recently have begun the task of using paleomagnetism to determine the emplacement age of intrusions that lack any other geochronometer (with the help of an industrious CC Geology sophomore, Dave Freedman). There are new classes, too: “Rocks and Ruins” at the entry level, explores the connections between catastrophic geology and the demise of civilizations, and a senior-level research class that uses GIS on everything from fully glaciated regions of Antarctica to petrologi-

MANDY SULFRIAN

(Administrative Assistant)

Hi! Summer was fun and full of travel to visit family and friends. I still work in the office two mornings a week during the summer, but it's nice to get out of town occasionally.



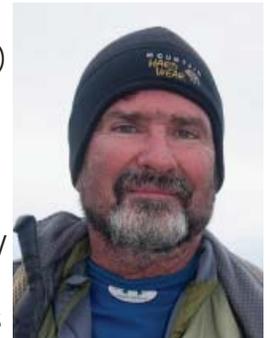
In October our son, Chris, married his sweetheart, Shelly, at the Denver Botanic Gardens. They lucked out, weather-wise, and it was a beautiful wedding. Our granddaughter, Kaylee, is getting so big! She's 2 ½ now and really at a fun age. Our daughter, Kate, and son-in-law, Matt, are hoping to move from Grand Junction to Colorado Springs in the next year, so I'm really looking forward to having more time with all of them.

Can't believe it's already 4th Block! The year is sure speeding by. We have some

great Geology majors this year, full of energy and fun to be around. If you're in Colorado Springs, stop by sometime and meet some of them; they are impressive! Also, please make sure that you send in your email address to precambrianbsmt@coloradocollege.edu or use the update form enclosed so you're sure to hear of any events we're having.

STEVE WEAVER

(Geology Technical Director)



It has been another busy and exciting year as Geo Tech Director supporting faculty and students in many class and research endeavors. The big equipment news for the department is that we have acquired a new Panalytical Xpert Pro x-ray diffraction unit to replace our ancient and barely functional Phillips machine purchased in the late 1980's! The new unit was installed in October and is state of the art with fabulous new software. Plans for use include more incorporation in courses as well as student research projects.

My name and recognition is growing in the photography world and this past year I was one of the organizers of the Geological Society of America's photography contest. I acted as one of the judges and also printed all of the accepted images that were on display at GSA's annual meeting in Minneapolis. I also was tapped by the American Mountaineering Association to be one of the jurors along with a photo editor from National Geographic for the Environmental Photography Exhibition. As always you can check out my work at my website: www.stephenweaver.com, and follow me on Facebook and Google.

On the personal side I will become a grandfather for the 4th time when Carolyn delivers a new granddaughter in June!

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Eric Leonard

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"King" stromatolites on the Regionals 2012 trip.

Henry Fricke

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Megan Anderson

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Christine Siddoway

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Paul Myrow

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Myrow, P.M., Strauss, J.V., Creveling, J.R., Sicard, K.R., Ripperdan, R., Sandberg, C.A., and Hartenfels, S., 2011, A carbon isotopic and sedimentological record of the latest Devonian (Famennian) from the Western U.S. and Germany: *Palaeogeography, Palaeoclimatology, and Palaeoecology*, v. 306, p. 147-159.

Active NSF Grants

It has been a big year in the department for NSF grants. There are 6 active grants within the Geology Department.

Christine Siddoway

Collaborative research: Polyphase Orogenesis and Crustal Differentiation in West Antarctica

Research at Undergraduate Institutions: Development of an On-line GIS Repository of Geological Data from the Ford Ranges, Marie Byrd Land, & Application to Cenozoic Paleogeography

Megan Anderson

Collaborative Research: Structure of the Nazca slab and Sierras Pampeanas

Megan Anderson & Christine Siddoway: Collaborative Research: Formation of Basement-involved Foreland Arches: An Integrated EarthScope Experiment

Paul Myrow

Collaborative Research: RUI: Stratigraphic test of the tectonic assembly of equatorial peri-Gondwanaland: a Himalayan perspective

Eric Leonard

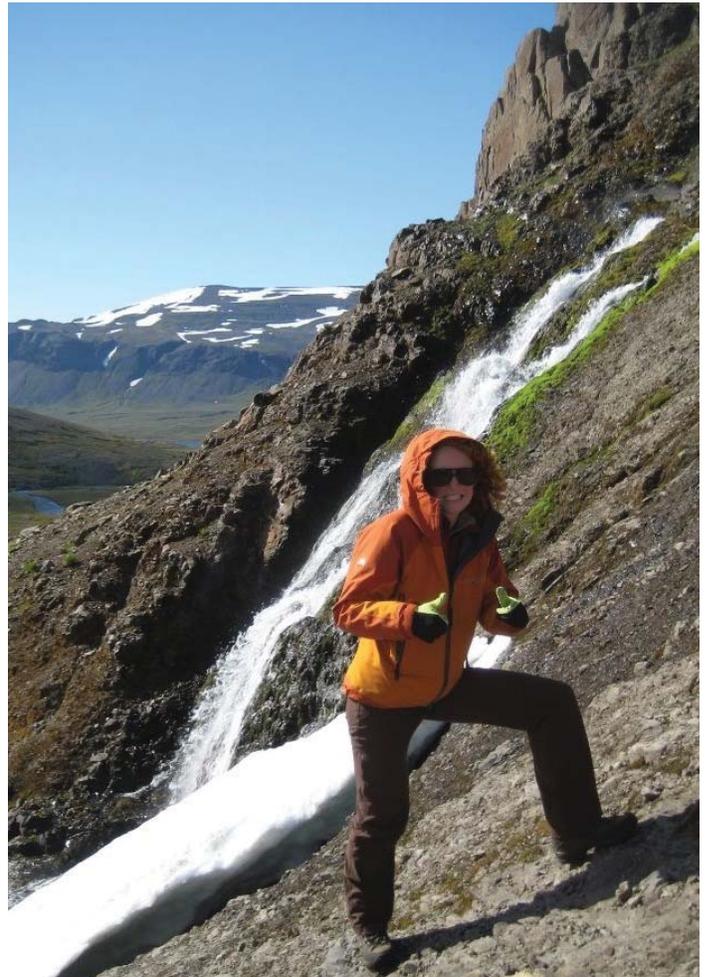
RUI: Collaborative Research: Glaciation and Climate Change in the Rocky Mountains During the Last Glacial Maximum and the Subsequent Deglaciation

Student Research

Petrology Research gets Icey

Erica Wineland-Thomson '12

This summer I participated in a Keck Consortium project in Iceland. We were a group of 6 students and 3 professors from different universities such as Smith College, College of Wooster and University of South Dakota. Our field site was in the Northwest Fjords in a fjord called, Hrafnfjordur. Every day we woke up early, headed out to our field sites throughout the Fjord, returned for dinner to discuss what we had discovered that day and then watched the sun set at 10:30pm every night (we never used headlamps!). I had to cross a glacial stream (source of the stream was 3 km away!) to get to my field



Erica at her field site in Iceland.

site, which was a 45 minute hike. The stream definitely woke me up! I was lucky and my field site covered all different kinds of igneous rocks; I took samples of basalt, andesite AND rhyolite back to the States with me! After Iceland, we spent long hours in the lab at the College of Wooster sawing, crushing, cleaning and measuring our 20 samples to create thin sections, pellets and fused disks. I had a wonderful experience with the other students and professors and learned so much throughout the collecting and preparing processes. I can't wait to begin analyzing!

Internship at the Polar Geospatial Center: Creating stereoscopic satellite Imagery for 3D mapping of geologic structures in West Antarctica

Elle Emery '12

This summer I was given a great opportunity to learn how to process Antarctic satellite imagery using GIS and ERDAS programs at PGC (Polar Geospatial Center) on the University of Minnesota campus. The intensive computer work was coupled with significant geologic research focused on Neogene volcanoes in Western Antarctica (WANT), specifically Marie Byrd Land (MBL). Along with Ashley Contreras '12, I worked with Christine Siddoway as a part of her NSF funded research in WANT. My work was focused on MBL volcanoes as a priority area to complete the processes involved in creating satellite imagery.

First, I completed the process of orthorectifying panchromatic and multispectral imagery. Orthorectification is the act of processing an aerial photograph to geometrically correct it so that the scale of the photograph is uniform and it can be measured as a map. Once we orthorectified

all of our imagery (286 images!), we then created DEMs (digital elevation models) of the glacial and volcanic terrain. A DEM gave us the topographic relief in the region. DEMs are created using ERDAS Imagine's LPS enhanced automated terrain extraction algorithm. The program creates "matches" between two adjacent 0.5 meter resolution stereoscopic images and interpolates an exact point. In my case, the goal was to come up with volcanic imagery that shows exposure of the geology with as little vertical exaggeration as possible. The hope was that this final overlay would represent an accurate and beautiful view of a volcano and the surrounding structures in the ice sheet (and in Mt. Sidley's case we got it—see figure). Unfortunately the mathematical algorithm has some errors still, so I was unable to complete this entire process for multiple volcanoes.

My senior thesis work involves the work from this internship as well as artistic interpretations of MBL volcanoes inferring the change in ice level over time as well as development and growth of the volcanoes. In October I had the opportunity to present a poster at GSA on aspects of this project and our exciting discoveries from the summer.



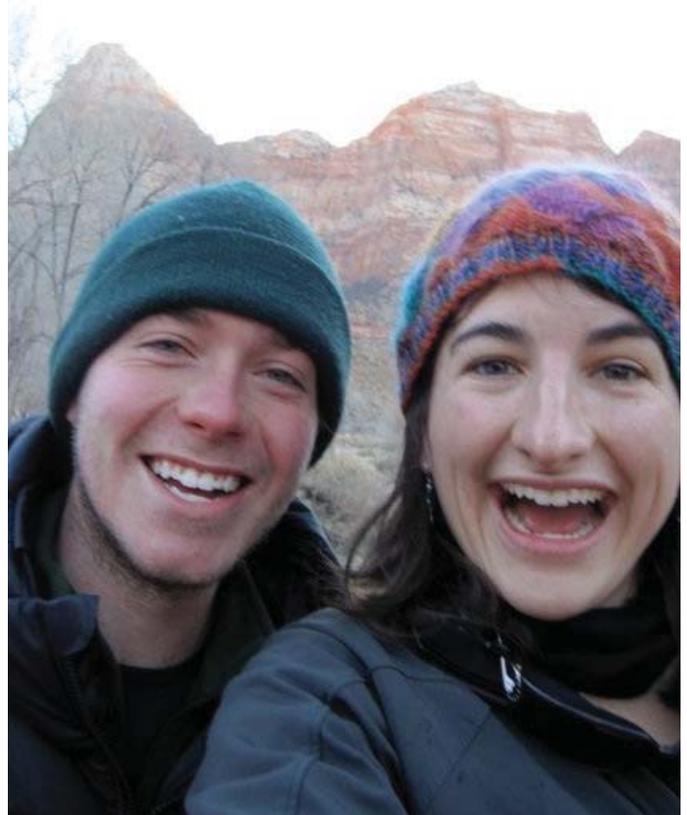
Elle Emery and Ashley Contreras, where they spent most of their time in Pillsbury Hall, at the University of Minnesota, in Minneapolis.

Regional Studies: Death Valley and the Bahamas

by Beth Kochevar

The graduating class of 2011 embarked on their Regional Studies senior capstone field trip in January, 2011. The students traveled halfway across the country to California for an exciting two weeks in Death Valley National Park, and one week on the small island of San Salvador, Bahamas. Students welcomed the break from the below-zero Colorado winter temperatures, and packed their bikinis and rock hammers.

After two days driving from Colorado Springs to the Nevada-California border, students finally stepped out onto the windy, but rewarding Death Valley overlook "Dante's View." From there, we were able to bear witness to the massive alluvial fans and the saline playa lake, aptly named "Badwater." Awed by the enormity and desolation of Death Valley, senior Martha Brummitt states, "It was epic."



Alex Gould and Martha Brummitt excited to wake up in Zion NP, on the first morning of the trip.



Kyle Pickard enjoys the sunshine in San Salvador.

Professor Paul Myrow and Visiting Professor Esti Ukar led the class, joined by Steve Weaver. Myrow and Ukar taught about the sedimentology and geomorphology of the Valley, and about metamorphic petrogenesis of the surrounding mountain ranges, respectively. The class spent the first few days tackling the geology of the surrounding Basin and Range province outside of Shoshone, CA, until getting run out of their campsite by a rain storm threatening a flash-flood. The class spent the last week of the CA trip inside Death Valley National Park, with ample geotourism and historical commentary by Paul, despite the difficulties inherent to caravaning with four 12-passenger vans. Throughout this portion of the trip, students gave presentations on specifics of Death Valley and regional geology, including playa lakes, sand dunes, and core complexes, oh my!

Regionals Cont.

Tom Ashley teaching the class about aeolian dunes.

After the two weeks in Death Valley, the seniors drove back to Colorado Springs to catch their flight to San Salvador, Bahamas (San Salvador is supposedly the first landing spot of Christopher Columbus!). The class, now accompanied by CC Biology professor emeritus Ron Capen resided and studied at the Gerace Research Centre in San Salvador. The research station is an old US naval base on the north side of the island, where scientists from different fields and nations gather to conduct oceanographic, biological, and geological research on the island. While in San Salvador, the geology seniors studied the ancient coral reefs making up much of the cliffs and beaches of the island and interpreted the importance of biological integration and its importance on the limestone oasis. We were also excited to try our hand at marine sedimentology and biology, and were rewarded by swimming out to the edge of the continental shelf and seeing a hammerhead shark. The seniors' adventure in San Salvador was a nice contrast to the landlocked, Laramide-dominated Colorado geology.

The vast majority of the 25 majors on this trip had taken almost all their geology courses together, beginning sophomore year. We had become a tight knit geology group over the three years, and it was a real treat to spend this final block together.

Schist! We're in Canada, Eh?

by Elle Emery

As a result of the change in major format beginning during the class of 2012's sophomore year (2009-2010), our class of majors has been split in half for 3 years—those on the old major track (took Mineralogy and Petrology as sophomores), and those on the new major track (took GY210 as sophomores). It wasn't until the fall of 2011 in the Canadian Rockies that our class of 12 took to the field together for the first time—a truly culminating experience. Taught by Professor Paul Myrow and Visiting Professor Chris Krugh, the class explored the geology of the Northern Rockies in detail, through interaction and debate involving the entire class and both professors.

The first stop on our long journey north was the Belt Supergroup Rocks located in the Mesoproterozoic Belt Basin of Northwestern Montana. Professor Don Winston (University of Montana), who has studied the Belt Supergroup for ~50 (!) years, led our group on a four-day field excursion mapping the Helena Embayment from North to South. We “let the rocks tell the story” as Don told us to do, determined sedimentary facies, found fault zones, and even spent the night at Don's duck hunting cabin in the middle of nowhere! Don made every attempt to convince us that in fact the Belt Supergroup region represents a paleo-lake depositional environment, but Paul didn't agree.

Our road trip continued north through Glacier National Park (on both sides of the border).

After a lovely detour through the West side of Yellowstone National Park—we all think Paul just wanted to say hey to the bison—we spent a couple beautiful days hiking in Glacier NP. Rock structure and sedimentary structures were a focus on our hikes, when we weren't busy avoiding bears and the idiot tourists who walked right up to them. One funny aspect of arriving in the National Parks was our lack of interest in "normal tourist stops"—often our vans would pull off to the side of the road and 3 to 4 cars behind us would pull over thinking we had seen wildlife. To their disappointment all we had found was a sweet road-cut full of king-sized stromatolites.

In Canada, the driving continued. We spent a day at the Frank Slide in Frank, Alberta discussing the immense power of all types of landslides. We measured a stratigraphic section along a highway just outside Banff that turned out to be the Banff Traffic Circle, so cool! A hike at Lake Louise allowed us to discuss ripples, glacier features, and walk along a present day deltaic environment. Our northernmost stop at the Athabasca Glacier was slightly depressing, given the immense glacial recession over the past 20 years.

Needless to say, it brought geology into the scope of real world problems.

Our drive back to CC was broken up by stops in Yellowstone NP and Grande Teton NP. In Yellowstone NP we discussed super-volcanoes and raced to watch



Paul Myrow.

the Old Faithful cone geyser. We took a mid-day stop back in Grand Teton NP, where we learned about some of Chris' research along the flanks of the Grand Teton, while we enjoyed the beautiful fall colors.

With only one hospital visit, one lost field notebook and three-plus weeks of caravanning, camping, food preparing, and reading *The Hunger Games* (nearly all 12 students read the entire series during the trip), we were ready to head back to the Springs and continue our geologic adventures for the final seven blocks of our Colorado College careers.



The CC Geology class of 2012 at a parking lot in Canada, showing how many geo classes they had taken with Paul Myrow. Paul shows 6.

Thank you Rob Dolce

We would like to say thank you to Rob Dolce, in the Transportation Dept, for donating a beautiful collection of Eocene Green River Formation Fossils from the Fossil Butte National Monument, WY. The slabs were given to Rob by Mark Klimiuk, CEO of Radiant Technologies.



Eocene fish fossils from the Green River Fm. in Wyoming.

Congratulations

Congratulations to Ken Sims ('86) for being named a National Geographic Explorer. See his volcano adventures in the April, 2011 issue of National Geographic magazine.

Obituary Carol Erickson - 1924-2012

Sad News - Long-time Geology Secretary Carol Erickson passed away in early January. Carol joined the Department for the 1976-77 academic year and remained as joint Geology/Anthropology secretary for more than a decade. In 1988 she stayed with Anthropology when the department moved into newly opened Barnes Science Building. Carol stayed on another two years with Anthropology before retiring. Carol was born in Oklahoma and held onto her accent (mixed with a little Texan) her whole life. Before coming to CC she was secretary for the Denver Bears (minor-league predecessor of the Rockies) and then, apparently, the first secretary for Denver's new AFL football team- the Denver Broncos.

For more than a decade Carol was the face of the Geology Department for my of us, with her welcoming smile and laugh, and she sharp wit. She loved students, and tolerated the faculty (once the new guard of faculty arrived in the late 70's and early 80's she called them her "kids"), as long as they didn't put their feet on her desk.

Carol is survived by Lauren Erickson, her husband of almost 62 years.

-Eric Leonard

Alumni Spotlight

Steve Wood '85

Greetings Precambrian Basement!

I was a liberal arts and science major at CC. I combined geology and art, and explored the world of geological illustration. I always loved rocks: climbing them, collecting them, painting them, hiking over them, seeing their transformation to gravel and dirt and clay and all that good stuff that allows living things to live. So the degree made sense. Still, I was always really an artist. This was ironic, as I was most strongly embraced by the geology department. They instilled in me a deeper love of rocks and landforms and geologic processes, and wonderfully gave me my first serious public art commission: to paint a mural for the scanning electron microscope room in the basement of Palmer (at least I think it was a scanning electron microscope...I never did take petrology!). The mural survived until the geology department was given the boot from that room (a muralist's first lesson: paint all murals on a removable panel). I play rock hammer golf to this day, and morph into a geomorphologist every time I leave the house. So, yeah, the art department always thought I was a little weird, my artistic inclinations notwithstanding.

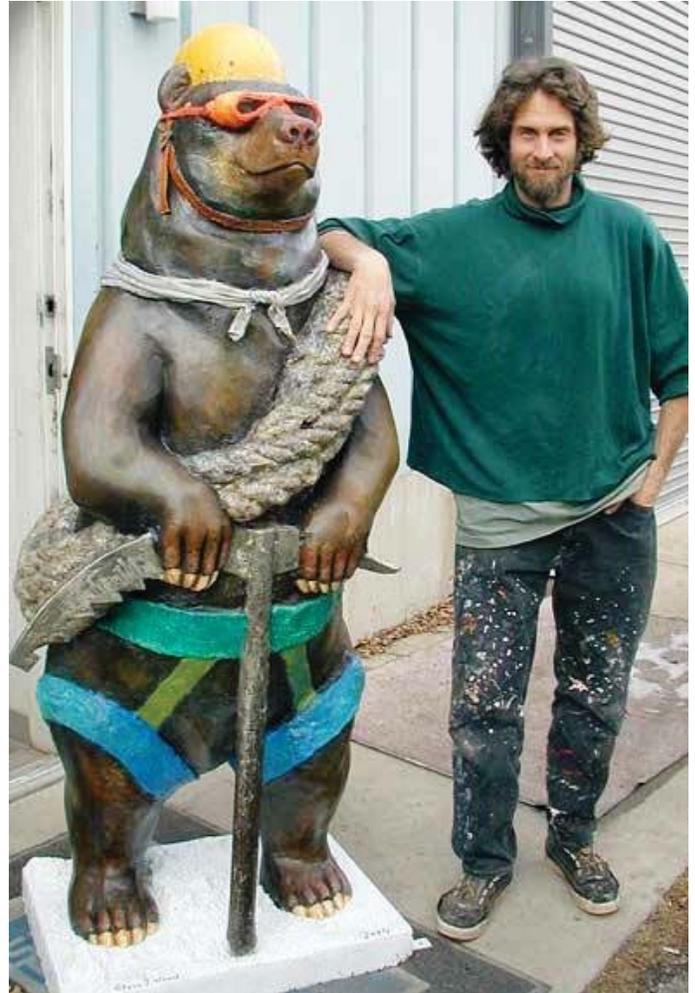


Naomi Marshall and Aly Titterington worked with Community prep School students to design and fabricate a sign for their school. Many CC students have worked on Concrete Couch projects throughout the state.

Alumni Spotlight (cont.) Steve Wood '85

After college I did a couple years of scientific illustration, and always drew and painted the landscape on every trip. It helped to be able to understand the “bones” on the landscape, and economically these works were actually quite lucrative. Somewhere along the way, I started making murals and sculptures and teaching others how to make public art, as community creations. (Here I should mention my apprenticeship with Eric Bransby, which lasted several years. Eric has the distinction of being the only person to get an MFA from CC... the mural in the Cossitt Hall rotunda was Eric’s graduate thesis! For that project he painted directly on the rotunda, not on panels; he guessed rightly that no one would ever mess with the rotunda!)

Now I work with community groups on creative projects – murals, sculptures, puppetry, farming, etc, etc – through a small non-profit called Concrete Couch. We work all over the country, but mostly in Colorado Springs, and sometimes in collaboration with CC (through the sociology department...go figure!!). It’s fun work, where I always meet new people, and learn new things. It’s a lot like CC in that way, and its even block-based. Every once in a while I even get to help a community create a geologically inspired artwork for their community. And I am still embraced by the geology department...thanks for inviting me to contribute this piece for the PCB!



Steve and bear.

Alumni Spotlight

Lauren Tice Birgenheier '02

Greetings CC Geologists!

Hi there from sleepless in Salt Lake! I am writing you as I am on maternity leave after the birth of our first child, Elle, this past October. My husband, Nate, and I are thrilled and also a bit weary from sleepless nights.

I suppose my journey as a geologist began as an outdoor enthusiast and freshman at CC, like many of you. One trip to Arches and Canyonlands during my Intro Geology course in the spring of 1999 sealed the deal for me. I decided exploring the western landscape and its reason for being was a good reason for my own being. And I have never looked back. My time in the Geology Department at CC was fantastic, with a great group of faculty and mentors. It culminated with a senior thesis project in Wyoming and Montana with CC's own Dr. Paul Myrow. I have come to appreciate that the field skills I learned at CC have given me a key advantage in my academic path. It is something I still value, practice, and look for in my own graduate students. After a paraprof stint in 2002-2003, as is probably typical of most outgoing geology majors, I wasn't so sure what I wanted to do. My now husband, then boyfriend, was accepted to medical school in Omaha, Nebraska. He asked me to go with him, and so we were off to Omaha.



Field work 27 weeks pregnant in summer 2011. Green River Formation, eastern Uinta Basin, Utah.

Alumni Spotlight

Lauren Tice Birgenheier '02

When we arrived in Omaha in 2003, I had absolutely no plan, but decided a basic J-O-B would be a good idea to pay the bills. I found a position with an environmental consulting firm in Omaha. Being the only geologist amongst 25 other male engineers, made me realize I wanted something a little different and sent me running back to school. Luck was on my side. I was fortunate to find an NSF funded Ph.D. opportunity at University of Nebraska-Lincoln with two exceptional advisors, Drs. Chris Fielding and Tracy Frank. It turns out there is a gem of a sedimentary geology program in Nebraska. I fast tracked it to the Ph.D., as by then I was certain I wanted to work in the world of academia, and the funded project available for me was Ph.D. in scope. I spent a few field seasons in eastern Australia, studying the sedimentology, stratigraphy, and geochemistry of late Paleozoic exposures of Gondwanan glacial deposits. We were better able to constrain the nature, duration, and extent of the late Paleozoic ice age through collaboration with several groups across the country studying late Paleozoic glacial deposits in different locations. I was able to return to CC to teach a summer block in the summer of 2007, which allowed me a great opportunity to reconnect with CC and test teaching on my own two feet.



Lauren, Nate, and Elle in December 2011.

I graduated in 2007, and after a PhD recovery year of teaching and post doc research at University of Nebraska, I was off to Salt Lake City, for a post-doctoral position, and later a Research Assistant Professor position, at the Energy & Geoscience Institute at University of Utah. My husband and I both managed to find post graduate opportunities at University of Utah, his position being a medical anesthesia residency. For the last three years at Energy & Geoscience Institute, I've focused on sedimentary research questions relevant to the oil and gas industry, and have been working largely on rocks in Utah, such as the Cretaceous of the Henry Mountain Syncline and the Mancos Shale and Green River Formation of the Uinta Basin. Though climbing the funding game learning curve straight out of my Ph.D. was tough, I have learned a tremendous amount in these past three years, perhaps much more than during my Ph.D. alone. And I'm happy to report I am leading a few thriving projects funded by the U.S. Department of Energy and the oil and gas industry. Even better is that I have developed interdisciplinary relationships with many colleagues both at University of Utah and across the country. It's an exciting time to be involved in finding solutions to the country's energy challenges in the context of our increasing need to address climate change and environmental issues.

Alumni Spotlight

Lauren Tice Birgenheier '02

Spring 2011 was an eventful time for me. I learned that I would be offered a tenure-track Assistant Professor position at University of Utah and that I was pregnant all in the same week. They were both once-in-a-lifetime opportunities, and I wouldn't have passed up either for the world. Dual-career issues have been one of my biggest challenges, with my husband navigating an ambitious path in medicine and me an equally ambitious one in geology. That challenge and support for one another turned into our greatest strength. We sold ourselves as a package and the University of Utah decided to offer us both positions. The rock exposures in Utah are world-class and the geology community here is superb, so I am proud to put down roots here. In August 2011, 30 weeks pregnant, I started a tenure-track position in the Department of Geology and Geophysics at the University of Utah. I delivered the baby over fall break in October, just a couple days after finishing grading my 110 students' mid-term exams and turning the class over to my colleague co-teaching the course. Many people say that at CC, you learn not to procrastinate. I would say that was an instance when learning that lesson at CC really paid off. I'll be back teaching a Depositional Environments course in the second half of spring semester 2012. In the meantime, I've been staying quite busy changing diapers, nursing, and rocking. Repeat every 2-3 hours. Since Elle was born, I've managed to make it into the office a couple times a week, in part to keep my graduate students honest on their thesis progress (I'm sure they wish they'd see less of me on maternity leave), but also because I can't seem to stay away. Although, a little less email traffic would be appreciated as I've found it difficult to nurse and type one handed.



Lauren and daughter Elle.

As a geologist, I absolutely love what I do. I advertise this to everyone I meet, including my students and anyone who will listen. I am very much in debt to many folks who have helped me along this path, from my time at CC, University of Nebraska and University of Utah. Specifically at CC, Paul Myrow and Jeff Noblett have often acted as sounding boards, and Paul has kindly written recommendations letters with each step. I am really fortunate to have had many cheerleaders along the way. I look forward to many more years of looking at great rocks with great people.

Cheers,

Lauren Tice Birgenheier ('02)

Geology Day Presentations

April 8, 2011, Olin Lecture Hall
Olin Science Center

Ben Mackall

Estimates of Late Pleistocene LGM climate of the Snowy Range, Southern Wyoming, using numerically modeled paleoglacier reconstructions

Alex Gould

Paleoseismology of the Taupo Rift: The Honeycomb Trench

Julian Springer

Biomere Boundaries: High Resolution Isotopic Analysis of Mass Trilobite Extinctions in the Late Cambrian (*Pterocephaliid-Ptychaspid* Biomere)

Maisie Richards

Forests of the Early Eocene Climatic Optimum (EECO): Paleoclimatic and visual reconstruction of *in situ* stumps of the Wind River Basin, WY

Ben Borkan

Rare Earth Element and Stable Isotope Patterns in Pedogenesis of the 442-meter Level in the Willwood Formation of Wyoming

Kira Olsen

Dynamics of Flat Slab Subduction: Focal Mechanisms, Ridge Buoyancy, and Slab Tear in Central Argentina

Wesley Paulson

Using Split Shear-Wave Analysis to Image Mantle Deformation beneath the Sierras Pampeanas, Argentina

Aaron Bandler

Single event locations and 3D interpolation of active fault planes, Eastern Sierras Pampeanas, Argentina

Drew Thayer

Constraints on Lithosphere and Mantle Structure in the Bighorn Mountains: Analysis of Frequency Dependence in Shear-Wave Splitting

Martha Brummitt

Assessing New Zealand's four major faults to interpret seismic hazards and risks

Maggie Cowling

GIS Development and the Application of Remote Sensing for Marie Byrd Land, Antarctica

Beth Kochevar

Links Between Climate Change and Sedimentation in Laramide Intermontane Basins: An Example from the Denver Basin

Elle Emery and Ryan Armstrong

The M6.3 Earthquake in Christchurch, New Zealand on 22 February 2011

Emily Cleveland

Unearthing an Ancient Climate: A new look at Eocene global warming in the Wind River Basin of Wyoming

Senior Awards

Presented at Honors Convocation 2011

Rocky Mountain Association of Geologists

Award:

Kira Olsen

Association for Women Geoscientists Award:

Kira Olsen

Maisie Richards

William A. Fischer Special Recognition

Award:

Aaron Bandler

Drew Thayer

Estwing Outstanding Senior Geologist:

Wesley Paulson

Scholarships Awarded in 2011

Buster Research Scholarships

Ryan Gall; Anne Hanson; Caleb Birchard;
Megan Hurster; Dirk Rasmussen

Putman Research Scholarships

Zachary Snyder

Gould Scholarship

Adam Freierman; Anna Kutkiewicz; Drew
Thayer; Nicholas Weldon

Hannigan Field Scholarship

Zachary Snyder

Creager Field Scholarship

Anne Hanson; Ryan Gall

Ritt Kellogg Grants

Alex Gould; Drew Thayer; Erica Wineland-
Thomson; Martha Brummitt

Venture Grants

Drew Thayer

Student Conference Presentations 2011/2012

Regional GSA Conference:

Albuquerque, NM

Tom Ashley: Experimental Study of Wave
Ripple Defects and Their Role in Adjustment
of Ripple Spacing

David Freedman: Geomagnetic Investiga-
tion of Sandstone Dikes of the Colorado Front
Range, for Determination of Age and Mode
of Emplacement

Dirk Rasmussen: Possible link between PETM
climate change and sedimentological-

change in the Wind River Basin, Wyoming

Adam Freierman: Early Eocene Leaf Fossils
of the Denver Basin, CO: Paleoclimatic Inter-
pretations and Comparisons with Other Early
Eocene Floras

National GSA Conference:

Minneapolis, MN

Ash Contreras & Elle Emery: Use of Stereo-
scopic Satellite Imagery for 3D Mapping of
Bedrock Structure in West Antarctica: Ex-
amples from the Ford Ranges and Neogene
Volcanoes of Marie Byrd Land

Ben Makall (and Eric Leonard): Estimates of
the Last Glacial Maximum Climate of the
Snowy Range, Southern Wyoming, Using Nu-
merically Modeled Paleoglacier Reconstruc-
tions

Seminar Series 2011-12

Dr. Megan Anderson, Colorado College,
Colorado Springs, September 26th, 2011
Japan: What happened to the most earth-
quake-ready country in the world?

Dr. Grant Meyer, University of New Mexico,
Albuquerque, October 17th, 2011
Fire and Climate as Catalysts for Geomorphic
Change in Western Mountain Conifer Forests

Dr. Grant Meyer, University of New Mexico,
Albuquerque, October 18th, 2011
What's Up (and Down) at the Yellowstone
Caldera? Insights on Deformation From Post-
glacial Shorelines of Yellowstone Lake

Dr. Ian Miller, Curator of Paleontology at
Denver Museum of Nature and Science,
Denver, November 30th, 2011
The Snowmastodon Project

Dr. Ethan Baxter, Boston University, Boston,
January 25th, 2012
Evidence for Brief Pulses of Metamorphism

Dr. George Davis, University of Arizona, Tus-
con, March 2nd, 2012
Geoarchaeological Excursion to the Sanctu-
ary of Zeus, Mt. Lykaion, the Peloponnese,
Greece

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

Robert Schock '61

You could say that from 2004-2007 I served as a coordinating lead author for the 4th Assessment Report of the Intergovernmental Panel on Climate Change (ipcc.ch). For the past 5 years I have been the Director of Studies for the World Energy Council, based in London (worldenergy.org), and was responsible for 12 reports on a sustainable energy future. I am now trying to relax a bit more and spend time with Susan, my wife of 51 years, racing sailboats on San Francisco Bay, rooting for the Giants (since my youth in New York), and occasional consulting.

Steve Spear '69

After teaching geology for 28 years at Palomar College, I have retired. My new email address is precambriansteve@hotmail.com. Kinda fitting isn't it? The best thing about geology is you don't have to be employed to wander aimlessly and look at rocks. My new hobby is rock collecting. I mean ROCK collecting. My latest specimen is a 3,200-pound perfectly cross-bedded piece of Navajo sandstone now on permanent loan from BLM land on the Arizona-Utah border and wonderfully displayed in my back yard. Stop by for some wine and I'll tell you how I got it here. I owe my career (and by extension, my retirement) to CC geology; a debt that I can never repay.

John Dolson '71

My wife and I have finished another great year consulting globally in the oil and gas industry with our main projects in the USA, India and Argentina. Over the last 3 years we've consulted with over 25 companies in 14 countries. A highlight of the last year was helping Cairn Energy India open up a new petroleum basin offshore Sri Lanka—something we had the chance to follow over three years from concept to fruition. As our main focus is teaching and mentoring the next generation of geoscientists, I can honestly say this is a terrific business to be in and if anything, a huge challenge to keep up with technology. Our long-time association with the American Association of Petroleum Geologists has also given us a friend in every country we visit. If you have a passion for geology, then pursue it. That passion and drive to continually learn will be the key to an amazing global experience, if you want it.

Roland LaForge '72

This past year has been a busy one in the earthquake hazards field, with large damaging earthquakes in Japan, Chile, and Haiti, plus a magnitude 5.8 event in Virginia that shook up the eastern U.S. I have been busy with nuclear plant seismic hazard studies for the

Nuclear Regulatory Commission, hazard analyses for a proposed \$6b dam in Alaska, and a research project for the U.S. Geological Survey on a historic tsunami that hit Puerto Rico in 1918.

Sarah Andrews '73

I'm at it mixing murder and mayhem with geology again, this time taking our fictional CC alum/geologist/sleuth Em Hansen down the Grand Canyon by raft. The resulting mystery novel, ROCK BOTTOM

(number 12 in the series), will be released from St. Martin's in August 2012. While availing myself of a little research for the tome, I stopped by Lee's Ferry, the put-in spot



for rafting trips, and chatted up a group who were getting ready to launch. Now what are the chances of this: One of the rafts had a nice sticker on it that read "CC ALUMNI COLORADO COLLEGE." This crew included Matt Hermann, the son-in-law who released Bill Fischer's ashes over Lava Falls. I got to shake the man's hand and thank him for that. They were danged busy, hence the west view of a boatman facing east, but I did get a nice snap of that sticker.

Greg Twombly '75

My company, Resource Development Technology (RDT) has sold our successful coal bed methane project in New Zealand, put our China venture in Heilongjiang province on hold due to changes in rules, and are starting a new project in Spain. We have added to our domestic US assets with Mississippian oil production in eastern Colorado and Cretaceous oil and gas in northeast Wyoming, added to our existing operations in Colorado, New Mexico, Utah, Wyoming and Oklahoma. I am currently studying Mississippian carbonate systems in Colorado and Wyoming trying to make sense of depositional environments and unconformities in relation to the development of the Transcontinental Arch and the onset of Pennsylvanian tectonism. I've looked at core at the USGS core library and outcrop at Shelf Road and Rifle Mountain Park, along with some fun sport climbing in both areas. Carbonates are as interesting to climb on as to study. My company has recently supported graduate research in methanogenesis at CU, CO2 sequestration experiments in Australia, and coal maceral studies in New Zealand.

My daughter Becky is currently studying Neuroscience at CC, while son Chris is studying engineering physics at CU and son Matt is finishing high school and deciding where he wants to go to college. My wife, Mary Walter Twombly (Biology, 1976) is currently teaching at Conifer High School.

Bryan Bracken '79

I've worked for Chevron for 25 years doing everything from field operations to field studies. At present I am the coordinator of Clastic Stratigraphy Research at the Chevron office in San Ramon, CA. My team is actively trying to create next generation predictive models for shallow marine clastic depositional systems. I also try to spend as much time in Utah studying the spectacular outcrops that John Lewis introduced to us in Senior Field Geology. Thanks John!

Phil Harvey '79

Phil currently lives in the Chicago area, where he is the senior hydrogeologist at CNA (Conestoga-Rovers & Associates). His responsibilities typically include evaluating fate and transport of contaminants, interpreting groundwater and surface water data, developing remedial designs, cost forecasting cost, strategy development strategy, preparing public presentations, and preparing expert submittals. He re-married in August 2009 to Renee, an environmental attorney. They spend time outdoors with their families and their two dogs, Max and Cooper.

Jim Bowman '81

Jim is a retired USAF Fighter Pilot, and is currently a pilot with Southwest Airlines. He is a part-time contractor for the DoD, specializing in Homeland Defense / Air Space Security. He is married to Jeanne Nazimek (Southern Illinois '82), and lives in Colorado Springs.

Roy Herndon '82

Just a quick update to say this class of '82 alum is still actively practicing hydrogeology at the Orange County Water District in southern California. I keep busy investigating and developing projects to control seawater intrusion, clean up groundwater contamination, and find more ways to replenish the aquifers. Recycled water has become a major component of our water supply as access to "imported" water from northern California and the Colorado River has declined. My job activities are a nice blend of science, community outreach, administration, organizational participation, and even litigation. I manage a department of 14 dedicated staff including 6 hydrogeologists, 1 engineer, and 3 GIS specialists. CC and graduate school at the University of Arizona provided me the technical and writing skills needed to succeed. Speaking skills came later through numerous

"trial by fire" experiences – something that I can't recommend enough for future scientific leaders. My kids are about out of the house, so my wife, Lynn, and I have more time for weekend adventures. If any students have an interest in a career in groundwater, feel free to contact me.

Marli Miller '82

Marli is enjoying life in Eugene, Oregon. She's busy teaching in U of Oregon's Geological Sciences Department, as well as functioning as its Associate Department Head. She was recently awarded the contract to rewrite the book "Roadside Geology of Oregon," although she continually gets distracted by her ongoing interests in photography (marlimillerphoto.com) and Death Valley geology. She visited CC last year with her two daughters (ages 18 and 13), the oldest of whom is interested in possibly attending herself! Her email address is millerm@uoregon.edu.

Ana Vargo '84

I am looking forward to hearing from my fellow friends. I am currently living in Salt Lake City. I am working for USDA Natural Resources Conservation Service as the geologist in Utah. It is a great job. I mostly work as an engineering geologist. I cover the whole state. It is a beautiful place to work, and is pleasantly challenging.

Van King '85

I have been recently promoted to the Manager of Water Resources for the Rio Tinto-Kennecott Utah Copper Mining operations in Utah. Our Water Resource team manages one of the largest private water right portfolios in Utah and this new role allows me to explore water policy while staying close to the science of hydrogeology. We continue to back-country ski the Oquirrh Range to "manage" the land and water assets held by Rio Tinto and on weekends during the winter months I assist Snowbird Resort with avalanche control work.

David Williams '87

David still has rocks on, or is it in, his head. He's working on a new book, on the natural and cultural history of rock cairns. Expected publication date is fall 2012.

Ross Freeman '90

For the past 3 years I've been working as the first-ever Environment & Sustainability Manager at Stevens Pass Ski Resort, 90 miles east of Seattle in Washington's Central Cascade Mountains. My task is to green-up the entire operation, save on energy, look for efficiencies, reduce our carbon footprint, and let the public know how to get involved. So far it's going very well indeed: I've generated a lot of media interest, won some

industry grants/awards, and orchestrated a significant operational makeover. Plus, holding our office meetings on the chairlift doesn't hurt! During my summer furlough, I have 4 months to do some sustainability consulting down in Seattle, raft guide on Oregon's Rogue River, and adventure deep into the backcountry of the PNW (plenty of jumbled geologic history there, including lots of volcanoes to climb and ski). For many of the past 10 winters, I've rendezvoused with fellow CC Geology Alum Craig Hart at a backcountry ski hut in British Columbia's Kootenay Mountain Range for a week of telemark ski touring. In 2007, I took a year off to travel by foot, train and bus around southern Europe and Central America, and prior to that, worked for 6 years as a Conservation Ecologist in the Northwest office of a national advocacy group focusing on river protection and restoration.

Mike Kerwin '92

Mike is an Associate Professor of Geography and the director of the Environmental Science and Geology Programs at the University of Denver. Although Mike still roots for CC in all hockey games, he did enjoy DU's back to back national championships in 2004-2005. Mike also misses being in a geology department but still gets to teach some basic geology. In fact, for the past nine years, Mike has taught a field geology and ecology class in mountainous regions of Colorado, New Mexico, and SE Arizona. This "block-like" class has always focused to some extent on the effects of wildfire in a variety of Southwestern ecosystems. In 2011, Mike's class was fortunate enough to get to examine first hand the impacts from a 223,000-acre wildfire that burned in Arizona's Chiricahua Mountains in the summer of 2011. The students hiked through what had been a thriving forest of Ponderosa Pine and Douglas Fir trees. Instead of enjoying the shade from large healthy trees, the students saw only charred stems and soil. Even the largest tree in the Chiricahua Mountains – a 400-year old giant Douglas Fir – could not withstand the fire. Mike plans to have future classes monitor the recovery from the 2011 fire and consider the need for human reforestation efforts.

Jen Pierce '95

Greetings from Boise Idaho! Jen is currently an Associate Professor in the Department of Geosciences at Boise State University. My research mainly focuses on Quaternary climate change and landscape response in Idaho's beautiful mountains (forest fires and debris flows, climate-driven changes in snowmelt, river incision, carbon storage in soils. . .) For you CC juniors and seniors, Boise State is a great place to do graduate work--give us a call! Outside of work, my husband Dave and I have a wonderful 16 month old girl (Sabine), and another kid due in the spring. Never a dull

moment. We are having a great time mountain biking, backcountry skiing, and exploring Idaho's river canyons. My email addresses are idahojen@gmail.com or jenpierce@boisestate.edu.

Emily Munson (Richardson) '95

I am married and have a 16 month boy (William) who keeps growing way to fast. We live in Seattle and love it. Nothing is better than the Pacific Northwest on a nice day with Mt Rainier shining down on you. My geology these days is collecting rocks with my son. He loves throwing and chasing after them.



Emily Richardson's boy William, with a nice leaf.

Pete Mortimer '97

I am living in Boulder enjoying my first year as a dad. Spending lots of time climbing and filming rocks, but, perhaps sadly, not much time studying and philosophizing about them. My film companies can be explored via these websites: www.senderfilms.com and www.reelrocktour.com.

Christa Placzek '98 and Nathan English '97

Christa Placzek and Nathan English joined the School of Earth and Environmental Sciences at James Cook University (Northern Queensland) and are adapting to life in the tropics. Christa is a Lecturer in geochemistry and Nathan is an adjunct faculty associated with the Centre for Tropical Environmental and Sustainability Science, both at James Cook University. The English children miss ice hockey this season, but are enjoying the local surf lifesaving club. Christa looks forward to participating in her first "block mode" course this December.

John Howell '98

John Howell and wife Tracey have a new daughter! Sabine Jameson Howell was born 05/02/2011.



John and Tracey Howell's new daughter Sabine.

Carrie Brugger-Schorr '99

I've had an extremely busy and eventful year! Last July (2010) I married my husband Ben on the beach in Hawaii. Less than a month later we moved from our home in Honolulu, Hawaii to Flagstaff, Arizona where I began my new job teaching in the Geology Department at Northern Arizona University. In addition to the stresses of a new job, I also spent the year finishing my dissertation. In July (2011) I head back to the University of Hawaii Manoa for my dissertation defense. If anyone cares, the title was: "Crystallization of hydrous rhyodacite magma during continuous decompression." The other big news is that my husband and I bought our first house this summer. So life is good and keeping us busy! We're loving our new town and slowly adjusting to life without a beach and palm trees.

Natalie Kehrwald '99

I am a research scientist at the University of Venice where I study ice cores, eat good food, and occasionally wade to work.

Laura Dickerson Sears '99

Celebrating 10 amazing years running the nonprofit I started with my husband Shawn Sears ('98). We've provided free multi-day environmental education field trips for over 6,000 low-income youth of the San Francisco Bay Area! www.Vveducation.org. Come visit our camp if you're ever in the area!

Sarah DeWitt '00

Sarah DeWitt (paraprof 2000-2001) has been living in Washington DC since 2002 and recently moved into a classic 1910 rowhouse with her boyfriend Jack. They spend most of their hours cycling around DC, Virginia, and Maryland, and camping in Shenandoah National

Park. When not in the US they can usually be found visiting Jack's family in Scotland and Belgium, or chasing solar eclipses in China and Australia. After nine years of working at NASA's Goddard Space Flight Center as an Earth science multimedia producer and public affairs officer, 2011 introduced a few changes including the end of the Space Shuttle program and a new job. Sarah is now the communications officer for NASA's Chief Scientist at the agency's headquarters in DC. She is enjoying her new role because her "client" is also a Colorado Earth scientist and they both love to communicate about the value and emotional heart-beat of science. She also loves commuting by bicycle along Pennsylvania Avenue between the White House and the Capitol every day!

Woody Fischer '00

All is going well with my research group here at Caltech. We have spread out across the timescale a bit with projects studying the evolution of photosynthesis and the rise of oxygen, paleoclimate, and mass extinctions. We continue to do a fair bit of fieldwork as well in South Africa, Western Australia, Oman, Canada, Wisconsin, and Sweden. And I was awarded a Packard Fellowship, which provides a wonderful opportunity to explore some new ideas over the next five years!

Meadow Koslen Ridd '00

Meadow Koslen Ridd is still living down under, near Queenstown, New Zealand. After many years, I will finally swear allegiance to the Queen of England and get myself a kiwi passport next week. And, as I've ticked off all my sky diving, bungee jumping, jet-boating adventures, and now prefer to spend most of my days taxiing Oliver (7) and Madeleine (4) around sports, dance, kindergarten, and swimming lessons. In my spare time, I work at a Montessori pre-school and am studying for a diploma in Montessori education. I still think rocks are pretty cool - the kids love breaking off chunks of schist around the lake - Ollie likes the breaking part best, and Maddy likes the sparkly mica. I guess I'm pretty lucky to have a view of the Remarkables Mountains out the front kitchen window, and while I can sometimes take it for granted, I'd definitely invite all my mountain loving buddies to come have a look if you find yourself heading down south. And for a few fun facts about New Zealand, we finally won the rugby world cup after a 24 year drought, summer begins on the 1st of December, and for some unknown reason, people still love cricket.

Michael Toomey '00

I just completed my dissertation and have finished my PhD program in Geography at UCSB. There were no rocks involved - I was studying the Amazon using

remote sensing and ecological data. And in November I will be starting a postdoctoral fellowship in the department of Organismic and Evolutionary Biology at Harvard studying temperate forest ecology. I would be happy to hear from other alums in Boston. My e-mail is michaelptoomey@gmail.com

Katie Vaughan (Lake) '00

Aloha Geobuddies! I have been living in Honolulu, HI for the last 7 years teaching middle school Earth Science at Punahou School. This might sound familiar, as it is the school Obama attended, and now that it is on the map it will be hard for my own kids to get in. I am proud to have 2 former students now attending CC. Hawai'i is great, but I am really missing the sedimentary and metamorphic landforms of the mainland. In 2010 I married a fellow CCoer, Darren Lake, and we had a daughter, Addison, in October. Please don't hesitate to look me up if you are on Oahu! I'm a good tour guide.

Drew Beckwith '01

So for last year's update, I had to put in that we just had a baby - but my wife was still pregnant when the deadline came around. So this year I get to say we're enjoying our wonderful baby girl Macy. She'll be about 1 year old when you read this.

Loving Louisville, CO - the number one small town in America two years running - wasn't that great living on a cul-de-sac before having a wee one, but I can see the benefits now. In other news, I feel quite lame for missing GSA in Denver, would have been a good place to see a bunch of old friends. I'm now working at a non-profit in Boulder called Western Resource Advocates as the manager of our Water Policy group. I spend a fair amount of time on urban water conservation and finding ways for utilities to meet future water needs without building more pipelines from the western slope. Currently quite involved with advocating against the Flaming Gorge pipeline - proposed to bring water from Flaming Gorge reservoir in Wyoming to the Front Range, more than 500 miles away. Ridiculously expensive and totally unneeded in my opinion.



Drew Beckwith with daughter Macy.

Lauren Tice Birgenheier '02

I'm living in Salt Lake City with my husband, Nate Birgenheier, also a CC alum. I've been in Utah about three years at the University of Utah as a post-doc and then Research Assistant Professor at the Energy & Geoscience Institute.

I just started a tenure-track Assistant Professor position in the Geology and Geophysics Department at University of Utah this fall 2011 semester. Nate and I are also expecting our first baby, a girl, in late October. I am thrilled with both new developments. The sedimentary rocks in Utah are world class, and so far I've managed to convince various funding agencies to let me run around and describe them. Can't beat it!



The Tice-Birgenheier family with daughter Elle.

Jesse Porter-Henry '03

I am in my fifth year teaching at a small secondary school in Western Massachusetts called The Academy at Charlemont. I teach Math and Science and am the Athletic Director. This year Geomorphology has been a theme for our school as we are located right alongside the Deerfield River-which rose to around 100,000cfs during Tropical Storm Irene. The typical flow is about 800cfs. Other news in my life is that I am a father. My wife, Amy Scully, and I had a daughter, Hazel Scully-Henry, on April 17th, 2011. She is a bundle

of joy and she is already headed towards a career in Geology as every time we go outside she finds a rock to try and eat. Best wishes to everyone!

Claire Lukens '04

I'm currently working on a PhD at the University of Wyoming, focusing on landscape evolution and sediment sources in modern streams. When I'm not tramping around in the Sierra Nevada collecting samples or spending quality time in the lab, I spend my time skiing/running/generally playing outside with my dogs. I'm also working on a yoga teacher training to get me through the long Wyoming winter. I had the opportunity to teach CC's summer class in 2011, and had a wonderfully enthusiastic group of students. Being back in the department for a few weeks was a real treat, and a reminder of how supportive, fun, and inspiring the CC Geo community is!

Emily Pope '04

It's official - I'm finally a Dane! To everyone in California, Colorado, and scattered to all corners of the planet, greetings from Scandinavia! I moved to Copenhagen, Denmark this last April to start a new post-doc and, of course, to see what it feels like to be European for a couple years. Adjusting has taken a bit longer than I had hoped (not because I'm not really enjoying being here so far - the city and country are absolutely beautiful, and I already have a good base of very kind and helpful friends) but because it turns out that moving to a new country, finding a new place to live, starting a new job, and trying to make new friends is even harder when you don't speak the language. (You should hear the adventures I've had obtaining - and receiving calls on my new phone, a story I'll happily send along to any curious parties...)

But I am finally able to say that things are more or less settled, and that my first few months here have given me time to obtain at least some of the basic need-to-knows of Danish life... I've learned that bicycles are absolutely the only way to travel, people look at you funny every time you mention how cool it is to not be paying health insurance, every meal (I mean EVERY!) requires a knife and fork to be eaten, it's apparently considered a fun summer pastime to jump into the Baltic Sea in nothing but a bathing suit (Brrrrrr!), there is no bad time for coffee (okay - I already knew that), and that "Hi hi!" actually means goodbye.

Okay - the details, that is if you are ever interested in finding me, or visiting the beautiful homeland of H.C. Anderson, Carlsberg Beer, and the place that makes those super crazy chandeliers (my new apartment does have a guestroom...) are as follows: pope.emily@gmail.com and Emily@snm.ku.dk.



Kiel, Catherine, and their daughter Elizabeth (age 3), at the Shedd Aquarium in Chicago.

Kiel Smith '04

I have moved around a lot since I graduated in 2004. Following my graduation from CC I became a commodities broker at the Chicago Board of Trade. During that time I completed an MS program in Secondary Teaching and Learning and became a science teacher. I worked at a school district on the southwest side of Chicago, where I was instrumental in convincing them to reinstate their Earth and Space Science Program. To reward my hard work they laid me off along with about 70 other teachers. Following my loss of employment last year, I moved to a private school teaching Chemistry. This year I again convinced my school to let me teach Earth Science. It is an exciting prospect for me because I finally get to teach the subject CC taught me to love! I have also been accepted by the Field Museum's Field Ambassador program. crushthebeans@yahoo.com.

Lizzy Fay Douglas '05

I am currently pursuing a Master of Education at the University of Montana in Missoula, MT. I am working on a project to integrate geology and field work into elementary school curriculum. I married Mark Douglas on August 6th, 2011 just outside Boulder, CO. Rebecca Zentmyer ('05), Emily Waldeck ('05), and Christine Siddoway attended the ceremony and reception.

Melissa Barton '06

After graduating from CU-Boulder in 2010 with an M.S. in Museum and Field Studies, Paleontology/Collections concentration, Mel did a couple of internships in Oklahoma and Texas. She's now an exhibit guide at the Butterfly Pavilion in Westminster, working on her dragonfly photography skills, and getting increasingly excited about living invertebrates (she still likes rocks and fossils, too). Last year she went to Hawai'i and saw the eruption at Kilauea where the lava enters the ocean, which was awesome.

Caitlyn Florentine '07

Caitlyn Florentine lives in Bozeman, Montana. She completed her M.S. in Geology this past May 2011 at Montana State University (MSU) and is thoroughly indulging in her newly recovered freedom via the outdoors, winter, and an out-of-this-world group of fun, smart, good-timing friends. She currently works as a lab manager at MSU with the Paleoecology Research Group, studying vegetation and fire history. She continues to be geologically inclined, particularly when it comes to the cryosphere, alpine environments, and the intersection of science, policy, outreach and education. Her boss in the lab is another Colorado College Geology alum, the brilliant Yellowstone scientist and grant-writer extraordinaire Dr. Cathy Whitlock. Caitlyn conducted her graduate thesis work on a rock glacier located at Big Sky Resort. Ever skied there? Ridden the tram? Then you have walked (or rather skied) upon "her" mountain landform. Her rock glacier is located directly underfoot at the base of the tram and is a fascinating, dynamic, interdisciplinary landform that served excellently as the object of Caitlyn's graduate obsession. In her free time she likes to practice yoga, play soccer, shred gnar and generally enjoy the mountains and cowboy culture Montana has to offer!

Ted Starns '07

I defended my thesis at the University of Wyoming on November 10th, titled: Structural evolution of the southern margin of the Baker terrane, Blue Mountains Province, northeast Oregon. The thesis was generally geared toward accretionary processes of Mesozoic age, and involved geologic mapping to identify tectonic boundaries within a late Paleozoic to Middle Jurassic accretionary complex, exposed in the Blue Mountains of northeast Oregon and referred to as the Baker terrane.

I passed and now after three and a half years I'm headed to Houston to work as a geologist for ConocoPhillips, where I will be in an operations role.

Samantha Phillips '08

I'm living here in Colorado Springs (still) and teaching earth science and astronomy at Pine Creek High School. I LOVE IT. I've dabbled in some other stuff around here – coaching, student council, club sponsoring – but mostly, I just really love teaching.

Matt Rosales '08

I'm still working at Teck Resources, based out of Vancouver BC. My summer has been spent working in the Yukon looking for Reduced Intrusion Related Gold deposits. I just came back from the CC alumni Grand Canyon rafting trip with Paul Myrow and it was amazing!



Matt Rosales doing some arm waving in the Yukon.

Dan Woodell '09

I am currently in the second year of my master's at the University of British Columbia, specializing in Volcanology. My project focuses on columnar basalts, and what initial conditions are needed to create columns. I am approaching it from several angles, with high temperature experiments, numerical modeling, and fieldwork. I've successfully synthesized columns in the high temperature oven, and my field area is just south of Whistler, which makes for rather cushy field trips. Vancouver is a spectacular city (especially when it's not raining), and there are plenty of other CC Geology grads in the area. The skiing and hiking around here is amazing, and I'm looking forward to spending another year here.

Tyler Doane '10

After 5 years of Colorado livin' Tyler decided it was time for a bit of a change in scenery. He spent a summer driving around to various places meeting up with friends, many of whom are from the legendary geology department itself. He is now in the first year of his MS at McGill University in Montreal studying contentious active structures on the western margin of the central Andes in southern Peru. Aside from school, he is enjoying the city, and feelin' like an American in Canada. Any and all CC Geo grads are more than welcome and encouraged to visit in Montreal.

Robert Jacobsen '10

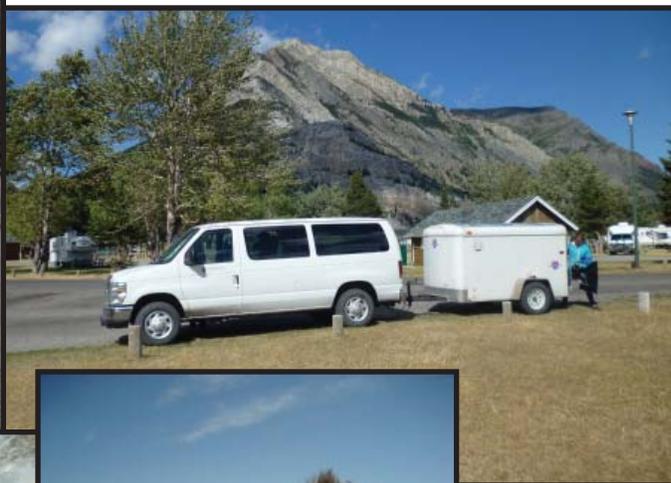
I've begun my second semester as a graduate student at the University of Tennessee. Currently, I'm studying the geomorphology of Earth and Mars, while teaching three introductory labs. Hopefully, this winter my research will take me to the Atacama Desert and Andes Mountains of Chile to study Quaternary and modern climate change, respectively...Mars is too expensive.

Alex Kerney '10

Last winter I was on a sailboat in the Patagonian Fjords looking at tidewater glaciers. This summer I worked for the Chewonki Foundation leading sea and white-water kayaking trips, when I wasn't otherwise rushing around Maine doing support. Over that 3 month period I went from a three week sea kayaking trip along the coast of Maine (the kids learned to tune me out when I started going on about the erratics on the first day), to subbing in on another trip with less than 24 hours of notice, to having a moose run into the back of the van that I was driving in a rain storm. I think my record number of nights in one location was six. I've discovered that racing in a triathlon the morning after the ski season kickoff party isn't a smart idea (but a fun one), and that I instinctually put on my avalanche beacon if I'm going to skin up something even if it's a ski area on Halloween.

Ben Borkan '11

I spent a few weeks over the summer working as a Paleontological Resource Monitor in Barstow, CA working for an environmental consulting firm. I then flew home for a few days where I packed my life up for a year and flew to Sacramento, CA where I am now an AmeriCorps Team Leader.



Photos, clockwise from top left: Regionalists class of 2012 in Wyoming; The Cathe Van on Regionals; Getting some good stuff from an old school geologist; Ben Gardiner in San Salvador on Regionals, 2011.

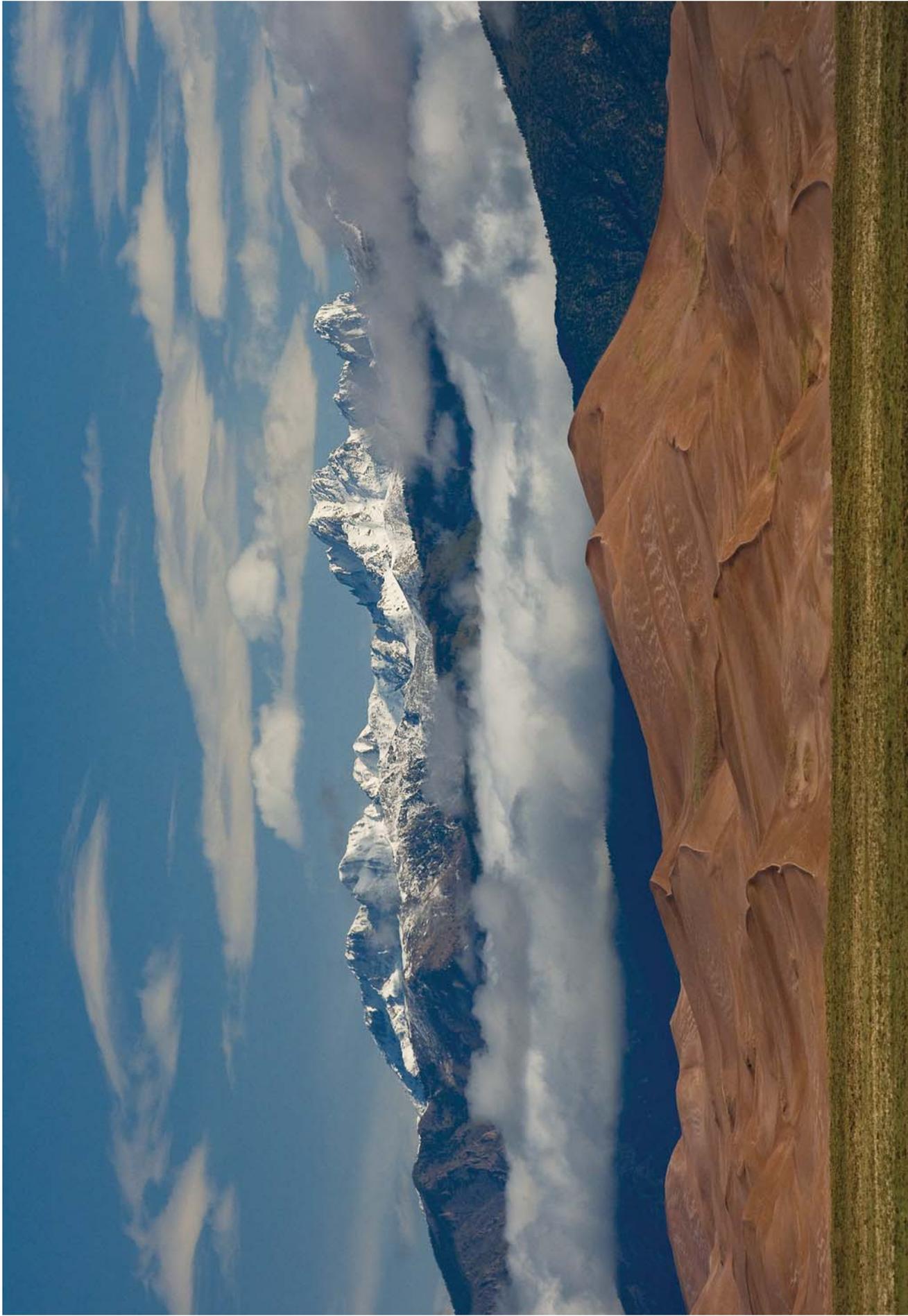


Photo by Stephen G. Weaver

Dear Colorado College Geology Alum:

We hope you have enjoyed the 2011 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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