

GEOLOGY NEWS

Department of Geological Sciences • University of Colorado at Boulder • Spring 2005

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Geology faculty & students gather together for a holiday picture in December 04.

Letter from the Chair

Mary Kraus

My second year as chair of the Department was as busy, in fact, probably busier, than my first. Despite the many personnel changes going on across the campus, the Department has been quite stable. We still have 30 faculty members, a large number of whom (nine) are junior faculty. We were given permission to hire a new aqueous geochemist, and that search is in progress; we hope to have a new geochemist join the faculty this fall.

During the past year, the Department instituted several changes. A new core course, required of all entering graduate students, was added to the curriculum. This course – Parade of Professors – is a one-credit hour course in which each faculty member gives an overview of his/her research to the new graduate students. Also required of all new graduate students is an introductory field trip at the beginning of the semester. The first trip, held the weekend before classes started in August, was very successful. The first day of the trip, led by Prof Karl Mueller with a contribution by Emeritus Prof Pete Birkeland, focused on geology between Boulder and Rocky Mountain National Park.

The group spent the evening at the Mountain Research Station. The Advisory Board was instrumental in trip logistics. Not only did Board members provide funding for the food and liquid refreshments for the trip, but also Dave Peterson made all the arrangements with the Mountain Research Station. Tim Garfield came all the way from Houston and spent the day preparing a barbecue feast for the weary field trippers. The second day of the trip was led by faculty Bob Anderson and Alan Lester. Other faculty who participated in various aspects of the trip were myself, Suzanne Larsen, Sandra Laursen from CIRES, and Chuck Stern.

The Advisory Board has two new members - Anna Wells (St. Anselm Exploration in Denver) and Neil Fishman (USGS in Denver). Matt Silverman continues his outstanding work as chair of the Board. This newsletter contains an article by Matt that describes recent activities of the Board.

Because state funding continues to decline, it is more critical than ever that the Department try to raise funds to support student programs. One of our top fund raising goals is to increase the number of endowed graduate fellowships we have to support graduate students.

www.cugeology.org

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Through the help of the Advisory Board, new monies of \$125,000 were contributed to the Bruce Curtis Endowed Graduate Fellowship Fund by August of 2004. This enabled the Department to receive a second match of \$75,000 through a special grant from Melissa and Anthony Moores to the Graduate School at CU. Because of fundraising efforts in 2004 and early 2005, the Curtis Fund now stands at approximately \$420,000. Because tuition continues to rise, the Curtis Fund needs to reach \$500,000 if it is to fully support a non-resident graduate student. With the help of the Advisory Board, the Department hopes to reach that goal in 2005.

Our major fundraising effort this year is the Bill Braddock In-the-Field Fund. In December, we decided that our goal for the year was to raise an additional \$80,000 to bring that fund to \$200,000. To help attain that goal, Bruce Benson has promised matching funds of \$40,000 if the Department can raise the other \$40,000 by August of 2005. This endowment provides funding for student field trips, either within academic courses or as special Department events, with the goal of keeping students "in the field". Ultimately, \$500,000 will be needed to fully fund the Braddock In the Field Endowment.

The last page of this newsletter lists the names of those who have donated to our program over the last calendar year. To all these individuals and corporations I express my thanks on behalf of all the faculty, students, and staff of the department. Please consider making a gift to the department so that our students can have the same quality educational experience today that you had when you were a student. This newsletter includes an envelope for sending a gift to the department and the last page has a form for identifying the fund to which you would like to donate. In addition to the Braddock and Curtis endowed funds, the Department is always in need of general gifts funding. General gifts support a number of important departmental programs including student travel to conferences to present the results of research and activities of the undergraduate Geology Club.

Notes From The Advisory Board

by Matt Silverman
silvermanmr@yahoo.com

Last year in this space I offered the old Washington saying that "if you don't like the news, make some of your own." Well, a lot of the news from Boulder has been even worse this year than last, as most of us know too well.

The scandals in programs as diverse as football and ethnic studies have affected the whole university. Enrollments will be down, capable university administrators have left, morale and funding are suffering; it's not just an image problem.

All that said, the Geological Sciences Department is in very good shape, and I'm always pleased to be associated with it. You can be, too, without reservation. This newsletter is filled with the good news to come out of the Department in the past year.

The Advisory Board continues to support the Department however we can. The +/-15 members of the Board come from all subdisciplines in the geological sciences and from homes around North America. We meet twice-yearly in Boulder with faculty, students, and CU Foundation officers to offer our ideas and the benefit of our experience in the post-CU (aka "real") world.

More importantly, a few of the Board's initiatives include:

The Bruce Curtis Graduate Student Fellowship. Alumni and friends of the Department like you have now donated about \$420,000, putting us well in sight of our \$500,000 goal. Two deserving graduate students are already receiving the support for which this endowment was created in 2001. Thanks for your gifts; please help us make our goal this year by putting another generous check or pledge in the mail.

The Bill Braddock In-the-Field Fund. This endowment was created to support critical (but increasingly expensive) field studies at the undergraduate and graduate levels. A recent challenge grant by Bruce Benson has put us well over the \$125,000 mark, also on the way to a \$500,000 goal. Everyone believes in the value of field work and alumni support is essential. Again, now is the time for all of us take advantage of the matching gift and donate to this effort.

The New Graduate Student Field Trip. Last August the Board inaugurated a field trip for all incoming graduate students. Our goal was to introduce the new students to each other and to the geology of the Front Range. With the eager participation of Karl Mueller, Bob Anderson and other faculty members, and under the leadership of Dave Peterson and the Texas-barbecue skills of Tim Garfield, this was a famous success. The 2005 trip is set for August 20 and 21, back at the Mountain Research Station at the base of Niwot Ridge.

These are just three of the activities of which the Department, its alumni and students can be very proud. If there is anything else you'd like your Advisory Board to do, let me know, please.

Submit your alumni news @
www.cugeology.org
click on the "alumni web" link

Faculty Activities



Jaelyn Eberle and her team of U.S and Canadian scientists (including a Ph.D. student from the University of Saskatchewan) explored for Eocene fossil vertebrates on northern Banks Island in Canada's western Arctic (~74 N. lat.) this summer, thanks to funding from the National Geographic Society.

Suzanne Larsen

Suzanne received two awards: (1) A Certificate of Recognition for support of scientific research from Sigma Xi, Scientific Research Society and (2) the Ralph E. Elsworth Award from the University of Colorado Libraries for excellence in librarianship

Alan Lester

Alan continues to serve as the academic advisor for undergraduate students (approximately 80 majors and 40 minors), and as the TA coordinator for the large introductory physical geology lab courses, and as a senior instructor. Alan teaches several courses including geological disasters, historical geology, and both introductory and advanced field geology.

In the last year, Alan completed an outreach project called "Geology at our Doorstep" with Sandra Laursen of CIRES outreach program, and has begun a new project called "Mountains and Moraines" with both Laursen and Prof. Karl Mueller. Alan has also been involved in developing virtual field trips on DVD, combining his favorite pastimes of rock climbing and flying small airplanes with teaching geology.

Matthew Pranter

This past year, Matt has been busy starting a new EMARC research consortium that addresses the stratigraphic architecture, sandstone connectivity, and reservoir characteristics of fluvial deposits in the Williams Fork Formation in western Colorado. This research is sponsored by eight petroleum companies and through a grant from the Petroleum Research Fund of the American Chemical Society. This research involves the collection of field data, including lidar (LIght Detection And Ranging) data. These data will be collected in the spring and summer when the weather improves. Matt and David Budd have also been working on research involving petrophysical heterogeneity within dolomites using outcrop data they collected from Sheep Canyon and Lysite Mountain, Wyoming. At Lysite Mountain, these data were collected with the much appreciated help of former CU geology undergraduate, Todd Preston, who is also an experienced rock climber (see figure). Thanks Todd!!

Quentin German (former CU geology undergraduate) is now a Master's student working with Matt on the Williams Fork research project. During 2004, both Amanda Ellison and Marielis Vargas successfully completed their Master's programs. Amanda is now a petroleum geologist with ExxonMobil Exploration Company in Houston and Marielis has returned to Venezuela to continue her work with Petroleos de Venezuela (PDVSA).

Matt continues to be active in AAPG and serves as a reviewer for the Bulletin and is a member of the Reservoir Development Committee and vice chair of the Future of Earth Sciences Committee.

Anne Sheehan

As part of our ongoing collaborations with seismologists in Nepal, graduate student Gaspar Monsalve visited the Department of Mines and Geology in Kathmandu, Nepal, in May 2004. He helped researchers there apply advanced earthquake location algorithms to their many years of earthquake data. He visited the site of one of our seismometers near Namche, which involved a two day trek from Lukla. Graduate student Tom de la Torre spent the 2003-2004 academic year teaching science at Manhattan Middle School in Boulder, as part of a National Science Foundation K-12 program. In the summer of 2004 he worked as a seismology intern at Lawrence Livermore National Laboratory. Oliver Boyd completed his Ph.D. in summer 2004 and is now a Mendenhall postdoctoral fellow at the USGS. He is working on earthquake hazards research. Part of his thesis work was published in Science in July 2004. Greg Benson has been working on an information technology project focused on the Rocky Mountains, and attended the Rocky Mountains Earthscope workshop in Fall 2004. Sheehan has been working on the installation of a collaborative CU/USGS seismic station near Aspen, which will be on-line in spring 2005. Data from the station will be telemetered in real time to

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Chuck and Alex on the Llaima volcano in central Chile, amongst the araucaria (Monkey Puzzle trees). They were on a field trip with their student Jonathan Funk, prior to the 2004 General Assembly of the International Association of Volcanology and Chemistry of the Earths Interior .

Views of former CU undergraduate (now at USGS), Todd Preston, collecting dolomite samples at Lysite Mountain, Wyoming and hanging out on the rocks!



the National Earthquake Information Center at the USGS in Golden, Colorado. CU undergraduates contributing to research efforts in Sheehan's group this year include Jacob Walter and Jennifer Clifford.

Paul Weimer

Paul Weimer received two career honors in 2004-2005. First, he gave the SEG/EAGE Distinguished Instructor Short Course in 2004-2005. The one-day course, "Petroleum systems of deepwater settings," was taught in 24 cities, in 18 countries, on 6 continents to more than 1700 participants. Highlights included teaching at the oldest Geological Society (The Geological Society of London), a cook's tour of the Dead Sea rift and surrounding area, birthday celebration at Luxor (Egypt), first time for teaching in India, China, Japan, and Malaysia. Paul spent more than 120 hours flying and accrued many frequent flyer miles. Associated with the tour, Paul wrote a 488-page book that all course participants received at the beginning of the course. He also spoke at several universities and companies along the way.

Second, Paul will receive the AAPG Grover E. Murray Distinguished Educator Award in Calgary this coming June. In addition, he was named a GSA Fellow in November.

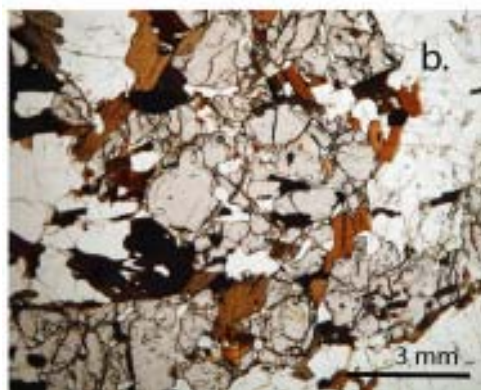
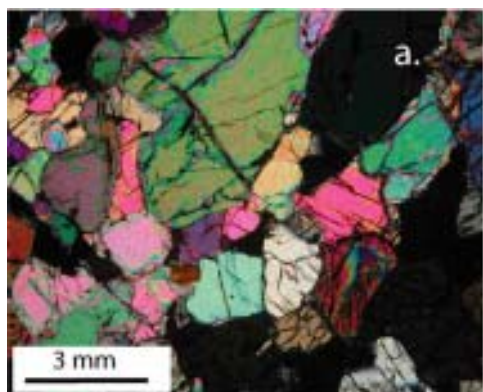
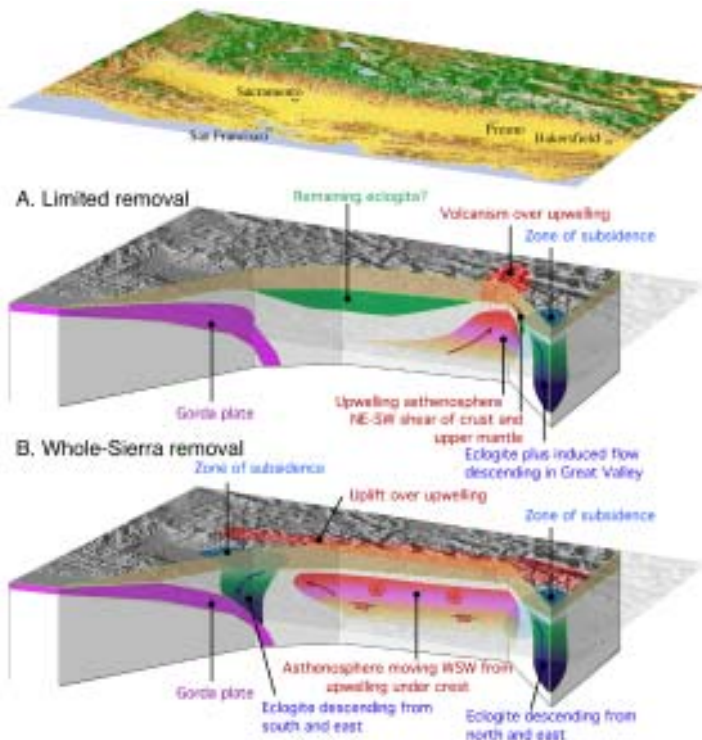
In 2004, he was a keynote speaker at the RMAG 3-D seismic symposium, and at the Offshore Technology Conference in May. He is currently finishing writing a book with Roger Slatt for the AAPG. He published 18 papers and wrote one book in 2004.

Paul remains a Trustee for the Gulf Coast Section- SEPM Foundation. He finished his two years serving as AAPG Treasurer in late June. He co-organized a session at the AAPG-Cancun meeting in late October, and is co-organizing the 2006 SEPM Research symposium on mass transport deposits in deepwater settings.



CU part of first FlexArray deployment of EarthScope

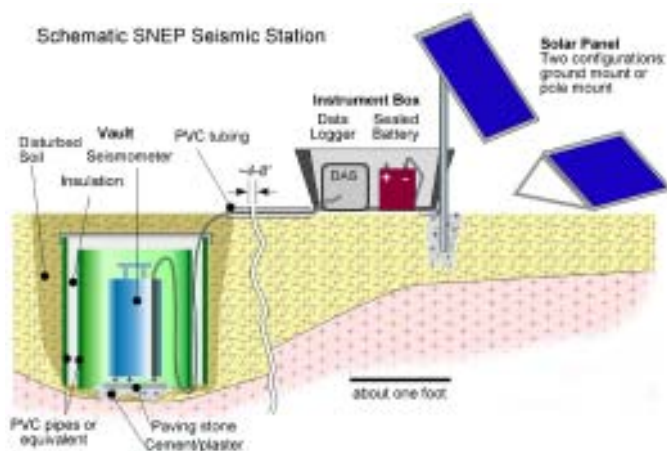
by Craig Jones



This past year has seen the beginnings of the NSF-funded EarthScope facility go into the ground. Costing about \$200M, the EarthScope facility (<http://www.earthscope.org>) has three main thrusts: USArray, a moving network of broadband seismometers, the Plate Boundary Observatory (PBO), which is a network of GPS receivers to monitor deformation, and the San Andreas Fault Observatory at Depth (SAFOD) near Parkfield, California. One component of USArray is a collection of portable seismometers (the FlexArray) available for investigator-instigated science. CU Associate Professor Craig Jones is collaborating with Prof. George Zandt and CU PhD alum Hersh Gilbert at the University of Arizona and Prof. Tom Owens at the University of South Carolina to deploy the first FlexArray equipment. This study will place over 40 broadband seismometers in the Sierra Nevada from Kings Canyon National Park to near Lake Tahoe over the next 2 years.

The goal of the experiment is to learn to what degree the Sierra have been created by the replacement of dense mantle material (similar to the garnet amphibolite in (b) at lower left) by spinel peridotites ((a) at lower left) about 3 to 5 million years ago and what the effects of such an event are on the lithosphere. Jones and Prof. Lang Farmer suggested in a 2004 GSA Bulletin paper that this event caused the entire range to rise, normal faulting to become active in what is now the western Great Basin, and the California Coast Ranges to shorten as the Sierra pressed west into the Pacific plate (panel B at left). In contrast, lead PI Zandt has argued that the material was only removed near Long Valley and that volcanism of the Long Valley caldera is the principal result of this material descending into the mantle (panel A at left). By examining an area north of previous experiments, these two ideas will be tested.

In addition to the work already undertaken by Jones and Farmer, CU professors Peter Molnar and Bob Anderson have also contributed to study of the Sierra and will be involved with workshops that are part of the project. Several CU graduate students (and at least one undergrad) will be out in the field this coming year, helping to install and service these instruments. As part of this project, we are hoping to develop outreach projects through the national parks in the area and a summer workshop to expose students and possibly teachers to a large multidisciplinary project.



"In The Field"

Your continued support of "In The Field" programs helps provide students with the funds needed to experience geology in a real and up close environment. Please consider supporting "In The Field" programs.

Astrobiology Field Trip To Yellowstone

The graduate class in astrobiology took a four-day field trip to Yellowstone National Park early in the fall semester. The goals were to see first hand the occurrence of life in extreme environments and to begin to understand the nature of the relationship between organisms and their planetary environment.

The trip was led by Bruce Jakosky (Professor of Geological Sciences) and Tom McCollom (Research Associate in LASP), and included ten participants. In addition to seeing the usual well-trodden tourist spots, the class was able to get into the backcountry, led by Tom to some of his field sites. There, they were able to explore thermal features from all angles, without being constrained by the tourist boardwalks.

In addition to seeing the entire range of features that occur in the Yellowstone basin hot springs environment, our group was the first to note the revival of an inactive geyser in the Norris Geyser Basin. It was spurting at ten-minute intervals up to a height of about 25 feet, including splattering some water onto the nearby boardwalk. The park ranger later told us that it continued to do this for another day, then stopped again as suddenly as it had started. We felt very lucky to have something truly out of the ordinary!

Field trip participants standing in front of Old Faithful, at the very tail end of one of its eruptions.



Structural Geology Trip To Moab

The structural geology class visited western Colorado and Utah for a three-day field trip last fall. They left early on a Friday and drove west to view the oilfield-scale geometry of a Laramide monocline at Colorado National Monument where they also examined brittle strain along the sheared boundary of the structure. Afterwards, the class drove into the Onion Creek diapir in Utah, an active salt-cored uplift located near the Fisher Towers. Though threatened by rain, they managed to traverse the gypsum-filled core to examine high shear strains in the evaporite sequence, stratigraphic relationships with overlying cover strata and the implications of active salt flow in response to erosion in the Onion Creek stream drainage. The participants stayed that night at a youth hostel in Moab (more time spent looking at rocks, less time setting up tents), supported by the department's In the Field Fund. The second day was spent climbing down into Upheaval Dome, an incredibly well exposed salt diapir in Canyonlands. The core of the Dome contains a series of radial thrust faults that deform the Moenkopi Formation (think of a layer cake put in a blender) as well as large clastic dikes produced by high pore fluid pressures. After climbing back out of Upheaval the class examined an array of normal faults along the edge of the Moab Valley near the entrance to Arches National Park, and finally, walked up to Delicate Arch to watch the sunset at the end of the day. On the last morning, they used a local flight service company for an overflight over the active normal faults collapsing above the Paradox salt near the confluence of the Colorado and Green Rivers. These are stunningly exposed fault blocks that allow the structure students to witness firsthand how faults interact and link together in complex arrays. After doing a couple of tight loops around Upheaval they buzzed rock climbers on Castleton towers, then flew on to Onion Creek for a wide angle perspective of the salt-cored diapir. Students appreciated the perspective the plane flight gave them after first examining the same structures and sediments on the ground. This also makes subsequent classroom lectures on complicated salt structures much easier to comprehend and relate to growth sedimentation.



Getting a helping hand on steep ground in the core of Upheaval Dome



Structure students examining deformed Permian evaporites in the core of the Onion Creek Diapir, near Moab Utah.

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Students brave the elements during a field trip to the Grand Canyon lead by Craig Jones.

Field Tectonics Seminar Braves the Elements

The fourth running of the Field Tectonics Seminar (GEOL4717/5717) had more bad weather than the previous three combined yet still proved to be a success. Eleven students (five undergraduate and six graduate) combined to speak on 24 topics as we drove in 10 days to such landmarks as Shiprock, Canyon de Chelly, Petrified Forest, the Mogollon Rim, the Superstition Mountains, the Maria Fold and Thrust Belt, Death Valley, Valley of Fire, the Grand Canyon, and Bryce Canyon. This running of the trip also saw the most elaborate cooking yet, with as many as 8 burners glowing through dinner preparations. It also saw the most dedicated coffee snobs (who were rewarded somewhat when we found the Kiva Koffeehouse near Escalante, UT). Despite rain on half our days, only a presentation at Bryce was sufficiently inclement to force us to discuss things over the radio instead of outside the trucks.

Although the emphasis in the class is on the student presentations of key geologic localities, we keep a running pattern going on the geology and each vehicle had a combination of GPS, computer, scanned maps, and software such that our position on a geologic map was nearly always shown. This allows all of the class to keep in mind where we are in a broader sense and helps students making their presentations to be aware of the geologic elements of localities they have never visited.



Bruce and Tom in front of a boiling hot spring

Please Support
The Bill Braddock
Geology In The
Field Endowment



Muskox baby "in the field" in Canada's western Arctic



Karl Mueller teaching
"In The Field"



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EMARC News

emarc.colorado.edu

Things have been busy! In October 2004, former students and research scientists presented 16 papers at the GCAGS Annual Meeting in San Antonio. The papers reflected all of the work done by students and research scientists in our most recent Gulf of Mexico industrial research consortium. This research constituted 20% of the technical program, as EMARC was quite well represented. Seven posters were presented at an all-day poster session on Monday, and nine oral papers were given at a Tuesday morning oral session. Program highlights included a one-hour joint presentation by Todd Lapinski and Aaron van den Berg on the results of their theses, and Sean O'Connor receiving the Thomas A. Philpott Best Oral Paper Award (the paper was given by Paul Weimer in Sean's absence). Fifteen written papers were published in the Transactions Proceedings volume.

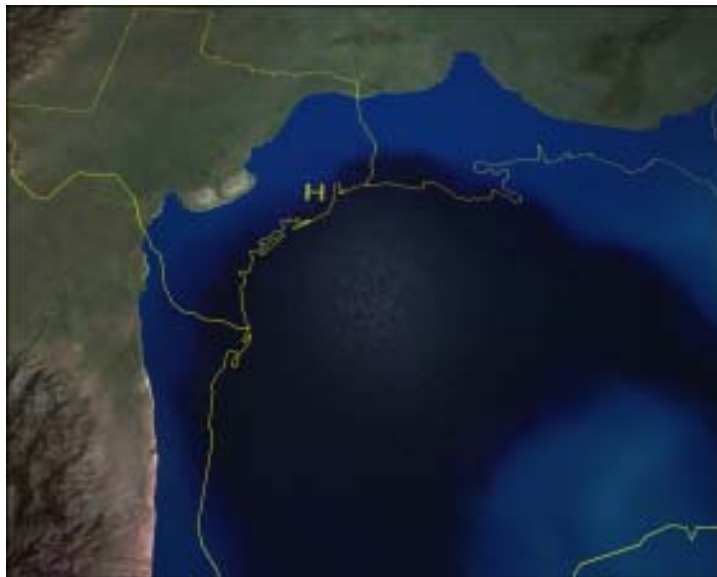
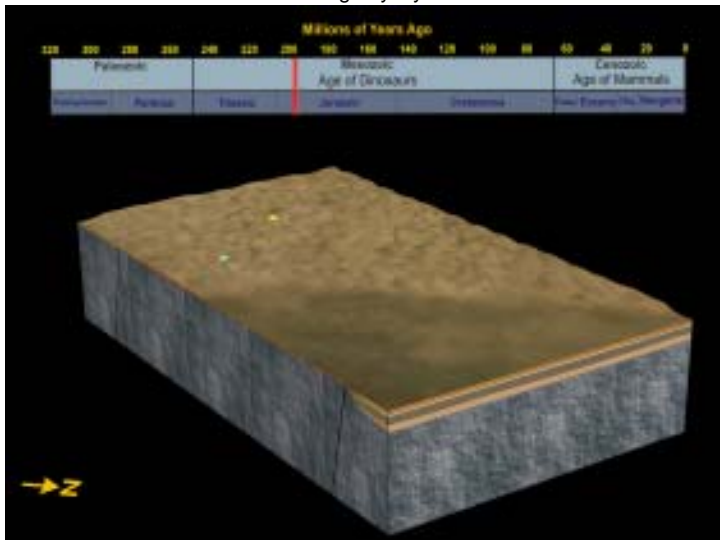
At the AAPG Annual Convention in April 2004, EMARC Gulf of Mexico research results were presented in a six poster session, again by former research scientists and students.

An upcoming 2006 SEPM Special Publication will highlight the final results of all of the integrated studies from this consortium. Results will be included in a special digital publication that will include several interactive atlases.

In 2003-2004, six visiting scientists from PEMEX (the national oil company of Mexico) worked at EMARC for seven months studying the geology of the deep and ultradeep Gulf of Mexico. The goal was to summarize the geology using all of the existing 2-D seismic data. Eleven deepwater provinces were identified as well as several leads for Pemex. This extraordinary frontier exploration project was the first to identify systematically the petroleum potential for the deepwater areas of offshore Mexico, which is quite high.

Research on EMARC's Williams Fork Consortium, directed by Matt Pranter, focuses on the stratigraphic architecture, sandstone connectivity, and reservoir characteristics of fluvial deposits in the Cretaceous Williams Fork Formation. This research involves stratigraphic analysis and modeling using well-exposed outcrops and Lidar data (aerial laser imaging) of the Williams Fork

Block diagram illustrating the eolian Wingate Sandstone, Early Jurassic, Colorado National Monument. Image by Ryan Crow.



Paleogeographic map of the Gulf of Mexico, near end Cretaceous. Present shoreline shown by yellow line. Image by Ryan Crow.

Formation in the Little Book Cliffs of western Colorado, near Grand Junction. Graduate student Quentin German and our new research associate, Dr. Zulfiquar Reza, are both working on this research. Zulfiquar joined EMARC in August, 2004, holds a Ph.D. in Petroleum Engineering from the University of Alberta, and is interested in geostatistical modeling and multi-phase fluid-flow simulation.

Zulfiquar is also conducting research with Matt Pranter and Paul Weimer in deepwater reservoir modeling using sequence stratigraphic and geomorphic constraints. This research will be presented at the upcoming AAPG Annual Convention in June 2005 in Calgary.

Interactive Geology Project: igp.colorado.edu The IGP group (Ryan Crow, John Roesink, Jay Austin, Rick Couture, Paul Weimer) has had considerable success placing their products in various public venues. The goals of the group are to construct interactive displays and computer animations that show the public how National Parks and Monuments have "evolved" through geologic time. Products in 2004-05 include a 10-minute animation placed in the Visitor Center at Colorado National Monument, a 5-minute animation placed in the geology museum at the Colorado School of Mines, a 7-minute animation done in concert with the BEG - Austin, in the Wiess Energy hall at the Houston Museum of Science, and a web-based deliverable for Canyonlands National Park illustrating a quick virtual tour of the geology of the park. The group was featured in the front page of the Daily Camera in November for their efforts. Future projects in 2005-06 include further collaboration training with several National Parks and local museums.

Visit EMARC Online @
<http://emarc.colorado.edu>

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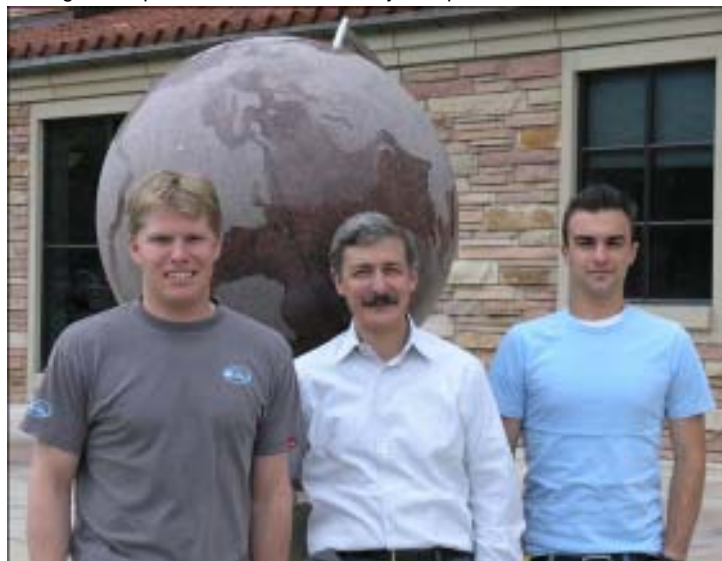
Student News

Tara Chesley is currently working on an Honors Thesis with Dr. John Andrews on Core B997-338 from Djúpáll, a trough in NW Iceland. She is hoping to expand and probably change the data presented in Andrews et al (2002). The dates produced in Andrews et al. (2002) have been determined to be too old, which indicates reworking. Tara's work is addressing her honors thesis in two ways. First she is using a program called RockJock (Eberl, 2003) to determine the quantitative mineralogy of XRD samples. She is then running these results in another model called MinUnMix that determines the percentage of the material from Greenland versus Iceland. These data will be presented at AGU in San Francisco. The second aspect to be addressed in her honors thesis is a foraminifera analysis. Due to the reworking that occurred in this area, there are fresh looking foraminifera mixed with reworked looking foraminifera. Tara has separated these and submitted them both for isotope analysis. Through this process she is hoping to better understand the process of reworking that occurred in core B997-338. Much of this work was funded through mentorship grants from the University of Colorado Geology Department

The first Curtis Graduate Fellows were announced at the Denver Alumni Reception in February. Both will be second-year MS students in 2005/06.

Greg Robertson is working with Shemin Ge on a project titled: "A preliminary study on the effects of plate deformation on the water-level decline in Devils Hole". Devils Hole is located in Ash Meadows National Wildlife Refuge, an extension of Death Valley National Park. The water level in Devils Hole has been decreasing since 1989. The water level has significant implications for the survival of an endangered endemic species. Plate tectonic activity related to rock deformation has recently been mentioned as a possible cause for observed water level declines. Greg is working on developing a tectonic deformation model based on the observed local deformation to explain pore pressure changes in the subsurface. He will then link those changes to water level fluctuations in Devils Hole.

Winners of the Bruce Curtis Award are Greg Robertson (far left) and Quentin German (far right). Matt Silverman (center) presented the award during the Department Award Ceremony on April 22nd, 2005.



Quentin German is working with Matt Pranter. Quentin is focusing on outcrop analysis of the high net-to-gross interval of the Williams Fork Formation, Plateau Creek and Main Canyons within the Piceance Basin of western Colorado to characterize the stratigraphic variability and associated sand body connectivity using outcrop analogs, core data, airborne lidar imaging, and high-resolution orthophotography.

Professor Karl Mueller and undergraduate **Elizabeth Wolfe**, along with graduate student **Arwen Vidal**, have begun work analyzing wrinkle ridges in Mars' Isidis basin. The basalt-filled crater, similar to lunar mascon basins, displays a complex network of long, low ridges in both radial and concentric patterns. They are currently mapping the ridges in detail to understand how they formed, taking into account Mars' unique global stress field.

Ethan Gutmann received an Outstanding Student Paper Award for his presentation, at the AGU 2004 Fall Meeting. The presentation was titled "On the Selection of Soil Hydraulic Properties in Land Surface Models Based on Soil Texture" with Eric Small as a co-author.

Last summer, undergraduate **Jacob Walter** received an REU internship at the University of Alaska Fairbanks, working with seismologists Roger Hansen and Natalia Ratchkovski. In addition to that, Jacob helped Doug Christensen install seismometers in the Brooks Range and near Prudhoe Bay, Alaska. Jacob examined stress fields associated with the magnitude 7.9 Denali Fault Event of 2002. He collected a database of quakes and relocated them using a double-difference algorithm, developing the most accurate aftershock map to date (he implemented data from temporary sensors just made available). During the research experience, Jake acquired skills using the Unix operating system, MATLAB, and Antelope. He presented the results of the project at the Fall AGU Meeting.

Starting in the fall, Jacob has been working with graduate student, **Shad O'Neel**, examining various aspects of the Columbia Glacier, Alaska. So far, they have conducted a GPS velocity analysis, and have used photogrammetry to track the receding terminus over the period of a few months. During the upcoming field season, they will conduct active source experiments to better determine the seismic velocity through the ice, as well as numerous velocity surveys. Next fall, they hope to tackle lingering questions concerning the glacier's seismicity and wave propagation through ice.

During Bruce Jakosky's Astrobiology (GEOL 5830) fieldtrip to Yellowstone last fall, the class witnessed a rare reactivation of a geyser, and **Than Putzig** managed to capture part of the eruption on video. When the group reported the event to Denise Herman, a Park Ranger stationed at the Norris Geyser Basin, she was at first rather skeptical. However, when the group showed her the video, her eyes lit up and she ran to the telephone to discuss the event with a fellow ranger and geyser expert. Than has a web page containing photos from the field trip and a video clip of the event:

<http://than.putzig.com/cu/yellowstone/>

Undergraduate **Mark Gorman** was Co-Author on a paper for GSA on a Palocene flora at West Bijou Creek. Rich Barclay has been researching the recovery and diversity above the K/T boundary (which has been found out near Strausberg) leading to and

including flora similar stratigraphically and in morphology to that of the Castle Rock Rain Forest (64mya). Mark and Rich also conducted a census of each fossil leaf locality and used leaf margin and leaf area climate calculators to calculate the possible mean annual temperature and mean annual precipitation. Mark is currently working for the CU Museum on fossil insect research and organizing the collections.

Heidi Reeg, a first year Ph.D. student in geological sciences, has been involved in the NSF GK-12 fellowship this year. The ten graduate fellows in the program are paired with middle or high school teachers in their area of expertise and go into the classroom ten hours each week. The graduate fellows are "science experts" in the classrooms, providing additional information on topics students are studying. Another goal of the fellowship is to simply bring students into contact with young scientists and give them a role model for pursuing higher education.

Beginning in June, and continuing throughout the year, the graduate fellows have been attending seminars and workshops on how to work effectively with a broad spectrum of students including second language learners, talented and gifted students, and teenagers in general. Each fellow planned and orchestrated some type of outdoor lesson or field trip for their students this spring. Fellows are from geological sciences, ecology and evolutionary biology, astrophysical and planetary sciences, and chemistry.

This year, Heidi is working with Jason Albert, an 8th grade Earth Science teacher at Casey Middle School. She goes to the school two days a week and works with all of Jason's classes. With a background in experiential education, Heidi has been working on bringing hands-on activities to the classroom. In addition, she and Jason have included many lessons from the FOSS kits. (FOSS is a research-based science curriculum for grades K-8 developed at the Lawrence Hall of Science, UC Berkeley.)

On a different note, Heidi recently discovered that she is a 4th generation CU Boulder student. Her mother, Margo A. Dunlap Reeg, did her undergraduate studies in Chemistry (1965) and her father, Charles F. Reeg, completed his Ph.D. in Physical Chemistry in 1969. Her grandmother, Margaret L. Jacobucci Dunlap, was a Home Economics major, and her great grandfather, Joseph H. Jacobucci, received a Bachelors' degree in Engineering in the early 1900's.



Tara Chesley & Jill Pursley pose after the 2005 Department graduation ceremony.

GUMP Update

The Graduate-Undergraduate Mentorship Program (GUMP) met in December to discuss summer research/internship opportunities. Several undergraduates listened as graduate students shared the positive aspects of doing research during their undergraduate career. We discussed opportunities at local, state, and national levels. Hopefully, we will see many CU undergraduates in research positions this summer (and throughout their school days)!

GUMP mentors also participated in a fall department forum on graduate school. Undergraduates asked many questions about admissions procedures, how to pick a graduate advisor, and what to expect in graduate school. We hope to have a career forum in the spring, if there is interest.

If you know of a good internship or research opportunity for undergraduates, please email Arwen.Vidal@colorado.edu with the information.

AAPG Chapter News

by Quentin German

The AAPG Student Chapter at CU has been busy planning various field trips for the upcoming year. With donations from Shell Oil Company, the group will visit Utah to see the stratigraphy of the Book Cliffs and is also planning to see the Bingham Canyon Copper Mine outside of Salt Lake City. This mine is one of the largest open-pit mines in the world.

Several of the student members will attend the 2005 AAPG Annual Convention in June in Calgary. At the convention, students will learn about petroleum geology research from around the world and can network with petroleum companies for career opportunities.

The chapter was delighted to have the new EMARC research associate, Dr. Zufilquar Reza, present his research on dynamic data inversion in reservoir modeling. This was a great opportunity for the group to see and discuss some of the latest research in the area of reservoir characterization and modeling.

Chapter officers for 2004-2005 are president, Quentin German; vice president, Greg Robertson; secretary, Marisol Ortiz; and treasurer, Tom de la Torre. For more information on our chapter please visit our website at <http://spot.colorado.edu/~pranter/aapg.html>. Also, feel free to email the student chapter president at Quentin.German@colorado.edu.



Chapter Officers from Left to Right: Quentin German (President), Tom de la Torre (Treasurer), Greg Robertson (Vice President), Marisol Ortiz (Secretary), and Dr. Matthew Pranter (Faculty Advisor)



**GSA
alumni reception**

**November 17, 2005
Salt Lake City**



**NAPE
alumni reception**

February 2, 2006

**Hilton
of the Americas
Houston**



**CU at the Brown
alumni reception**

**February 23, 2006
Brown Palace Hotel
Denver**

What's New in the Jerry Crail Johnson Earth Sciences and Map Library!

by Suzanne T. Larsen

What do librarians do anyway? We are bibliographers, which means we decide what books or maps to buy for the library based on the research and teaching interests of the faculty as well as maintain a balanced subject based collection that reflects all aspects of the discipline. This means we are subject specialists who understand our discipline in the broadest sense. We make sure that the lights are on, the doors are open and the books are on the shelves (hopefully in the right order!). We go to LOTS of meetings. We plan for the future. But, in an academic library, one of the most important roles for a librarian is teacher. This can be informal teaching one-on-one at the reference computers or it can take place in a formal classroom setting. For about 10 years or so I have co-taught a class called Writing in the Geosciences, GEOL 4960, which is required for a geology degree. I also teach single classes in courses requiring a paper or research assignment at the request of the professor.

Why do we need to "teach" students how to use the library? Don't they learn this in high school? Since it is on the computer and all the students are computer literate, isn't it easy for them? The answer is no and no. The resources available through the University Libraries change, grow or are enhanced on a regular basis. It would be wonderful if finding information in libraries was intuitive but, at this point, that is far from the case. We have over 14,000 electronic resources available through Chinook, the online catalog. Most are full text online journals, but there are e-books, websites, and other types of e-resources in the catalog. We have several hundred databases; some are full-text and some are indexes, some are interdisciplinary and some are subject specialized. Choosing the right index and finding material on the shelf or in the catalog is not always straight forward.

Being computer literate and being library "literate" are two different things. We teach research techniques and information finding strategies so that when a student is confronted with a new database interface or is at a different university, they have the skills to find their own way. It is much like the old proverb of teaching people to fish rather than giving them the fish. We teach how to evaluate a resource for its validity and usefulness. This is true for both traditional print resources and websites. In many cases the amount of information that students find on their topic is overwhelming. They need to be taught the strategies for managing it. Over the last year Katie Lage, the map librarian, and I taught 24 class sessions in several different departments with over 600 students attending. And that's what we do!

New acquisitions in the Map Library:

The Map Library has recently acquired a full set of Sanborn maps for the state of Colorado. Sanborn maps were created from the late 1800's into the 1930's for assessment of fire insurance. These large scale maps give a glimpse of the history of our cities by identifying each building by type of building material and use. They are beautifully color coded for this. As far as we know this is the only full set in the state. We have also acquired the National Elevation Dataset, which consists of Digital Elevation Models for the entire U.S., to add to our growing collection of digital data for Geographic Information Systems (GIS) applications.

As always, please come by the Library if you are visiting Boulder. Our hours are listed on our website: <http://ucblibraries.colorado.edu/earthsciences>.

Degrees awarded

B.A. Geology Majors

Briana Lindsey Agar
Valerie Ramer Bakeman
Nicole Blake
Daniel Stephen Brothers
Michael Charles Farrauto
Erin Suzanne Farris
Quentin Ashton German
Rachel Elizabeth Gurn
Jasper Norwood Hammond
Guy Douglas C Henry
Ali Raza Jaffri
Lindsey Michelle Kruckenburg

Daniel Scott Lester
Benjamin William Lowry
Kirk Newton Morris
Rebecca Scott Morris
Todd Michael Preston
Jesse Jones Richter
Jennifer Lyn St. Louis
John H Sosulski
Karen Jean Tankersley
Ryan Matthew Tolene
Brian Lloyd Toney



Susan Ellen Melzer, Dr. David Budd, Orbicular Granite, Donna Beares, and Stephanie Gaswirth pose after the Departments graduation ceremony.

M.S. Candidates Graduating with Degrees

| | Advisor | Thesis Title |
|--------------------|---------|---|
| Donna Beares | Budd | A geostastical approach to trace element organization in Dolomite: Madison Formation (Mississippian), Sheep Mountain, Wyoming |
| Amanda Cook | Smith | Testing the physical robustness of beetle cuticle to predict preservation potential |
| Jorge Diaz | Weimer | 3-D stratigraphic and structural interpretation of Quaternary sediments above Mensa and Thunder Horse mini basins, Mississippi Canyon, northern deep Gulf of Mexico |
| Amanda Ellison | Pranter | Numerical modeling of heterogeneity within a fluvial point-bar deposit using outcrop and lidar data: Williams Fork Formation, Piceance Basin, Colorado |
| Tracy Hall | White | Calcium cycling in tropical ecosystems |
| Hye-Yun Kim | Goetz | A feasibility study of near-infrared spectrometry approach to classify carbon quality in soils |
| April Kinchloe | Smith | A taxonomic and morphometric study of the Eocene spiders from Florissant, Colorado |
| Susan Ellen Melzer | Budd | Retention of High Matrix Permeability in Shallow Buried Paleogene Limestones, West-Central Florida, USA |
| Andrew Schmidt | Small | The effects of variable green fraction on land atmosphere fluxes and soil moisture in semi-arid environments, simulated using the Noah LSM |
| Sean Sundermann | Mueller | Structural and geomorphic development of active blind thrusts in the Los Angeles Basin, California |
| Aaron van den Berg | Weimer | 3-D seismic interpretation of the stratigraphic and structural evolution of the Mensa Area, Mississippi Canyon, Northern Gulf Of Mexico |
| Marielis Vargas | Pranter | Characterization and modeling of fluvial sandstone distribution and static connectivity, Williams Fork Formation, Rulison Field, Piceance Basin, Colorado |

Ph.D. Candidates Graduating with Degrees

| | | |
|--------------------|----------|---|
| David Pyles | Syvitski | On the stratigraphic evolution of a structurally confined submarine fan, Carboniferous Ross Sandstone, Western Ireland |
| Stephanie Gaswirth | Budd | Maturation of regional dolomite bodies in the Late Eocene Ocala Limestone and Early Oligocene Suwannee Limestone, West-Central Florida: processes and effects |
| Oliver Boyd | Sheehan | The heterogeneous upper mantle: seismic tomography and converted phase imaging of the Rocky Mountains, the Sierra Nevada, and New Zealand |

GEOLOGY NEWS

2003-2004 Undergraduate Mentoring Program

| MENTOREE | MENTOR | PROPOSAL TITLE |
|-----------------|--------------------|--|
| Briana Agar | Shemin Ge | Groundwater flow in South Park Basin, Colorado |
| Jason Gelfand | Suzanne Larsen | Indexing historical aerial photographys of Colorado using GIS |
| Jason Shapiro | Jocelyn Turnbull | Quantification of fossil fuel CO2 emissions over China |
| Amanda Nahm | Melissa Fallin | Morrison Formation paleosols in the Bighorn Basin, Wyoming |
| Andrew Hattel | Eric Small | Soil texture as a control on water limitations in arid and semiarid ecosystems |
| Tara Chesley | John Andrews | Sediment provenance and depositional processes in a trough off Iceland |
| Todd Preston | David Budd | Porosity and permeability in the Madison dolomite, Lysite Mt, Wyoming |
| Erin Farris | Yarrow Axford | Sediment analysis of Holocene lake cores from North Iceland |
| Max Knop | Henrietta Laustsen | GIS in earth science education |
| Jacob Bauer | Tom Marchitto | Millennial-scale changes in the ENSO system since the last glacial maximum |
| Keith Hoyt | Jason Briner | Cosmogenic isotopes for dating moraines in the Rocky Mountains |
| Elizabeth Wolfe | Karl Mueller | Planetary geology of a large impact basin on Mars |
| Jacob Walter | Shad O'Neel | Retreat of Columbia Glacier using photogrammetry and passive seismology |

Undergraduate Awards for Spring 2004

| AWARD | RECIPIENTS |
|-------------------------------|----------------------------|
| AWG | Erica Johnson |
| Estwing | Jacob Bauer |
| Johnston Memorial Scholarship | Briana Agar, Steve Santoro |
| RMAG pick | Brian Toney |
| T. Keith Marks Scholarship | Ben Lowry |
| Hiss Creativity Award | Matt Reynolds |

Graduate Awards for Spring 2004

| AWARD | RECIPIENTS |
|--|--|
| Association of Women Geoscientists (AWG) | Suellen Melzer, Greta Kristjandottir |
| Bruce Curtis Fund | Amanda Ellison, Jon Funk |
| Jack Edwards Scholarship | Gaspar Monsalve |
| Jeffrey Deen Memorial Scholarship | Oliver Boyd, Yarrow Axford, Shirley Kurc |
| Longley, Wahlstrom, Warner | Nicole Feldman |
| W. O. Thompson Award | Dominic Papineau, Justin Tweet |
| Waldrop Memorial Scholarship | Arwen Vidal |

Congratulations to all of our Department of Geological Sciences Graduates and Award Winners!

At the December 2004 graduation, alumnus Bruce Benson received an honorary doctoral degree recognizing his university and public service. The citation that accompanied the awarding of the degree is reprinted below.

Bruce D. Benson Honorary Degree

Bruce D. Benson might never have made a fortune or become one of Colorado's foremost educational and political leaders if he hadn't had the courage to discontinue his graduate studies.

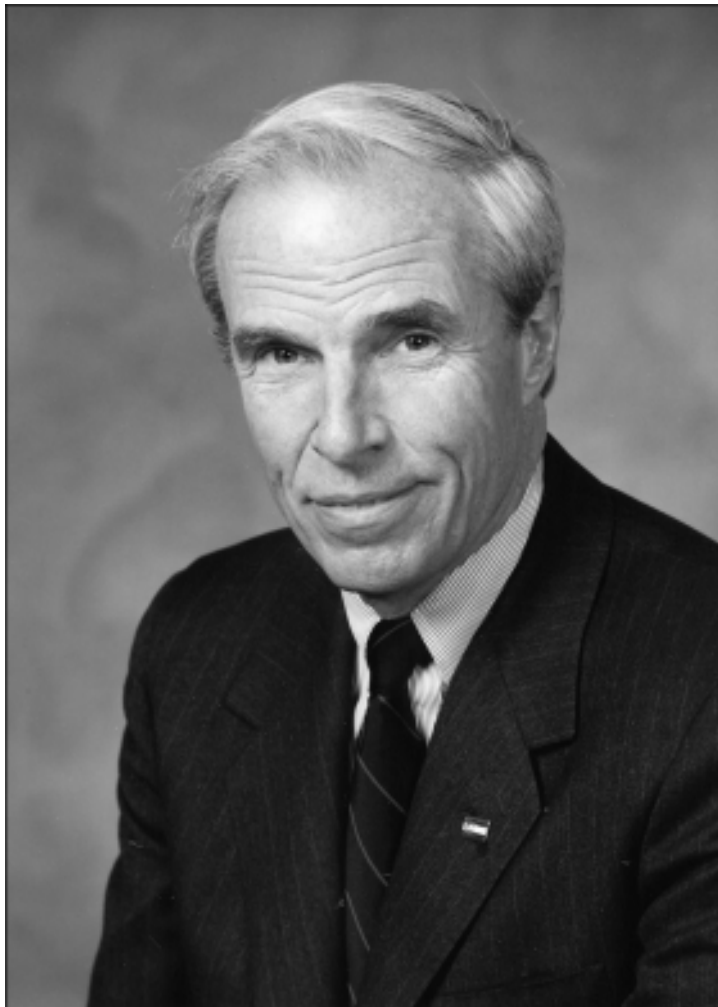
In 1965, after earning a bachelor's degree in geology from CU-Boulder, Benson decided to put his master's degree studies on hold in order to drill for oil in eastern Kansas. Using geologic concepts he developed during his master's research at CU, Benson went on to build his own multi-million dollar company from scratch.

As a result of Benson's hard work and generosity, CU-Boulder's department of geological sciences relocated in 1997 to a new campus building. He personally donated \$3 million for the facility and led a \$14 million fundraising campaign for its construction. The building bears his name in tribute. Benson also donated \$1 million for renovation of the CU Museum and endowed a \$3 million faculty chair in petroleum geology. Joined by his wife, Marcy, Benson recently chaired the University of Colorado's \$1 billion Beyond Boundaries campaign.

In addition to his gifts to the university, Benson has offered his talent and leadership to higher education and political causes in Colorado. Benson's resumé includes tenures as state Republican Party chairman, state chairman of the 1992 Bush-Quayle campaign, Republican candidate for governor in 1994, and Colorado finance chairman for the Bush/Cheney 2004 campaign. He served three years as chair of the Colorado Commission on Higher Education and two years as chair of the Governor's Blue Ribbon Panel on Higher Education for the 21st Century.

Benson has also served as chair for the Denver Area Council of the Boy Scouts of America, Berkshire School, and the Denver Zoo. He has been a trustee of the National Endowment for the Humanities, National Park Foundation, and Smith College. He now chairs both the Denver Public Schools Foundation and Metropolitan State College of Denver Board of Trustees.

The University of Colorado Board of Regents is pleased to award the degree Doctor of Humane Letters, honoris causa, to Bruce D. Benson for his outstanding university and public service.



Bruce D. Benson

Department of Geological Sciences Front Office News

by Beth Hanson

The front office remains the "meeting/greeting" place, and operations center in the Department. Our dedicated staff of four continues their task of endeavoring to meet the administrative needs of Geological Sciences faculty and students in an efficient, friendly, and timely manner. We also look forward to assisting alumni and friends of Geological Sciences to find answers to appropriate questions they have regarding the Department, faculty, former faculty, students, and staff.

We said goodbye to Lisa Massengill and welcomed Carrie Simon to our office personnel during the last year. Currently the staff moves forward with Carrie Simon as front office first contact; Joanne Brunetti, as our departmental accounting tech; Marge Atkinson, as our graduate program assistant; and Beth Hanson as lead administrative officer, office supervisor, and assistant to the Chair.



From left: Carrie Simon, Marge Atkinson, Joanne Brunetti, Beth Hanson

Alumni News

Lynda Lastowka, MS 2001, has accepted a position with the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization in Vienna, Austria. The Commission's main task is the establishment of an International Monitoring System (seismology, hydroacoustic, infrasound, radionuclide) and International Data Centre for nuclear test monitoring and treaty verification.

Several retired professors and former students ran a field trip at the 2004 national GSA meeting in Denver—**Ed Larson, Ralph Shroba, Ven Barclay, and Pete Birkeland**. It is the 2nd time they have put on the trip, billed as an eco-geo-hike (see Geological Society of America, Field Guide 5, 2004). The eco is to use public transportation only, the RTD bus from Denver, and the Skip bus in Boulder. The trip starts in north Boulder at the northernmost bus stop. From there everyone hikes southward up and down the first hogback, discussing bedrock, evolution of rock structures and landforms, and landslides. Topics covered are a combination of prior work by others, 101 field trips, as well as original work by the trip leaders. Everyone carries their own food and beverages. The trip ends with dinner at a local brewpub, The Republic of Boulder. Then they bus back to Denver. Participants like the idea of both public transport and a day hiking. People can still go on this trip, as it will be offered at future GSA meetings, as long as the leaders remember to show up. - **Pete Birkeland**

Mohammad Hassan Karimpour has been the chairman of the geology department at Ferdowsi University of Mashhad Iran for the last 3-years. He has been doing research on mineral database of Eastern Iran for the last 3-years. His present research is applying remote sensing, geophysics data, geochemical data, petrochemistry, and all geological models to generate areas having potential for mineral exploration. Mohammad received his MS and PhD in economic geology from CU Boulder in 1982.

Krystyna Kowalska and Joe have been happily living in Santa Barbara, CA for the past few years. They tried getting geology jobs there, but had no luck so started selling Electronic Medical Records Software. They both like it and it keeps them pretty busy. It also gives them the opportunity to travel all over the country. We miss you all, Krystyna and Joe

Amanda Ellison, who received a MS degree in December 2004, received the Runge Award for the best student paper given at the AAPG Rocky Mountain Section Meeting in Denver. Her

paper was titled "Quantification of Stratigraphic Heterogeneity within a Fluvial Point-Bar Sequence, Williams Fork Formation, Piceance Basin, Colorado: Application to Reservoir Modeling".

Jake Cinammon was included in Geotimes magazine for his Peace Corps experience living in a small town in Bulgaria and working as an environmental consultant. Jake went directly from his undergraduate work at CU into the Peace Corps.

Matt Silverman has been named Exploration Manager of Robert L. Bayless, Producer. Based in Denver, Silverman is responsible for Geological and Land departments there and in Farmington, NM. Bayless has producing and exploratory assets in the Southern and Central Rocky Mountain Regions and in Australia.



Alumnus William Smith and Chair Mary Kraus with a large specimen of Lyons Sandstone that William donated to the Department. The Permian sandstone slab contains an excellent example of the track-way of a mammal-like reptile. The specimen has been mounted and is displayed in the Jerry Crail Library in the Benson Building.



Amanda Ellison and Dr. Matt Pranter pose after the graduation ceremony. Amanda received the Runge Award in 04'

Visit us on line at:
www.cugeology.org

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Laura Von Holdt Wilhelm
Alison Wilson
David Wilson
Lee Colvin Wilson
Anna M. Rosasco
Wells Zakroff
Michael A. Zakroff



Michael Zakroff and Anna Wells Zakroff at "CU at the Brown" Alumni Reception held in Denver on February 24, 2005.

GEOLOGY NEWS

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