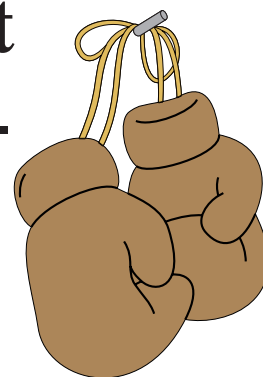


Colorado Scientific Society

*The objective of the Society is to promote
the knowledge and understanding of Earth science,
and its application to human needs*

Annual Student Night — Competition —



*Featuring FOUR knock-out talks!!
(See abstracts on pages 2 and 3.)*

University of Wyoming,
Laramie



vs.



Colorado School of Mines

Get off the sofa and support our Rocky Mtn. students! Join us!

Thursday, November 20, 2008
American Mountaineering Center
710 10th Street (NE corner 10th and Washington) Golden, Colorado
Social half-hour – 6:30 p.m. Meeting time – 7:00 p.m.

Abstracts—2008 Student Night Finalists

Late Miocene through Pliocene evolution of the Angastaco basin (NW Argentina): Implications for the tectono-climate evolution of the Eastern Cordillera in the late Cenozoic

Sharon Bywater (University of Wyoming),
Master's candidate in Geology

The Angastaco basin is located in the Calchaquí valley in NW Argentina between the Eastern Cordillera (EC) to the west, and Santa Barbara (SB) system to the east. Uplift of the eastern basin-bounding range, the Sierra de los Colorados of the SB, and development of an orographic effect, is postulated to have occurred between 3.4 and 2.4 Ma (Coutand et al., 2006). The Angastaco basin-fill consists of four formations: the Quebrada de los Colorados, the Angastaco, the Palo Pintado, and the San Felipe (Díaz & Malizzia, 1983). The Pliocene San Felipe Formation holds key information concerning the tectono-climate evolution of this part of the Andes, including: timing of uplift of the eastern basin-bounding range as well as timing of development of an orographic barrier and subsequent onset of aridity. Lithofacies interpretations derived from measured stratigraphic sections for the upper ~1 km of the late Miocene Palo Pintado Formation and throughout the San Felipe Formation are consistent overall with previous studies: the Palo Pintado Formation is interpreted as fluvial to lacustrine deposits, whereas the Pliocene San Felipe Formation is interpreted as braided stream and alluvial fan deposits (Díaz & Malizzia, 1983; Coutand et al., 2006). Lithofacies associations suggest a transitional boundary between the two formations.

Preliminary U-Pb SIMS dating of zircons from an ash layer near the Palo Pintado-San Felipe transition confirms ca. 5 Ma as the transition age. Provenance data document a decrease of western (EC) sources up section and a final switch to eastern (SB) sources within the uppermost San Felipe Formation. These data constrain exhumation of the eastern basin-bounding range to upper San Felipe time (ca. 2–3 Ma), supporting the model of Coutand et al. (2006). Paleocurrent data show an axial NNE-flowing drainage during upper Palo Pintado deposition, an E-flowing drainage during San Felipe deposition, and a SW-flowing drainage during uppermost San Felipe deposition. Stable isotope data (^{13}C and ^{18}O) from paleosol carbonates suggest a woodland or montane grassland environment (Cerling,

1992) during Palo Pintado deposition trending towards more arid conditions by the Palo Pintado-San Felipe transition. These data suggest arid conditions within the basin prior to exhumation of the eastern basin-bounding range. The mismatch between timing of onset of aridity (ca. 5 Ma) and exhumation of the range previously thought to be responsible for the orographic effect (ca. 2–3 Ma; Coutand et al., 2006) suggests either that climatic variability is not controlled by local uplift of basin-bounding ranges, or that ranges farther east are responsible for the orographic effect.



A refined interpretation of the Medicine Bow orogeny, southeastern Wyoming: Implications for regional tectonics and crustal growth

Daniel Jones (University of Wyoming),
Ph.D. candidate

New SHRIMP ages from the Big Creek gneiss, southern Sierra Madre, southeastern Wyoming, indicate a complex Paleoproterozoic magmatic-tectonic history. The analyzed rocks have been interpreted as part of the Paleoproterozoic Green Mountain arc. The accretion of this arc, together with syn- to post-collisional granitic rocks (e.g., Sierra Madre granite), has been referred to as the ca. 1.78–1.75 Medicine Bow orogeny.

The new SHRIMP ages consist of 161 points (9 samples) from a representative suite of (meta)igneous rocks from the Big Creek gneiss. The oldest ages (~1.78 Ga) are from metagabbroic and granitic gneiss that are correlated with the Green Mountain Formation and related intrusions. The zircons contained no older, xenocrystic cores. The lack of significant spread in the arc-related ages suggests that the arc accreted shortly after crystallization of these rocks, perhaps by slab rollback related to a southward-dipping subduction zone. Two samples of augen gneiss and two samples of Fe-rich mafic rocks (one partially mingled with augen gneiss) yielded ages of ca. 1,767 Ma, corresponding to the massive phase of the Sierra Madre granite. This episode of bimodal magmatism may correspond to the breakoff of the subducted slab and represent a second phase of juvenile magmatic addition to the crust. Finally, zircons from a paragneiss leucosome, interpreted as having crystallized from a syntectonic, in-situ anatexitic melt, yielded an age of ca. 1,750–1,745 Ma, coeval with metamorphic zircon rims from other gneissic samples.

Abstracts—2008 Student Night Finalists (cont.)

This metamorphic and deformational event likely records a tectonic event to the south, possibly due to a southward jump in active subduction.

In summary, the Medicine Bow orogeny apparently comprises three tectonic events: (1) accretion of the Green Mountain arc at ~1,780–1,775 Ma; (2) slab breakoff at ~1,763 Ma; and (3) inferred contraction from the south at ~1,750–1,740 Ma.



High-resolution geo-cellular modeling of Upper Morrow “A” Sands at Postle Field, Texas County, Oklahoma

Dawn Jobe (Colorado School of Mines),
Reservoir Characterization Project (RCP)

Pennsylvanian-aged Morrow valley-fill sandstones are prolific producers of oil and gas in the mid-continent. Upper Morrowan reservoirs are particularly attractive because of their abundant reserves, good production history, and shallow depths; but are often poorly developed because of severe heterogeneity caused by rapid and extreme changes in facies and grain size. Understanding the reservoir heterogeneity has direct implications for interpretation of flow units and ultimately increased recovery and efficiency.

Postle Field, Texas County, Okla., produces from the Upper Morrow “A” sands and has over 300 million barrels of original oil in place. Today, only 40% of the OOIP has been produced. The small recovery is due to the difficulty of production caused by the extreme heterogeneity in the field. The goal for RCP’s Phase XII study at Postle is to identify and characterize the reservoir architecture, which is highly complex and changes over very short lateral and vertical distances.

The study area is a 6.25-square-mile block within Postle Field, over which a multi-component 3-D seismic survey was shot in March of 2008. The study area includes 63 wells of which log data was available as well as 4 cored wells. Detailed core descriptions and facies determinations, as well as well-log correlations, were integrated with seismic interpretation to produce a new depositional model for the area.

A high-resolution geo-cellular model that incorporated cores, vertical proportion curves, and seismic attributes was then created. Integration of different scales of data into the facies modeling maintained the heterogeneity and yielded a more accurate distribution

of facies and reservoir properties. The model was then up-scaled and history matched for future use in geo-mechanical and fluid flow simulation.



Soil respiration following pulse precipitation events in a semiarid grassland

Tyler Benton^{1,2}, Seth M. Munson^{3,4}, William K. Lauenroth^{3,4}, and Ingrid C. Burke^{3,4}

¹Colorado School of Mines

²SGS-LTER Research Experience for Undergraduates, Colorado State University (CSU), Fort Collins; ³Dept. of Forest, Rangeland, and Watershed Stewardship, CSU, Fort Collins;

⁴Graduate Degree Program in Ecology, CSU, Fort Collins

Semiarid and arid ecosystems are pulse-driven systems. At the daily time scale, the nearly continuous dry soil is irregularly interrupted by brief wet periods. The duration of these wet periods depends on the size of the precipitation event. The precipitation regimes in semiarid and arid environments, and therefore the pulsing regimes, are dominated by small events (≤ 10 mm). The goal of our research was to determine how small precipitation events (2mm, 5mm, and 10mm) affected the dynamics of soil respiration and water loss in the shortgrass steppe. Because land-use change has resulted in a patchwork of large-scale disturbances in this region, we estimated respiration and water loss from sites that varied in time since cultivation disturbance (4 and 20 years after cultivation, and undisturbed shortgrass steppe).

Total carbon respired and duration of elevated soil respiration increased as event size increased in all sites. Total carbon loss ranged from 0.3 g C/m² (0.01% of carbon in ANPP) after a 2mm pulse in a field 20 years after cultivation to 3 g C/m² (6% of carbon in ANPP) after a 10mm pulse in undisturbed shortgrass steppe. Time since cultivation did not significantly affect the total carbon respired for 2mm pulses, but increased in importance as event size increased. The smallest events (2mm and 5mm) caused a respiration response that lasted longer than it took soils to lose water from the pulses, whereas for the largest event (10mm), respiration returned to baseline before the added water had been depleted.

Our results suggest that water is the most limiting factor to soil respiration rates for the smallest events, but becomes less limiting for events above 5 mm. Small precipitation events have the potential for large short-term losses of carbon in the shortgrass steppe.

“Keg Night”—The History of CSS Student Night,

by Beth Simmons (with a few asides by the ed.)

The first “student (keg) night”—according to old CSS newsletters—was held on 29 October 1984, from 7 to 9 p.m. in the Colorado School of Mines (CSM) Green Center.

“We’ve never attempted this type of meeting before, so come prepared to relax and enjoy mixing with the students, and to hear some good papers. The beer is free, but if you feel so inclined, bring along a chilled 6-pack of your favorite brew—any such donations are welcome.”

Five papers were chosen from a field of twelve submissions from Colorado and Wyoming students. The winner was Ernest Duebendorfer for his talk, “Metamorphism, Deformation, and Tectonic Significance of the Cheyenne Belt, Medicine Bow Mountains, Wyoming.” He was awarded a prize of \$100.

The following year, the “student night” was held as a regular meeting at the CSM Green Center–Metals Hall. The newsletter listed the rules, the selection committee, and the nominees:

“Student lectures will be judged for content and presentation. The winner and runner-up will receive prizes of \$100 and \$50, respectively. From the abstracts submitted, six were selected by a committee composed of Bob Pearson, Bill Scott, Ernie Anderson, Jim MacLachlan, Platt Bradbury, and Doug Nichols. Beer and soft drinks will be furnished by the Society.” (Thus the KEG)

That year’s winner was Linda Gaye Martin for her talk, “Preliminary Foraminiferal Biostratigraphy of the Smoky Hill Chalk Member of the Niobrara Shale (Upper Cretaceous) in West-Central Kansas.” Al Merewether, Ken Pierce, and Dwight Schmidt secretly served as judges. Second place went to the future “Ms. Fire Science/Debris Flow expert,” Sue “sound bite” Cannon.

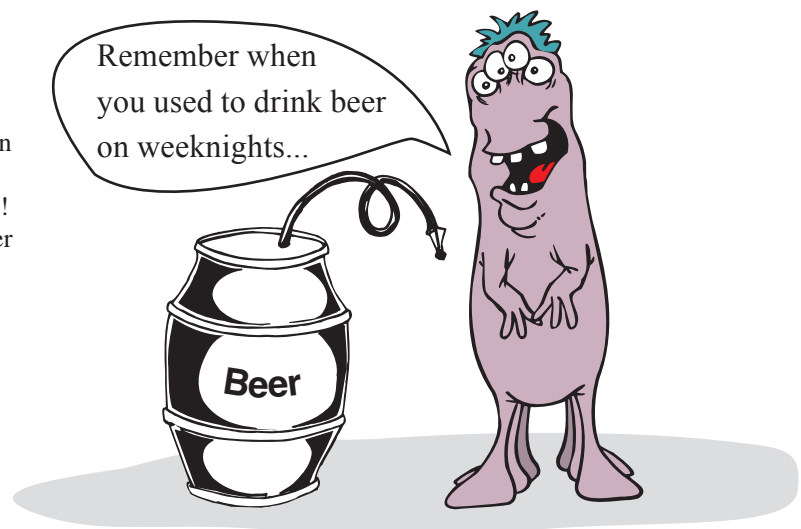
It appears that these two marathon sessions wore out the CSS members and judges, for there is no evidence of another student night until eleven years later in October of 1996. The session included only three 15-minute talks, with winners receiving the traditional monetary prizes PLUS membership to the Society. Sharon Diehl took the top prize with her talk on, “Geochemical and Petrographic Evidence for Fluid Flow and Dissolution in Some Low-Angle Normal Faults, Utah and Nevada.” The Tommyknocker (Charlie Sturdevant) and Wynkoop Breweries (John Hickenlooper) donated the refreshments. (The leftover brew found its way to a grateful Halloween party crowd!)

In 1997, the event was held in the Ben Parker Student Union ballroom at CSM. There were five 15-minute presentations, including another one by Aaron Kullman, the previous year’s 3rd place finisher. Mike Kaplan won best presentation for his “Late Quaternary glacial history of the mid-outer Cumberland Sound, eastern Canadian Arctic.” From whence came the beer? Golden City Brewery (Charlie and Janine Sturdevant). (And, once again the leftovers went to a deftly timed party.)

In 1998, CSS tried a new format, hosting “semi-final” presentations at various colleges in Colorado and Wyoming where cash prizes were awarded to each section’s winners. The top place winners from each school then presented to the Society at the Sheraton in Lakewood, vying for additional cash awards of \$125 for the winner, \$75 for the runner-ups, and a one-year complimentary membership to the Society. The winner was David Winterbourne, “Geology, Alteration, and Mineralization of the Cerro San Pedro Gold-Silver Deposit, San Luis Potosi, Mexico.”

That was ten years ago. Since then, student night has become a tradition, with minor changes in the way papers are submitted and prizes awarded, but the students still come forth with their research! Join us for this year’s “student night” (but no longer “KEG night”).

(Also in the history notes, there is evidence that CSS once had paperweights. Does anyone have one for the archives? And we should save a speaker’s mug, too.)





It may seem like a turkey of a story, but it really rocks!

By Matt Morgan

With November here and Thanksgiving fast approaching, I was trying to find a connection between geology and this traditional North American holiday. It dawned on me: Plymouth Rock! Although we can challenge when and where the first Thanksgiving was actually held (St. Augustine, Fla., in 1565 or Plymouth Plantation, Mass., in 1621), it has become a traditional tale in American culture that the Pilgrims, seeking freedom from religious persecution, landed at Plymouth Rock in November of 1620 and shared a “Thanksgiving” meal. So what about the rock?

The “celebrated” Plymouth Rock (no one knows where the *actual* rock is located) lies within Pilgrim Memorial State Park in Massachusetts, where it is visited by 1 million visitors each year. It is a piece of the Dedham granodiorite (quartz + microcline + plagioclase + perthite + chlorite + epidote) that has been dated to 622 Ma. It is part of the Avalon Terrane that was accreted to the eastern margin of Laurentia between 425 and 370 Ma. Like the Pilgrim’s journey across the Atlantic Ocean, the Avalon Terrane was rifted from Gondwana (~465 Ma) and made its own way across a proto-Atlantic Ocean before colliding with Laurentia.

The piece of the Dedham granodiorite that eventually became the famous Plymouth Rock was plucked from its outcrop by glaciers approximately 20,000 years ago. It was transported some unknown distance until it ended up at the foot of Cole’s Hill on the coast of Cape Cod.

In 1741, while plans were being made for constructing a wharf at the approximate location of the Pilgrims landing site, a 94-year-old Elder named Thomas Faunce reportedly identified the exact rock that his father told him the Pilgrims set foot upon. Regrettably, we now know the Pilgrims

landed near present-day Provincetown, Mass., in November of 1620 located 30 miles east of Plymouth Rock. The location of the exact outcrop they set foot is unknown. However, the now famous Plymouth Rock is located only 650 feet away from the first Pilgrim settlement.

Over the years, many pieces of the Rock have been removed for souvenirs. Today, about 1/3 of the top half of the Rock remains exposed and estimates suggest that the original Rock weighed approximately 20,000 pounds but is now roughly half that size, measuring approximately 6 feet x 4 feet.

So when you are sitting down at Thanksgiving dinner, think of the Pilgrims and the Rock in a slightly different, more geological way...both took a long journey, across a great ocean, and met a new world on the other side.

Happy Thanksgiving!



Plymouth Rock as it sits today. Photograph courtesy of Plymouth1620.com.

Sources: About.com; Wikipedia.org

Nevins, Erin, and Krol, M.A., 2005, Multiple episodes of magmatism, deformation, and metamorphism in the Avalon Terrane of eastern Massachusetts, Geological Society of America Abstract with Programs.

It's Time to Pay Dues for 2009...

Membership dues for the coming year (2009) are now due. You will find a dues payment form in our next issue of the newsletter, or you can download the form from the CSS website: www.coloscisoc.org/membership/dues.html. You will also see a reminder in the mail or e-mail this month. Dues payments have increased to \$20 for regular members; \$10 for corresponding members (outside the Colorado Front Range area), and \$5 for students. You may pay your dues by mailing a check to the CSS, or you can pay with a credit card using PayPal on the CSS website. If you are uncertain if you owe dues or of your member status, contact CSS Treasurer Don Sweetkind by phone at 303-236-1828 or by e-mail at dsweetkind@usgs.gov.

As you pay your dues, please consider making an additional contribution to one of our Memorial Funds, which support our student research grants program, or the Endowment Fund, which we use to defray operating costs. Any contributions made in calendar year 2008 (checks dated before 1 January 2009), will be credited toward the 2008 tax year.

Please remember that your entire contribution goes towards generating interest for the grants and that your contribution is 100% tax deductible because the Society is a non-profit Section 501 (c)(3) organization. Through interest income generated by our Memorial Funds, we have awarded over \$125,000 in research grant funding to more than 165 students. This year we also supported the participation of about a dozen students on our field trips through the Pillmore Fund.

Help us cultivate our scientists of the future by generously supporting the Colorado Scientific Society. Thank you.



Ancient Lake Alamosa
CSS field trip, June 2007.
A "student-rich" trip.
Photographs by Lisa Rukstales.





Earth Science Meetings and Talks

Newsletter items must be received by the 25th of each month.



Colorado Scientific Society's regular meetings are held the 3rd Thursday of the month at the American Mountaineering Center in Golden (unless otherwise advertised). Social time begins at 6:30 p.m. and talks start at 7:00 p.m.

For more information, contact Matt Morgan, at 303-866-2066, matt.morgan@state.co.us

AIPG Every 3rd Tuesday, 11:30–1:30 p.m., University Club, 1673 Sherman St., Denver, make reservations with David Abbott at 303-394-0321 or dmageol@msn.com, \$30 in advance, \$35 at the door; **Nov. 18**, Michael Wireman, EPA, “Hydrogeologic characterization of ground waters, mine pools and the Leadville mine drainage tunnel, Leadville, Colorado.

Café Scientifique Wynkoop Brewery, evening science talks at 6:30. Free, except for beer. <http://www.cafescolorado.org>

CSM Microscopy short course, Dec. 15–19, 2008, 9 a.m.–5 p.m. Use of reflecting microscope, ID of 40 common ore minerals, study of ore mineral suites. \$995. Taught by John Lufkin, 303-997-7365, lufk3@comcast.net. Class limit of 10.

Colorado School of Mines, Van Tuyl Lectures Thursdays from 4–5 p.m. in Berthoud Hall room 108. **Nov. 13**—Vince Matthews, Colorado Geological Survey, “China’s and India’s Ravenous Appetite for Natural Resources and Its Impact on Colorado School of Mines.” <http://www.mines.edu/academic/geology>

Colorado State University, Dept of Geosciences, Rm 320 Warner College of Natural Resources Bldg., Mondays, 4:00 pm. 970-491-5661. <http://welcome.warnercnr.colostate.edu/geo-training/index.php>

Denver Mining Club meets every Monday at the Littleton Country Buffet near Bowles and Wadsworth (8100 W. Crestline Ave., in the shopping center) 11:30–1:00. Purchase of lunch required. **Nov. 10**—No Meeting; **Nov. 17**—Greg Roush, President, and Heather Justus, Senior Project Geologist, Leonard Rice Engineers, Inc., “Geohydrology and Engineering Hydrology as They Relate to Mining in Colorado”; **Nov. 24**—Jim Burnell, Colorado Geological Survey, Annual Summary of Colorado Mining and Mineral Activity. <http://www.denverminingclub.org>

Denver Museum of Nature and Science **Nov. 20**, 6:30 p.m., Ken Carpenter, “The Life and Times of T. rex” Ricketson Auditorium. \$12 member, \$15 non-member. <http://www.dmnso.org/main/en/General/Education/AdultProgram/Lectures>

Denver Region Exploration Geologists’ Society (DREGS) meets in the Mutual Consolidated Water Building, 12700 West 27th Avenue, Lakewood. Social 6:00–7:00 p.m. Presentation at 7:00 p.m. Meetings are normally scheduled for the first Monday of each month. **Nov. 3**, Bill Bond and Paul Bartos, Esperanza Silver Corp., Geology and discovery of the Cerro Jumil Gold Skarn, Morelos, Mexico. For information contact Jim Piper, (303) 932-0137, or the website <http://www.dregs.org>

Denver Well Logging Society (DWLS) meets on the third Tuesday of each month, Sept. through May. Lunch and a technical talk at the Wynkoop Brewery begins at 11:30 a.m., 18th and Wynkoop Sts. in Denver. Call Sarah Voight at 720-946-1374 by prior Thursday for reservations. Web page: <http://dwls.spwla.org> **Nov. 22**—Rockbuster’s Ball & Annual Professional Awards Banquet, Columbine Country Club, Littleton, online registration at: <http://www.eventbrite.com/event/184831837>

Friends of Dinosaur Ridge <http://www.dinoridge.org>. Admission is free, but donations are welcome. 16831 W. Alameda Parkway. Talks at 7:00 p.m. Visitor Center (303) 697-3466 or contact Beth Simmons at cloverknoll@comcast.net for info.

Rocky Mountain Association of Geologists (RMAG) Reception at 11:30, lunch at noon, talk at 12:30. Reservations by recording at 303-623-5396 until 10:30 a.m., prior Wed. Luncheon \$30. Talk only (no res.)—\$5. Location: Denver Marriott, 17th & California. <http://www.rmag.org/events>. **Nov. 22**—Rockbuster’s Ball & Annual Professional Awards Banquet, Columbine Country Club, Littleton, online registration at: <http://www.eventbrite.com/event/184831837>

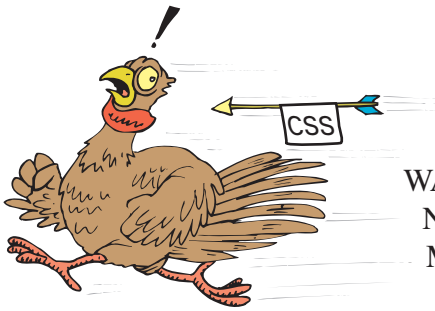
Rocky Mountain SEPM Reception at 11:30, lunch at noon, speaker at 12:30. Reservations: luncheons@rmssepm.org, before noon of preceding Friday. \$20.00 lunch, \$3 talk only. Wynkoop Brewing Company, 1634 18th St., Denver. <http://www.rmssepm.org/NewFiles/lunch.html>

USGS Geologic Division Colloquium Thursdays, 1:30, Foord Room, Building 20, Denver Federal Center. For more information contact: Peter J. Modreski, USGS, Denver, tel. 303-202-4766, fax 303-202-4767, email pmodreski@usgs.gov

Univ. of Colorado, Boulder, Geol. Sciences Colloquium Weds., 4:00 p.m., Rm. 380. Refreshments at 3:30 p.m. on the 3rd floor. **Nov. 12**—TBA; **Nov. 19**—Doug Yule, Univ. of Calif., “Megaquakes of the Himalaya.” <http://www.colorado.edu/GeolSci>

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Lakewood, CO 80215-0495

<http://www.coloscisoc.org>



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