

GEOLOGICAL SCIENCES
UNIVERSITY OF COLORADO BOULDER

Geology News



Undergraduate Field
Education In Iceland
Inside on page 8

Editors

G. Lang Farmer
Dan W. Mitchell

2013 - 2014

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Letter from the Chair

Lang Farmer

Welcome to the 2013-2014 edition of the CU Geological Sciences Newsletter. It was quite a year for the department, most notably in terms of faculty awards. Professor Peter Molnar headed this category as the recipient of the 2014 Crafoord Prize from the Royal Swedish Academy of Sciences. This award is the equivalent of a Nobel Prize for the geosciences and is a very rare commodity. In fact, there have been only thirteen or so Crafoord Laureates in the geosciences since the inaugural prize was awarded in 1982. The Crafoord Prize is designed to recognize the best of the best and that surely describes Peter and his achievements.

Back at CU, the most prestigious award offered by the campus each year is the Hazel Barnes Prize, established in 1991 to recognize "the enriching interrelationship between teaching and research". The 2014 recipient of the prize is Professor Bob Anderson, the first Geological Sciences faculty member to receive this honor. Bob is the quintessential Hazel Barnes Prize recipient. There are few who are as skillful in explaining complex concepts to undergraduate, graduate students, and professionals alike.

Professor Stephen Mojzsis was also honored at CU this year by the student-funded "Arts and Sciences Support of Education through Technology" (ASSETT) program. Steve's students recognized him for "Excellence as Outstanding Teacher for Technology in Teaching", a most deserved award.

In other faculty news, Roger Bilham retired in May from his faculty position in the department, but the event was made slightly more palatable by the fact that he will remain on the CU campus as a research associate in CIRES, and an emeritus faculty member in Geological Sciences. We plan on many more years from Roger as a high profile researcher in earthquake dynamics, neotectonics and natural hazards worldwide.

As far as new faculty members go, the department and INSTAAR searched for a joint faculty hire this year in organic geochemistry. This is the first search centered on our new geobiology initiative. We also worked with CIRES to recruit a new faculty member in Remote Sensing. A number of exceptional individuals applied for both positions and offers have been made, but you will have to check in next year to see if we were successful in landing our top choices.

As far as undergraduates go, we maintained a level of about 250 majors, and graduated sixty students in 2013-14. Our majors are still interested in both conventional and unconventional energy resources, as well as hard rock economic geology and environmental geosciences. This was the first year in which students were confronted with our new, more flexible, geology major and so far they seem to be navigating the major quite well.

We also had about six M.Sc. and nine Ph.D. students complete their degrees this year. Thesis topics this year included planetary geology, Quaternary geology, climate change, petroleum geology, paleoceanography, paleobiology, geomorphology, and geodynamics/seismology.

Alumni events again included an alumni get-together in the Houston area sponsored by Penny Patterson, and organized this year by Penny and Houston area newcomer, Jeremy Ring. We are exceptionally grateful to Penny and Jeremy for their efforts.

You may recall from last year's Newsletter that CU-Boulder announced the possible creation of the College of the Environment and Sustainability. Over the past year, this college morphed instead into a "school" within the College of Arts and Sciences. The department remains engaged in discussions on whether such a school will be created and, if so, what our level of participation in it should be. Stay tuned on this front.

As the fundraising pitch for this year, I turn your attention to the cover article describing our first attempt at an international undergraduate field class. This was a joint course with the University of Iceland, and took place in June 2014 in southern Iceland, itself. The class was highly successful, in no small part because of alumni donations, principally to the Braddock-in-the-Field fund, that underwrote the student costs of attendance and helped defray the travel costs for the CU instructors (myself and Giff Miller). This was a transformative experience for our undergraduates, but one that would not have been possible without your financial help. We are hoping to sustain the Iceland field class, offer a similar course with the University of Wollongong in SE Australia, and continue to provide graduate student research and travel grants and undergraduate mentorships. All of these enriching experiences are possible only because of your generosity, so I hope you will consider a departmental donation this year to help keep these programs afloat.

We want to thank our Advisory Board members for donating their time and energy to the department.

Notes from the Advisory Board

by Dean Miller

Greetings from the Geology Department Alumni Advisory Board. We had another productive year serving as a resource for both Lang Farmer, the Department Chair, and the students in the Department. As we do each semester, the Board met undergraduate students in the Fall and graduate students in the Spring to discuss the state of the Department. The general consensus is that the students are very satisfied with the Department, but they also made suggestions for improvement, which we passed along to the Department. Following the Spring meeting, the graduate students put on a poster session describing their current research. It was a great opportunity for new Board members to get to know the graduate students and to discuss the students' research, which reflects the multidisciplinary nature of the Department.

The Board held another career night, during which Board members shared their insights on networking strategies and job-hunting skills with undergraduate and graduate students. Board members also were active in helping students to network within the geology community. These efforts include reviewing students' resumes, suggesting networking strategies, and helping students find employment in geology-related fields. All of the Board members find working with the students very rewarding. If you are aware of internships or other opportunities for students, please let us know.

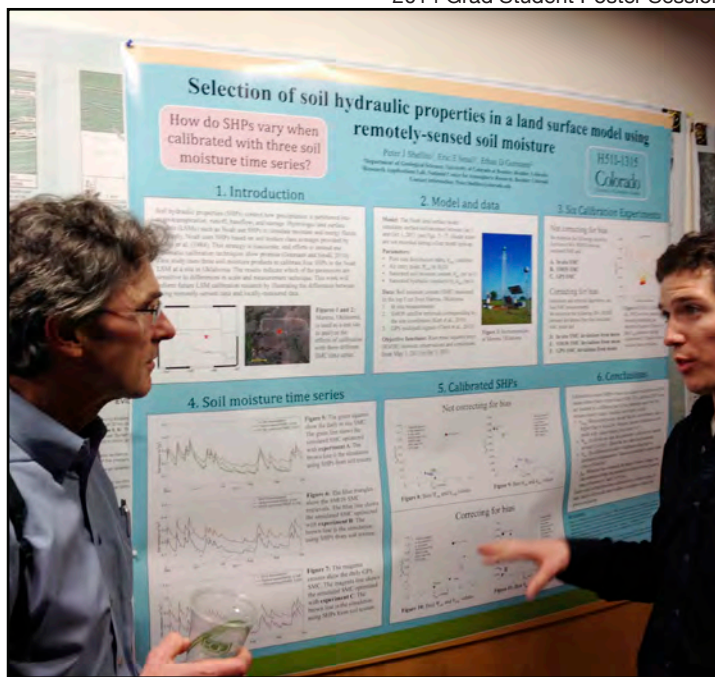
The 2013 Bill Bradley Field Trip for incoming graduate students picture by David Juszczak



Last August, several Board members again volunteered to act as drivers for the annual Bill Bradley Field Trip, where Department faculty and some Board members introduce incoming graduate students to the local geology. The two-day field trip included an overnight stay at the Mountain Research Station near Ward on Saturday night. After dinner, Lang Farmer displayed his skills as bartender. Several students who saw the movie Cocktail predictably mistook him for Tom Cruise. Alumni always are welcome to come along on the trip. If you are interested in participating in this year's trip on August 23-24, please contact Lang Farmer.

As usual, I have to make a quick pitch for fundraising. Those of you working in private industry would be shocked by the impact a small contribution can make for the Department. The State provides very little support for higher education. Please give what you can.

Houston Kempton and Peter Shellito at the 2014 Grad Student Poster Session



Geological Sciences Advisory Board Members

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Colorado Mesa University

Ted Ball
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Faculty Activities



Launch of the MAVEN spacecraft from Cape Canaveral, Florida, on Nov. 18, 2013

Bruce Jakosky

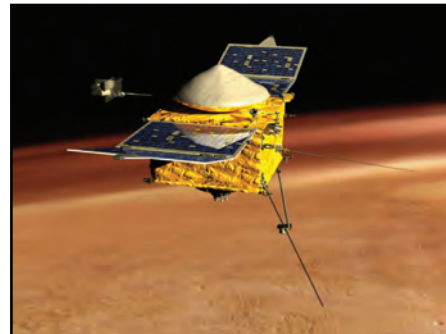
CU's MISSION TO MARS LAUNCHED SUCCESSFULLY AND ON TRACK

CU's Mission to Mars was successfully launched on Nov. 18, 2013, and is on track to arrive at Mars on Sept. 21, 2014. Known as the Mars Atmosphere and Volatile Evolution mission, or MAVEN, it is being led by GEOL Professor Bruce Jakosky. MAVEN has the goal of studying the upper atmosphere of Mars as a way to learn about the history of the planet's geology and of its habitability by microbes: Geochemical and geomorphological studies of Mars have shown that the planet had lots of water at the surface early in its history. However, today's cold, dry atmosphere is too thin to support liquid water. Key questions about the history of Mars, then, are where did the water go, where did the CO₂ from an early thicker atmosphere go? Although some of the water and CO₂ may be locked up in the crust, evidence suggests that loss of these volatiles out the top of the atmosphere to space may have been a major process in the evolution of the atmosphere. By studying the top of the atmosphere today, and how sunlight and the solar wind interact with it, the MAVEN team hopes to understand how gas can be lost and how much has been lost through time.

After a ten-month "cruise phase" to get to Mars, MAVEN will go into orbit around the red planet and make observations for a year. If all goes as expected, there should be sufficient fuel to allow it to make observations during an "extended mission" that could last as long as another ten years. So far, all systems on the spacecraft and with the science instruments are working well.

Jakosky is Principal Investigator of the project, and oversees both the engineering and the science activities. He is working

Artist's view of the MAVEN spacecraft in orbit around Mars. The communications antenna (at the top, covered by a white protective shroud) is 2m diameter



with CU's Laboratory for Atmospheric and Space Physics, the University of California at Berkeley, NASA's Goddard Spaceflight Center, and the Lockheed Martin Corp. on the mission. The project is on track to spend less than their allocated budget of \$671M.

Planning for MAVEN began in 2003. MAVEN was selected by NASA from among twenty separate proposals for a Mars mission, with final approval to develop the mission being given in 2008. On the path to the launch pad, MAVEN had more than 200 formal reviews to ensure that it was on track. With a five-year path to design, build, and test the spacecraft and instruments, MAVEN had to launch within a 20-day period; if it missed this launch period, the team would have to wait another 26 months for Earth and Mars to line up properly. MAVEN actually launched at the first minute of its 20-day period!

Jakosky and the MAVEN team are busy now getting ready for insertion into orbit around Mars and preparing to take measurements and "do science" with the data. They hope to have at least preliminary answers to where the water and CO₂ went early in 2015. Space enthusiasts will be able to watch the orbit insertion activities on Sept. 21 (at about 8 p.m. MDT) live on the internet.

GEOL Professor Bruce Jakosky (left) and Project Manager David Mitchell (from NASA'S Goddard Space Flight Center) talk about the MAVEN mission at a NASA press conference just before the launch



Gifford Miller

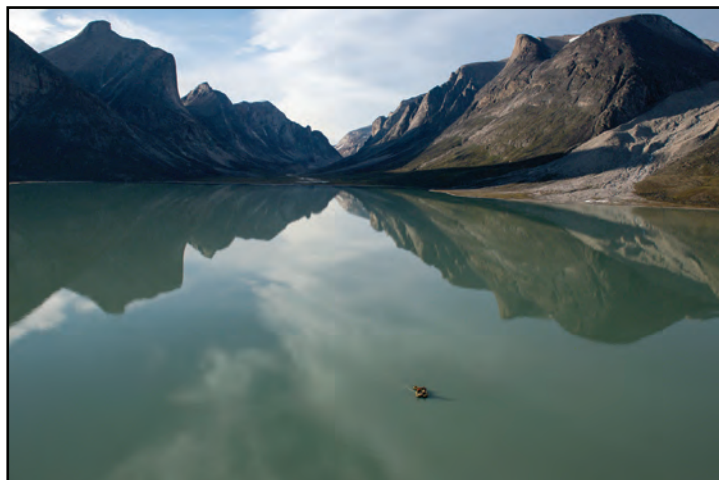
Building on a long tradition of Arctic paleoclimate research, Giff Miller managed to participate in field studies this summer on Svalbard, Iceland, West Greenland and Baffin Island, Arctic Canada. In several of these regions the field teams were focused on recovering rooted tundra plants entombed in ice that are now



Spire Base Camp, Baffin Is., Aug. 2013. Left to right: Matt Kennedy (EVT), Dan Sperduto (ecologist), Darren Larsen (CU Geol PhD 2013), Thom Davis (CU Geol PhD 1980), Sarah Crump (CU Geol PhD current), Giff Miller (CU Geol PhD 1975), Chance Anderson (New Hampshire), Kurt Refsnider (CU Geol PhD 2012), Simon Pendleton (CU Geol PhD current)

Photo by Matt Kennedy EVT

being exposed as glaciers and ice caps recede rapidly under warming summers. Dating these remains tells us when persistent cold summers dropped snowline below each site, and puts current warming in a millennial perspective. Combined with lake sediment cores that provide a more continuous record of local environmental change, the two data sets contribute to a more complete understanding of abrupt climate shifts under “natural” climate variability and contribute to a better understanding of possible future abrupt change. The Baffin Island field season was in stunning alpine terrain, and saw an unusual aggregation of current and former CU-Boulder Geological Sciences graduate students working together. With generous donor support the team included a videographer from Extreme Ice Survey who created a 5-minute video of the field season’s scientific goals amidst a visually exciting backdrop (<http://instaar.colorado.edu/galleries/baffin-island-disappearing-ice-and-climate-evidence/>).



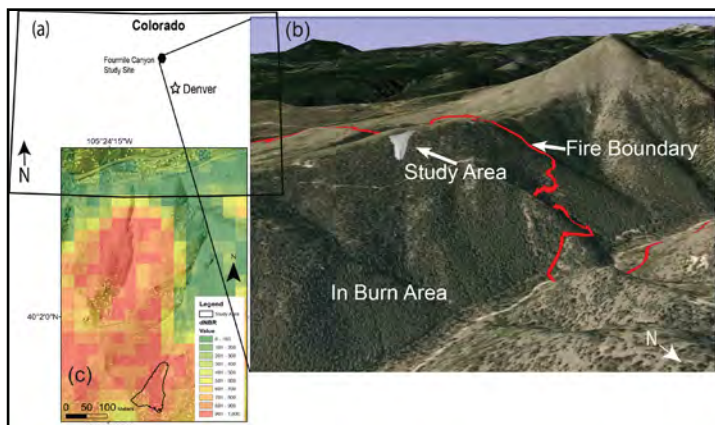
Sarah Crump’s team coring “South America Lake” below Spire Camp, Aug. 2013

Photo by Matt Kennedy EVT

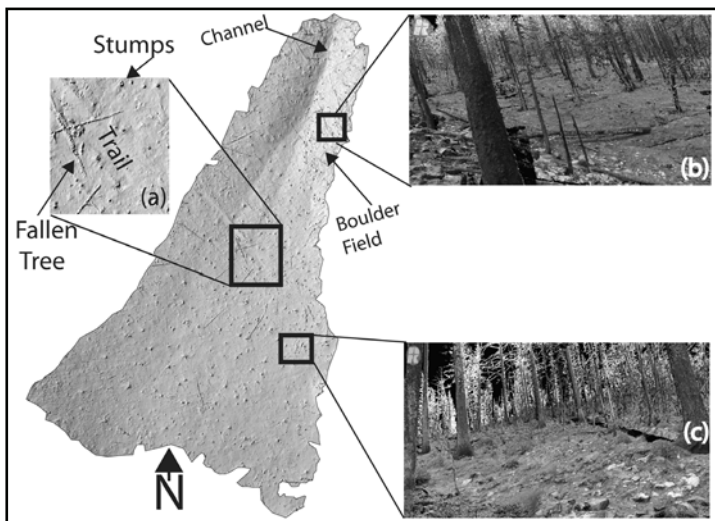
Greg Tucker

The impacts of a forest fire can be felt long after the flames have been quenched. Loss of forest-floor litter and changes to the soil can enhance runoff during heavy rains, potentially leading to flooding. Greater runoff, in turn, carries ash and sediment downhill and downstream, potentially contaminating water supplies, filling reservoirs, modifying stream geometry, and altering aquatic habitats. Vulnerability to runoff and erosion can persist over months to years following an intense fire, yet our knowledge of the sources of eroded material is limited by the difficulty in measuring sediment sources and sinks. In the past, researchers have had to rely on sediment trapping and similar methods to gauge the erosional yield following a wildfire; these methods, in addition to being highly labor-intensive, provide only sparse, integrated measurements of soil loss.

Recently, Greg Tucker and CIRES doctoral student Francis Rengers ran a field experiment in measuring post-wildfire erosion with ground-based laser scanning technology. The study took advantage of the 2010 Fourmile Canyon fire, which at the time was the most costly wildfire in Colorado’s history. Working with a team from the U.S. Geological Survey, who installed rainfall and runoff monitoring equipment on a ridge several miles west of Boulder, the team used a high-precision laser scanner to obtain detailed measurements of the terrain. Five surveys were collected over a period of 20 months. The surveys revealed some interesting surprises. Although the most obvious sign of erosion was scour of the site’s main channel, the majority of the sediment actually derived from widely distributed erosion of a relatively thin (several-centimeter) soil layer. Over the 20-month study period, sediment yield gradually decreased, while surface roughness increased as erodible patches of soil were depleted. The correlation between runoff force and erosion was surprisingly subtle; instead, the erosion patterns were notably correlated with soil thickness and terrain smoothness. Overall, the study demonstrates that ground-based laser scanning can document spatial patterns of post-fire erosion efficiently, non-destructively, and with centimeter-scale precision. The results will provide rich fuel for the next generation of post-fire runoff and erosion models.



(a) Site location in Colorado, USA. (b) Oblique view of study site, with gray shaded relief polygon delineating the study area. (c) Map of ΔNBR , a proxy for burn intensity (courtesy Sheila Murphy, USGS). Green represents low burn severity, yellow represents medium, and red represents high burn severity. (Figure courtesy of Francis Rengers)



Digital elevation image built from laser survey data, showing micro-topography such as a boulder field on the east side of the watershed. (a) Standing trees are filtered out, but some fallen trees, boulders, and tree stumps are left in the DEM. (b) 3D image of unfiltered laser data, looking SW. (c) 3D image of unfiltered laser data, looking S. (Figure courtesy of Francis Rengers)

Paul Weimer

Paul Weimer taught two graduate courses in AY 2013-2014. In September, he gave a 1.5-day short course for students at the AAPG International Conference in Cartagena, Colombia and was the co-convenor of two sessions. He then returned home to a flooded basement.

In April, he was a co-convenor of the Discovery Thinking forum at the AAPG Convention in Houston.

In May, he was a co-convenor of an AAPG Geoscience Technology Workshop in Rio de Janeiro on stratigraphic traps in deepwater settings, and gave the keynote address.

Current research topics include eastern Mediterranean, offshore Peru, northern deep Gulf of Mexico, Piceance basin, and animations for outreach with DMNS (<http://igp.colorado.edu>).

He is the co-Chair of the 100th Anniversary Committee, and serves on the AAPG Advisory Council, as a Trustee for the AGI Foundation, and for several other professional society committees.

Shemin Ge, Peter Molnar and Chuck Stern celebrate Peter's award during a department reception



Emeritus Activities

John Andrews named Honorary Member by the Quaternary Research Association - Citation

John Andrews has been a Quaternary scientist for over 50 years. He originates from Cumbria (then Cumberland), being born and raised in the small iron and steel town of Millom. He elected to go Nottingham University where he studied Geography, History, and Geology, graduating in 1959. He then moved across the Atlantic to McGill University in Canada where he spent 1959-1960 at the McGill Sub-Arctic Research Station in Schefferville, completing his MSc



thesis on the Glacial Geology of an area of the Labrador coast in 1961. His ampho-Atlantic early career is demonstrated by his first paper which was on the strength of lake ice and his second on the Wasdale scree. John's early career also included some fine sporting achievements, especially on the rugby field where he played at national level as a schoolboy and somehow found a place to play in Canada throughout the 1960s!

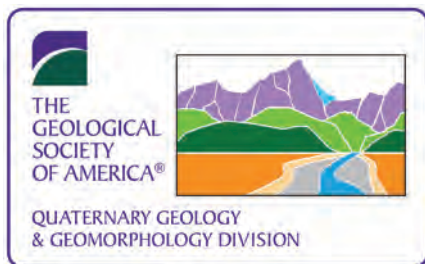
From 1961-1968 John worked for the Department of Energy Mines and Resources in the Geographical Branch and the Geological Survey of Canada. His research was concentrated on Baffin Island (then NWT) with an emphasis on glacial history and glacial isostatic rebound. In 1964-1965 he went back to Nottingham for his PhD under the supervision of Professor Cuchlaine King, and attended his 1st QRA meeting in 1965 at the Annual Discussion Meeting in Durham where he spoke about his work on Baffin Island. In 1968 he moved to the University of Colorado, Boulder, to the Department of Geological Sciences and he was also attached to the Institute of Arctic and Alpine Research (INSTAAR), where he has remained for the rest of his career, becoming Professor Emeritus in 2003. His research initially continued in the Eastern Canadian Arctic, but in 1978 he "went to sea" and has worked ever since then on marine Quaternary glacial issues in the waters of Baffin Bay, the Labrador Sea, and the western Nordic Seas. During his career, he supervised 75 graduate students, including 35 PhD students, many of whom will be familiar names such as Giff Miller, Art Dyke, John England, Peter Clark, Anne Jennings, and Aslaug Geirsdottir. His association with the QRA has been long, although distance has prevented attendance at a large number of meetings. His main contribution has been as an active member of the Editorial Board of the JQS since the inception of the journal. He has contributed a number of papers including two invited papers on Heinrich events (1998) and the MIS3 and MIS2 history of the Iceland Ice Cap and the Greenland Ice Sheet (2008). His most recent contributions were published in 2012 and 2013. In sister organizations, John has served as Past President of the Quaternary and Geomorphology Division of the Geological Society of America (GSA) and Past President of the American Quaternary Association (AMQUA). We are by no means the first to recognize John's contributions. Amongst others, he has been previously awarded Distinguished Career Awards of both AMQUA and the GSA. For all his past, present and future contributions to Quaternary science, the QRA is delighted to add Honorary Membership of the QRA to this list of honors!

Honorary Membership of the QRA is bestowed on individuals who have given distinguished and career-long service to Quaternary science and/or effective contributions to the activities and development of the QRA itself, and who are on the cusp of professional retirement or who have already retired. I am delighted to announce that we are awarding honorary memberships in 2013 to four individuals from a range of constituencies of the QRA.

- *Quaternary Newsletter Vol. 132 February 2014*

Peter Birkeland

The Division of Quaternary Geology and Geomorphology of the Geological Society of America announced a logo contest. So Shemin Ge and Pete Birkeland got busy and somehow won. Margo McGrew of the GSA finessed the final product. The logo depicts landscapes that people in the division study as part of their research. Oops, it was later pointed out (too late to change it however) that a Quaternary fault is not shown. This is unfortunate as having included a fault would have honored the Quaternary tectonic work of many of our former students, some of whom helped create the field of neotectonics, as well as that of Karl Mueller.



Peter Birkeland enjoying the 2014 Grad Student Poster Session

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Assistant to the Chair - Carmen Juszczyk

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Back row: Carmen Juszczyk, Susan Pryor, Paul Boni
Front row: Patricia Burton, Joanne Brunetti

Front Office News

by Carmen Juszczyk

The theme in 2014 has been rock solid as the whole department has received accolades from many corners of the world and CU Boulder campus. The front office has successfully supported the team throughout the year.

Paul Boni has contributed 28 years to Geological Sciences. He currently serves as, among other things, our building steward (aka, proctor) and our rock lab/x-ray diffraction trainer. A key to our hands-on STEM-style learning opportunities, Paul provides those who are willing to get their hands dirty the real deal in rock crushing.

Joanne Brunetti continues her position as the Accounting Tech with humor and efficiency -both strong job requirements! Joanne works hard to ensure the tracking of finances, travel and purchasing. She is very much the center of the Department and faculty financial activity.

Patricia Burton was hired in March 2014 to serve as our Undergraduate Program Assistant and Parking/Transportation Czar. She has mastered the parking appeals process in a very short time! Our beloved advisors (Lon Abbott, Jen Stempien, Alan Lester) and Patti have been putting their heads together to cook-up the best undergraduate experience Geological Sciences has to offer.

Carmen Juszczyk has rapidly assimilated the ways of higher education administration. She has appreciated all that the staff and faculty have done to share their knowledge, and make her feel welcome in the department.

Susan Pryor has completed her second year serving as our Graduate Program Assistant in the department. She does a great job managing the myriad of responsibilities for new students, existing students and their advisors. We depend on Susan to keep us on time, and appreciate her wise input on office initiatives.



On The Cover.....

by G. Lang Farmer



First day in the field

In June 2014, the Department of Geological Sciences at CU and the Earth Sciences Department at the University of Iceland (UI) offered a joint undergraduate field course on the Volcanology and Quaternary Geology of Southern Iceland. This was the first international field course organized by the department in at least thirty years, the first departmental "Global Seminar" offered through the CU Office of International Education, and the first ever joint undergraduate course offered by CU and UI. This was also a truly multigenerational, multinational, CU affair. Giff Miller and Lang Farmer were the CU instructors. The UI instructor contingent included volcanologist Thor Thordarson and Quaternary geologist Áslaug Geirsdóttir, who received her PhD from CU in 1988. Áslaug and Thor did all the heavy lifting required in preparing field exercises, accommodations, transportation (4-wheel drive bus!), and meals. In addition, CU alums Craig and Judy Canon subsidized the trip with a generous donation that provided the scholarships that helped the CU students attend the course.



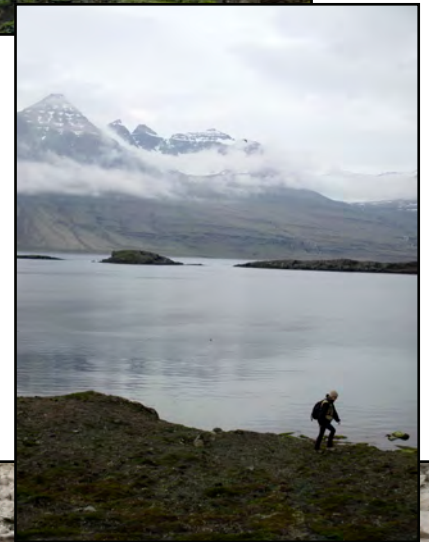
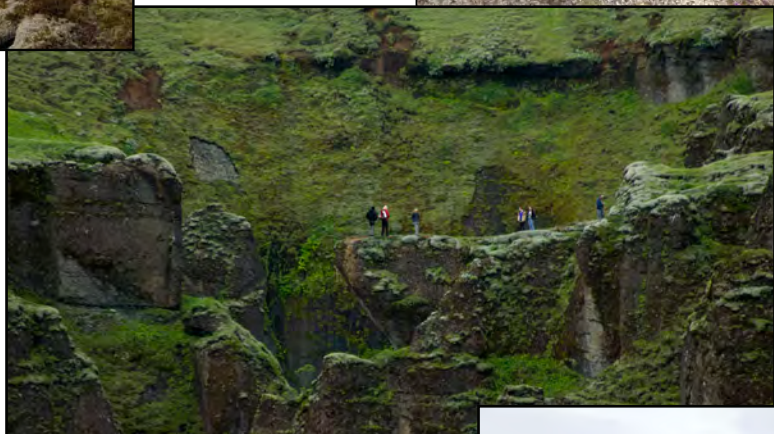
Class Participants - Back two rows (l-r) - Haukur Arnarson, Naomi Ochwat, Kara Brugman, Rakel Björk Benediktsdóttir, Unnur Þorsteinsdóttir, Katrína Jewell, Sigurdís Björg, Einar Bessi Gestsson, Matt Reed, David John, Ned McElfresh, Jeremy Ross, Sigrún Tómasdóttir, Mike Guido. Front Row (l-r)-Giff Miller (instructor), Austin Morgan.

The class started on June 16th when all four instructors met in Reykjavík with eight CU and seven UI undergraduate Geology majors. They then set off on an eleven-day stint working and living side by side in the wilds of southern Iceland, where some of the world's most dramatic examples of the interaction of ice and magma can be found. For the students, the class was an intense introduction to the art of field observations, with long days outdoors followed by group meetings inside in the evenings. The students worked in groups of three or four intermixed CU and UI students on field exercises pertaining to volcanology, igneous petrogenesis, glaciation, climate change, and magma-ice interaction. Of course, Iceland's changeable weather lived up to its reputation (rain, sun, cold, wet), as did the local midge population, so the fieldwork was not without its challenges. Fortunately accommodations for the class were exceptional and included a relatively posh hotel in Breiðdalsvík, a town in SE Iceland of about 140 people, an elementary school (classes were out for the summer, in case you were wondering), worker housing for a hydroelectric power company near the flanks of the Hekla volcano, and a twenty-person hut in Laki National Park. As important to the students as the education they received in field observations and critical thinking was the cultural exchange. The CU students got a crash course in Icelandic, including lessons on the correct pronunciation of Eyjafjallajökull, the volcano that erupted and disrupted air traffic in northern Europe in 2010, and were introduced to several local delicacies including puffin and sheep head. The Icelandic students got a chance to hone their public speaking skills, in English, with the help of an exceptional group of CU students. All in all, it was a remarkable and exhausting two weeks that ended with a resounding call from the Iceland contingent that a joint CU/UI field methods course be offered in 2015 on the Geology of Colorado. No doubt you will hear about how this class fares in next year's newsletter!



GEOLOGY NEWS

Various venues around SE Iceland.....



Field Trips



A field trip to examine the sedimentary rocks, sedimentary structures, and vertical facies sequences of the Dakota Group and Morrison Formation at the Dinosaur Ridge exposure across from Red Rocks Amphitheater is an annual part of the undergrad course in Sedimentology and Stratigraphy. Here students in the spring 2013 class are sketching the geometry of fluvial channels in an effort to address the question, one channel or amalgamated channels?

David Budd, flanked by Sed/Strat students, points out different trace fossils in the tidal flat deposits atop the Dakota Group at Dinosaur Ridge



Pablo Maldonado Moreno models chockstone in Little Wildhorse Canyon, Utah, on the geomorphology class fieldtrip



The 2013 Bill Bradley Field Trip for incoming graduate students

Bob Anderson and Lon Abbott deep in discussion during the new graduate field trip....
"righty tighty, lefty loosey"



AAPG-SEG Student Section Lecture Program

This year, the AAPG-SEG student section had a robust group of speakers that addressed a wide variety of current topics in industry.

October 21	Joe Stefani	AAPG Distinguished Lecture, "The Earth is Cleverer than You Are—Learnings in Earth & Seismic Modeling."
November 11	John Roesink	BBC, AAPG Discovery Thinking Forum, "Wasatch - Green River Resource Play, Uinta Basin, Utah."
December 5	Orion Skinner	Whiting, AAPG Discovery Thinking Forum, "Discovery of Pronghorn and Lewis and Clark Fields: Sweet Spots Within The Bakken Petroleum System Producing From the Sanish-Pronghorn Member – NOT the Middle Bakken or Three Forks!"
January 15	Webster Mohriak	AAPG Distinguished Lecture, "Birth and Development of Continental Margin Basins: Analogies from the South Atlantic, North Atlantic and the Red Sea"
January 16	Matt Silverman	Bayless Resources, "Twenty things I have learned as a consulting geologist"
March 3	Julia Gale	AAPG Distinguished Lecture, "Natural Fractures in Shale Hydrocarbon Reservoirs"
March 10	Tim Collett	USGS, "Global overview to gas hydrates."
March 17	Andy Pulham	"Recent results in behind outcrop coring and logging, Upper Carboniferous strata, western Ireland."
April 1	Julie Shemetta	"Microseismicity in unconventional resource plays"
April 2	Alfredo Guzman	Retired Pemex: "Future of resource development in Mexico: the opening of Mexico"
April 21	Steve Cossey	Consultant, "Remobilized sands in offshore Myanmar reservoirs" and "Anatomy of the giant deepwater Chicontepec field, Mexico"

Peter Molnar Awarded 2014 Crafoord Prize in Geosciences

The most prestigious geosciences research award worldwide is the Crafoord Prize, a prize that has been given out every four years since 1983 by the Royal Swedish Academy of Sciences from a fund established by Anna-Greta and Holger Crafoord. The Royal Swedish Academy of Sciences is the same body that awards the annual Nobel Prizes in Chemistry and Physics. This year the fourteenth Crafoord Laureate in the Geosciences was named and is our very own Professor Peter Molnar. As the Prize citation states, Peter received the award: “for his ground-breaking contribution to the understanding of global tectonics, in particular the deformation of continents and the structure and evolution of mountain ranges, as well as the impact of tectonic processes on ocean-atmosphere circulation and climate.” Peter was honored last May in Sweden at the three-day, 2014 “Crafoord Days” event held in Stockholm and Lund. The Crafoord Days event included a day-long symposium on mountain building which can be viewed at <http://www.crafoordprize.se>. The highlight, however, was the Prize award ceremony held in Beijer Hall (pictured) at the Royal Swedish Academy of Sciences, in the presence of H.M. King Carl XVI and H.M. Queen Silvia of Sweden. Needless to say, all of us are in awe of Peter’s accomplishment in being named the 2014 Crafoord Laureate and we hope you will join the Department of Geological Sciences in congratulating him on this remarkable honor.

A full CU news release can be viewed online at: <http://www.colorado.edu/news/releases/2014/01/16/cu-boulder-faculty-member-awarded-science-prize-royal-swedish-academy>



Peter Molnar delivering his 2014 Crafoord Prize acceptance speech at the Royal Swedish Academy of Sciences last May



The Department of Geological Sciences undergraduate mentor program is funded solely from gifts like yours!

2013-2014 Undergraduate Mentoring Program

Chris Believeau worked on re-calculating denudation rates following the Boulder Flood and on dating strath terraces near Lefthand Canyon with graduate student Melissa Foster and Prof. Robert Anderson.

Sara Constantine participated in a range of laboratory work, including analyses of ^{10}Be , aimed at reconstructing glacial and climate history on Baffin Island in the Canadian Arctic with graduate student Sarah Crump and Prof. Giff Miller.

Ian Contrares conducted a petrochemical study with Prof. Chuck Stern of cognate amphibole-gabbro xenoliths found in a radial dike from West Spanish Peaks, Colorado, which demonstrated that amphibole fractionation may have played an important role in the evolution of Spanish Peaks igneous rocks. The study resulted in an honors thesis and cum laude latin honors for Ian.

Travis Johnson conducted a petrologic study of miarolitic cavities found in a radial dike on West Spanish Peak, Colorado with mentor Alexandra Skewes. Project results demonstrated interesting Fe, Cu and Co mineralization by high temperature H_2O and CO_2 fluids. The study resulted in an honors thesis and cum laude latin honors for Travis.

David Liefert is studying exhumation constraints on the Colorado Front Range from apatite (U-Th)/He thermochronology with mentors Prof. Becky Flowers and graduate student Josh Johnson.

Melissa Lowe is constraining the unroofing of the Namaqualand Coast, South Africa, using AHe thermochronometry with mentors Prof. Becky Flowers and grad student Jessica Stanley.

Lena Ray is assessing US Array data from seismic stations in Colorado and New Mexico with Prof. Anne Sheehan and graduate student Jenny Nakai.

Undergrad mentoree David Liefert collecting a sample of schist in Rocky Mountain National Park as part of a larger (U-Th)/He thermochronology study in the Front Range with MSc student Joshua Johnson



News and Awards

Undergraduate Awards for Spring 2014

AWARD	RECIPIENTS
Bruce Curtis Outstanding Junior	Jason Van Fosson Stewart Ray
Johnston Memorial Scholarship	Katherine Ebeling
Kolber Award	Anna Klein Tate Hardesty
RMAG Outstanding Senior Award	Kara Brugman
T. Keith Marks Scholarship	Jeremy Ross Mike Guido

Shell Exploration & Production Graduate Research Awards



Shell provided funding that is helping graduate students complete research projects for their degrees.

Phil Orlandini
Sarah Evans
Josh Johnson

Graduate Awards for Spring 2014

AWARD	RECIPIENTS
Spetzler Award for Research	Ulyana Horodyskyj Cailey Condit
W. O. Thompson Award	Danny Feucht Melissa Foster Simon Pendleton Evan Anderson

2014 undergraduate award recipients



GEOLOGY NEWS

Degrees Awarded (Fall 2013 - Spring 2014)

B.A. Geology Majors

Farah Abdelmawla
Andrew Adams
Jamie E. Anderson
William Wells Baum
Nikolai Andrew Berge
Evan Griffin Berry
Karalee K. Brugman
Steven Chase
Caitlin M. Collins
Ian Albert Rafael Contreras
Philip Cunnell
Maureen Ann Dady
Mark Dennis
Briana Dodson
Katherine Ebeling
Tyson Eby
Cameron Eibl

Tait Erichsen
Maria Furtney
Jennika Greer
Lily Charlotte Grisafi
Rhiana Henry
Mariel Grace Herzog
Taylor Jerome Hindman
Qibai Huang
Blaine Curry Hudson
Muhammed Hakimi Bin Ismail
Katrina L. Jewell
Travis Alexander Johnson
Richard Jung
Tyler Kane
Jennifer Kathleen Kelly
Daniel King
Cameron G. Ledingham
Patrick Douglas McConnell

Charles Moog
Stewart Ray
Tyson Howard George Riddell
Ian Renato Rodriguez
Alexander Romansky
Jason Spencer Rosenthal
Scott Rothbarth
Chelsea R. Seiter-Weatherford
Joseph Senesi
Jeri C. Tebbetts
Collin Hannis Thompson
Ryan Thompson
Marshall J. Van Swaay
Alex Young
Matthew Zion



Spring 2014
graduate students



Fall 2013 graduation



Spring 2014 graduation

M.S. Candidates Graduating with Degrees

	Advisor	Thesis Title
Daniel Allen	Matthew Pranter	Geologically Constrained Electrofacies Classification of Fluvial Deposits: An Example from the Cretaceous Mesaverde Group, Uinta and Piceance Basins
Aya El Attar	Matthew Pranter	Regional Stratigraphy, Elemental Chemostratigraphy, and Organic Richness of the Niobrara Member of the Mancos Shale, Piceance Basin, Colorado
Lesley Ann Butcher	Kevin Mahan	Re-thinking the Laramide: Investigating the Role of Fluids in Producing Surface Uplift Using Xenolith Mineralogy and Geochronology
Tuba Evsan	Matthew Pranter	Geologic Controls on Formation Water Salinity Distribution, Southeastern Greater Natural Buttes Field, Uinta Basin, Utah
Sarah Hirner	Joseph Smyth	Structure and Hydration of the Humite Minerals
Ryan J. Sharma	Matthew Pranter	Fluvial Architecture and Sequence Stratigraphy of the Upper Williams Fork Formation, Plateau Creek Canyon, Piceance Basin, Colorado

Ph.D. Candidates Graduating with Degrees

	Advisor	Thesis Title
Adel Aboktef	David Budd	Sequence-stratigraphic Controls on Sandstone Diagenesis: An Example from the Williams Fork Formation, Piceance Basin
Caroline Alden	Jim White	Terrestrial Carbon Cycle Responses to Drought and Climate Stress: New Insights Using Atmospheric Observations of CO ₂ and δ ¹³ C
Stephanie Anne Higgins	James Syvitski	River Delta Subsidence Measured with Interferometric Synthetic Aperture Radar (InSAR)
Darren Larsen	Gifford Miller Áslaug Geirsdóttir	Holocene Climate Evolution and Glacier Fluctuations Inferred from Proglacial Lake Sediments at Hvítárvatn, Central Iceland
Erin H. Leckey	Dena Smith	Effects of Changing Climates on Plant-insect Interactions in Cenozoic Oaks
William Brower Levandowski	Craig Jones	Geophysical Investigations of the Origins and Effects of Density Variations in the Crust and Upper Mantle beneath the Western and Central United States
Emma Cordts Marcucci	Brian Hynek	A Multi-faceted Approach to Characterize Acid-sulfate Alteration Processes in Volcanic Hydrothermal Systems on Earth and Mars
Ursula Quillmann	Thomas Marchitto	The Influence of Subpolar Gyre Dynamics on Centennial to Millennial Scale Holocene Climate Variability in the High-Latitude North Atlantic
Andrew D. Wickert	Robert Anderson	Impacts of Pleistocene Glaciation and its Geophysical Effects on North American River Systems

Students “in the field”



Professor Alexis Templeton and graduate student Hannah Miller surrounded by mountains of peridotite in Oman



Sunset after a rainstorm on Cora Lake, Northern Saskatchewan, where Dr. Kevin Mahan and graduate student Phil Orlandini study deep deformation processes in an exhumed section of the lower crust

Photo by Phil Orlandini



Ulyana Nadia Horodyskyj collecting snow samples to test for pollutants with a local Sherpa-Scientist trainee; Lobuche Peak (20,150 ft.), Nepal



Graduate student Danny Feucht sitting an electric line during installation of dipole electrodes near El Paso as part of the DRIFTER experiment

Photo by Daniel Zietlow



Matthew Weingarten, Jenny Nakai and Will Yeck testing seismometer equipment during installation near Greeley, CO

Photo by Shemin Ge



At the Binghamton Geomorphology Symposium, Francis Rengers gave a quick safety talk before they got into the raft to head down the Snake River in Teton National Park. Also pictured are Andy Wickert - right foreground and Harrison Gray - second person on the left side



MSc student Aaron Hantsche and CU Alumni Dr. Inocente Guadalupe Espinoza Maldonado of the University of Sonora, studying anorthosite near Puerto Penasco, Sonora, Mexico



Graduate student Jenny Nakai explains the different hypotheses explaining the origin of the Grand Canyon to the GEOL4717/5717 Tectonic Seminar of the Western U.S. class at Toroweap Point, Grand Canyon National Park



Leif Anderson and Billy Armstrong drilling in a new gps support system on Kennicott glacier, Alaska

Houston Area Alumni Event

by Penny Patterson

On the evening of Saturday October 19, 2013, the Department of Geological Science Houston Area Alumni Party was held at the home of alumni Penny Patterson and her husband Townes Pressler. Attending alumni ranged from recent graduates to long-time Houston area alumni and also included several young children of the alumni (potential future CU alumni!). The current and

ongoing affairs of the department were presented by department Chair and alumni party honoree Lang Farmer. In addition, Jeremy Ring (MS, 2014) organized an artwork presentation by street artist Gonzo, who created a painting of the old CU Geology Building with the Flatirons in the background that was on a large sheet of plexiglass. It was an extraordinary presentation, which provided entertainment and memories for the alumni.

(from left to right): Jeremy Ring, Janet Thornburg, Gonzo, (artist behind his artwork that was in progress), Penny Patterson, and Michael Hayes

The Artist Gonzo's finished artwork



On May 31, 2014, a magnitude 3.4 earthquake occurred east of Greeley, Colorado

A team of CU Geological Sciences graduate students, led by Prof. Anne Sheehan, quickly deployed 5 seismometers in the epicentral region and are continuing to monitor seismicity in the region. The epicenter was close to a high-volume waste water injection well, and the CU team is working with industry and the Colorado Oil and Gas Conservation Commission (COGCC) to determine whether the quake was linked to the well, and if so, to find safe levels of injection. As a precaution, the injection company stopped injecting after a day of high seismicity and a magnitude 2.6 aftershock, and the seismicity is continuing to be monitored during the well 'shut-in'. Graduate students William Yeck, Matthew Weingarten, and Jenny Nakai have been working hard on the seismometer deployment and subsequent data analysis, and undergraduates Jamie Hansen and Lena Ray have provided field assistance.



CU geology graduate students William Yeck, Matthew Weingarten, and Jenny Nakai deploying seismometers



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Alumni News

John F. Hubert

Hello to all from John Hubert, M. S. geology 1954. I was in the geology graduate program back in the days before the interstate highway system, when the classes were in the old geology building, and there was open range land between Boulder and Denver. I have particularly fond memories of interacting with faculty members John Chronic, Warren Thompson, and Ernie Wahlstrom. The initiation into the Geology Club consisted of driving the blindfolded candidates up into the mountains on a switchback dirt road to an old mine where we crawled on hands and knees along the wet floor of the adit to a large stope. Then the dramatic scene of candlelight in the pitch black chamber when the blindfold was removed. In 1952, a new geologic map of Colorado was in preparation by the U.S. Geological Survey. To fill in a blank area, I did my master's thesis under John Chronic on the area just south of

Eagle, Colorado at the northwestern corner of the Sawatch Range, producing a geologic map, stratigraphic section, and geologic history.

In the fall of 1954, I met my wife Mary Alice (deceased) at a graduate mixer at Penn State and we had 56 happy years together. A Preschool teacher and field companion away from home for 27 field seasons and four sabbatical leaves, Mary Alice jointly raised our three children and kept the field work moving forward while making it all fun.

Now emeritus professor at the University of Massachusetts at Amherst, I have written *Listening to the Rocks: a Geologist's Life with Mary Alice* that includes the years at Colorado, a Ph. D. from Penn State under Paul D. Krynine the pioneering sedimentary petrologist, followed by teaching at the Universities of Missouri and Massachusetts. Anyone who would like to read anecdotes and adventures in the field, classroom and at home during those days can obtain the 235-page, 8 by 10-inch paperback or eBook at Amazon.com.

Obituaries

Larry G. Bale (Geol'59)
Frank R. Beck Jr. (MGeol'64)
Willson W. Bell (Geol'52)
Phillip R. Bigsby (Geol'62)
Arnold J. Boettcher (Geol'66)
Douglas R. Callier (Geol'46, MS'48)
David M. Fisher (Geol'52)
Robert L. Friedenwald (Geol'58)
E. Max Gilpin (Geol'56)
John R. Heslip (Geol'61)
Collis J. Lee Jr. (Geol'68)
Glenn E. Mathews (Geol'52)
Beverly E. McMahon (Geol'44, PhD'66)
Clarence R. Monette (Geol'53)
William E. Richardson (Geol'25)
Norman R. Rowlinson (MGeol'57)
Glenn R. Scott (Geol'48)
Leroy B. Scott Jr. (Geol'50)
Gordon A. Swann (Geol PhD'62)
Helen Herald Woodard (Geol'48)
Joan Wright Young (Geol'48)

Collis J. Lee Jr. died Nov 9. He was a wonderful husband and friend. He was told in his teens that he would die by 20. Then he would die by 30. He made it to his 66th birthday. He loved the CU Buffaloes, Colorado, Nascar and many iPhone game apps. He was born to Collis and Maxine Lee in Wichita Falls, TX, on October 26, 1946 he graduated with a degree in Geology from CU. He retired from IRS after 24 years of service. He is survived by his loving wife and caregiver of 26 years Gloria, all his in-laws, several cousins, and the very dear friends from college, Bob, Jeff, and Rick!

Gordon A. Swann was born on September 21, 1931 in Palisade Colorado.

He graduated with a Ph.D. in 1962 studying Precambrian geology of the Front Range.

Gordon enjoyed his career with the U.S. Geological Survey, Branch of Astrogeology, in Flagstaff, AZ, part of which was training astronauts and actively participating in all of the manned missions to the moon. The geology, teaching, writing, and speaking skills he learned at CU served him very well in his career. Among other awards he received, were the NASA Medal for Scientific Achievement and Professional Excellence award from the American Institute of Professional Geologists.

He died of metastatic cancer on May 22, 2014. No source for the cancer was identified. He lived four months after he was diagnosed with Stage 4 cancer.

We would like to thank ALL of our faithful and generous donors.
Words can hardly express our gratitude for your continued support and encouragement to the Department of Geological Sciences.
We would not be the first class program that we are without your support.

Our sincerest thanks
from the Faculty, Staff and Students.

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