

Colorado Scientific Society

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

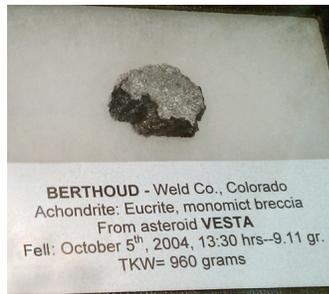
Rates of Quaternary Landscape Change in the Eastern Grand Canyon

by Lon Abbott, Senior Instructor and Associate Chair
University of Colorado—Boulder



Colorado Meteorites and the 2004 Berthoud Meteorite

by Fred Olsen, Denver, CO



NEW
LOCATION!!

Thursday, January 19, 2012

→ Shepherd of the Hills Presbyterian Church ←
20th Ave. at Simms St., Lakewood

NEW
LOCATION!!

Social half-hour—6:30 p.m. Meeting time—7:00 p.m.

January Talks

Abstracts

Rates of Quaternary Landscape Change in the Eastern Grand Canyon

by Lon Abbott
Senior Instructor and Associate Chair
University of Colorado—Boulder

The Grand Canyon is a type example of arid region geomorphic processes, making the constraint of process rates, such as river incision and scarp retreat, desirable. Such constraints are particularly important here for two additional reasons. First, the Colorado River is the master stream that drains most of the American Southwest, thereby exerting first-order control on rates of other geomorphic processes throughout the region. Second, the Colorado River's incision history provides fundamental constraints on models of the surface uplift history of the Colorado Plateau. When and how the plateau was raised to its present average elevation of about 2 km remains controversial.

Quantification of such process rates requires the dating of suitable Quaternary datums. Travertine is the prime datum candidate in eastern Grand Canyon due to its abundance and its amenability to U-series geochronology. Here I present process rate determinations for the last ~1 m.y. based on U-series ages and stratigraphic positions of travertine outcrops in the vicinity of Hermit Creek.

Our primary conclusions are: 1) The minimum incision rate of the Inner Gorge near Hermit Creek was 313 +/- 77 m/m.y. and the maximum rate was 436 +/- 104 mm/m.y. from ~1 Ma to ~400 ka. The rate then slowed to a maximum of 183 +/- 30 m/m.y. thereafter. This slowing of incision is consistent with the passage of an upstream-migrating knick point sometime between 1 Ma and 400 ka; 2) The average incision rate over the last ~1 m.y. has been 254 +/- 31 m/m.y., a rate sufficient to carve the entire Grand Canyon since 6 Ma, as many researchers have proposed. Conversely, Wernicke (2011) argues that the current Canyon was carved to within 380 m of its current depth prior to 16 Ma (mostly by an ancestral 'California River'). Our data admit such a hypothesis but demand vastly slower pre-Quaternary incision rates, as hypothesized by Wernicke (2011); 3) The Redwall escarpment has been retreating from the river at a rate of 465 +/- 51 m/m.y. during the last ~1 m.y.; 4) Travertine Creek, an ephemeral Colorado River tributary, aggraded its bed between 53–11 ka (to a depth of 21.6 m in its middle reaches), then incised that accumulated fill and an additional 1 m of bedrock toward the present. Today, its bed lies at a nearly identical elevation to the one it occupied at 53 ka.



Lon grew up in Boulder and fell in love with the mountains thanks to all of the time he spent in them. That passion for mountains fueled his desire to major in geology when he went to college. He completed bachelor's degrees in geology and geophysics at the University of Utah and then worked for two years after graduation as a field geophysicist for a small aeromagnetics firm based in Salt Lake City. He has done two internships in seismic processing in Denver, one at Marathon and the other at Amoco. After the aeromag. work, he went to University of California, Santa Cruz to do graduate work focused on mountain-building processes, sponsored by an NSF Graduate Fellowship. His study site in northern Papua New Guinea constitutes the world's youngest mountain range. For his Ph.D. he studied the evolution of the arc-continent collision, using both field mapping and marine geophysics. He stayed on to do a post-doc during which he quantified the rate of surface uplift for the range.

After his post-doc, he joined the faculty at Prescott College, a small liberal arts college in Arizona. His research interest in the Grand Canyon began there, thanks in part to several undergraduate senior theses he sponsored on local geology. He stayed at Prescott College for ten years, serving as the Chair of the Faculty Senate for four years and Associate Dean for Academic Affairs for one. He then moved to the faculty of Red Rocks Community College for a year before joining the Geological Sciences faculty at CU, where he serves as a Senior Instructor and the Associate Chair for Undergraduate Studies.

With his geologist wife, Terri, he has co-authored several recent geology articles in Earth magazine and two books on Arizona geology aimed at a popular audience: *Hiking The Grand Canyon's Geology* and *Geology Underfoot in Northern Arizona*. Their third popular geology title, *Geology Underfoot Along Colorado's Front Ranges*, is scheduled for release this fall.

Colorado Meteorites and the 2004 Berthoud Meteorite—by Fred Olsen, Denver, CO

Fred Olsen has studied and collected meteorites from Colorado and elsewhere, and has traveled extensively worldwide to visit meteorites and localities where they have been found. Fred has helped assemble the meteorite display at the Colorado School of Mines Geology Museum.

Some 85 meteorites are known from Colorado, of which some of the most notable are the Guffey iron meteorite (309 kg), the Bear Creek iron meteorite (227 kg) and the Rifle iron meteorite (103 kg). Of the 5 witnessed and recovered meteorite falls in Colorado, the most recent was the Oct. 5, 2004, Berthoud, Weld County, meteorite fall. (1 kg = 2.2 lbs.)

The Berthoud meteorite is a eucrite, a stony meteorite of basaltic composition. It belongs to the HED (howardite-eucrite-diogenite) group of meteorites that are believed to have been derived from the asteroid, Vesta. NASA's Dawn spacecraft mission to study two asteroids was launched in 2007; it is currently studying and photographing Vesta, and in Feb. 2015, it will arrive in proximity to the asteroid Ceres.

Thanks to a donor who contributed the funds, the Colorado Meteorite Society (COMETS) purchased a 50 gram slice of the meteorite for \$12,000, which they donated to the Colorado School of Mines Geology Museum, where it is currently on display.

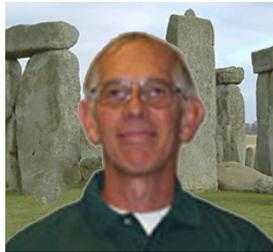
The Berthoud meteorite originally had a mass of 960 grams; after various pieces were sawn off and removed and sold, the largest remaining piece (main mass) weighs 247 grams, and is 70% covered by a fusion crust. It has been owned since 2010 by Oregon meteorite dealer Edwin Thompson, who would like to see it end up in some Colorado museum, but because he needs to raise money to help pay for medical expenses, he is planning to sell the meteorite by the end of this month. Thompson is asking \$45,000 for the 247-gram meteorite, an amount which, at \$182/gram, is in line with the prices commonly commanded by the more unusual types of meteorites; for example, specimens of the Johnston, Colorado meteorite, a



shower which fell in 1924, with 40.3 kg total known weight of meteorite fragments, sell for over \$200/gram. Interestingly, the Johnston meteorite fall was a diogenite, another of the HED group; Colorado is the only state in the U.S. known to have two different meteorite falls of Vestian origin.

Fred Olsen is hoping to find a donor or donors who might be able to purchase and preserve the meteorite for a Colorado public institution, during the very short window of time remaining before it is sold; the owner will be taking it to Tucson sometime shortly after Jan. 20 for probable sale to another buyer or institution if no Colorado purchaser is forthcoming. Fred (303-748-7400 or debfred@att.net) would be happy to speak with anyone who has ideas or suggestions about raising funds for this purpose.

President's Message, by Pete Modreski



Welcome to a new year for the Colorado Scientific Society! I, and the other CSS officers, councilors, and committee members will continue to do our best to bring our membership rewarding scientific experiences.

Our monthly meetings are the most visible and most regularly attended of the activities sponsored by the CSS, but it's worth taking note that this society does much more than that; we normally have spring and fall field trips, a Family Night (or Day), our annual special Emmons Lecture and Past Presidents' Dinner, a Student Night where we award cash prizes for the best student presentations, and we sponsor a number of scholarships thanks to the present and past contributions to our several Memorial Funds. At the present time, our biggest challenge has been deciding where to hold our meetings. For the past several years we have done very well meeting in a lecture room in Berthoud Hall on the CSM campus, but this has become less and less regularly available to us, and the limited parking on the CSM campus has required everyone to park farther and farther from the meeting location. We have tried holding meetings at the Golden Hotel, a good facility, but the hotel meeting room is expensive, and we are not allowed to bring our own refreshments. Our January meeting will be at what seems to be a very good facility, the meeting hall at Shepherd of the Hills Presbyterian Church, on 20th Ave. at Simms St., Lakewood. The cost is reasonable (\$130 per meeting), the meeting hall is roomy and attractive, there is a built-in digital projector and microphone system, and a large, convenient parking area. We'll see what the members who attend think of this meeting place.

It has also been suggested that CSS experiment with holding some of our meetings elsewhere in the Front Range area, outside the Golden-Lakewood communities. We have CSS member Bruce Wahle to thank for compiling data on residence or workplace locations of our members; his compilation shows that of approx. 500 CSS members, only 1/5 live in the west metro area, 1/5 in the northern area (Boulder-Louisville-Longmont-Greeley-Fort Collins), and about 55% in the Denver area. Holding one or more meetings during the year either in Denver itself or in one of the northern Front Range communities is a possibility; we invite comment from all our members about this, and we are planning to distribute a survey (which will probably go to most members electronically) about members' preferences in regard to meeting places and some other things. Another change we are planning to make this year will be to hold our annual Emmons Lecture in the fall, possibly September, rather than winter or early spring (hoping to avoid problems with the snowy weather which has struck us in the past).

If you have ANY comments or suggestions about meetings or anything else about the society's activities, you are most welcome to contact the president, or any other of our officers.

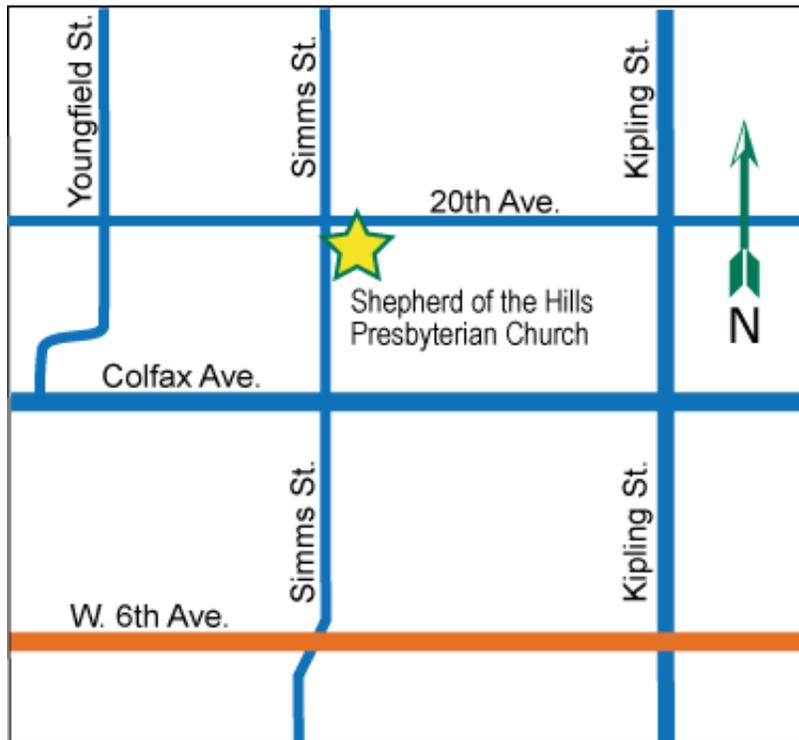
I hope to see many of you at our meeting this Thursday! ----Pete Modreski, 2012 CSS President

Map to the CSS January meeting on Thursday, January 19:

Shepherd of the Hills Presbyterian Church

11500 West 20th Avenue

Lakewood, Colorado 80215





A plea from the CSS Newsletter Editor:

Hi folks, and Happy New Year! This is my annual request to the membership to send me items for the newsletter. I'll take just about **anything**...Upcoming events, newsy notes, fun photographs (especially from the "old days"), breaking science news, member highlights and awards, career updates, jokes, cartoons, etc. To see an example of how we can spotlight CSS members, go to our website: <http://www.coloscisoc.org/symposium/special.html> and see the 8-page biography of Curtis Elder, a local geologist living in Evergreen. This is YOUR newsletter so the more input I have from the members, the better! *Thank you.*



Did You Know?....

The Denver Museum of Nature and Science has an over-21 venue called, "The Science Lounge" that meets every 3rd Thursday of the month. Know someone who might enjoy "science lite"? This month:

KNOW YOUR SNOW

Thursday, January 19, 6:30–9:30 p.m.

It's no secret that Coloradans love their snow. Whether you're always on the lookout for the next Epic Pass-worthy, call-in-sick powder day—or just love a good snowball fight, you'll get to know snow like never before. Chill out with our signature cocktail, The Frostini, as you learn about the crystalline structure of snowflakes, the physics of skiing, and how moguls migrate uphill. Plus, enjoy music by Canadian Folk Music's Instrumental Artist of the Year, Jayme Stone. \$8 Museum member, \$10 nonmember. Ages 21+ only.



Thursday, Jan. 19, 4:00-5:00 p.m. *Van Tuyl Lecture Series*, "Diamonds: origins, occurrences, and method of discovery" by Dr. Joyashish Takurata, Ohio University, Candidate for Teaching Assistant Professor in Economic Geology. Berthoud Hall Room 241, Colorado School of Mines campus, Golden.

Friday, Jan. 20, 7:30 p.m., at the monthly meeting of the *Littleton Gem and Mineral Club*, "Colorado Diamonds" by Dr. Pete Modreski, U.S. Geological Survey. At Columbine Hills Church, 9700 W. Old Coal Mine Ave., Littleton, CO 80123; all are welcome to attend; <http://littletongemandmineralclub.com/>

Thursday, Jan. 26 and Friday, Jan. 27, NOVA Sneak Peek: Ice Age Death Trap; 7:00 p.m. both days, at the Denver Museum of Nature and Science. "Go behind the scenes and behind the science for 'Ice Age Death Trap', a new NOVA program produced by National Geographic and dedicated entirely to the discovery near Snowmass Village. Scientists Kirk Johnson and Ian Miller will host and present never-before-seen footage from the NOVA program. Share in the excitement of the discovery and the theories being explored around what happened to produce this rich and unique site. Get the inside scoop before the full program airs on Rocky Mountain PBS on February 1." Reservations required, \$8.00 members, \$10 nonmembers; For details see: <http://www.dmns.org/learn/adults/after-hours>.



Time to Pay Dues for 2012...

....if you don't pay, we'll hide the cookies and hot cider from you!

You can find a dues payment form on the CSS website:

www.coloscisoc.org/membership/dues.html

Dues payments are \$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 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 2012 (checks dated before 1 January 2013), will be credited toward the 2012 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. A big THANK YOU to everyone who has donated.



Free GPS Navigation Class at USGS—Bldg 810 on the Denver Federal Center

Friday, January 20, 9 a.m.–5 p.m., (1-hour break for lunch) If you don't have a GPS, we'll loan you one for the day. Other handout material will be provided. Maximum enrollment is 25 students, so please don't register unless you're sure you can attend. This class will not cover map reading or compass use—it will focus on how to use a GPS receiver with a USGS topographic map. Please note this class also does not address loading digital maps into your receiver. The Denver Federal Center (DFC) is located on the west side of Kipling between Alameda and 6th Avenue. Be advised pets and firearms are not permitted on the DFC. You'll be asked to show photo ID when entering the DFC. Come into the building 810 Map Sales office and you'll be directed down the hall to the classroom. The class is free, but you *must* register by calling 303-202-4689 or by sending an email to gpsworkshops@usgs.gov For more information and for future classes, please see:

<http://www.cr.usgs.gov/gpsworkshops/index.php>



Antarctic Peninsula, South Georgia and Falkland Islands

Scotia Arc Tectonics, Climate and Life

December 27, 2012 to January 20, 2013

In a unique collaboration, the Geological Society of America, University of Texas at Austin's Jackson School of Geosciences, and Cheesemans' Ecology Safaris are coming together to celebrate GSA's 125th anniversary, hosting a voyage for geologists, naturalists, photographers and explorers. The 3-week geologic fieldtrip to the Antarctica and the Scotia Arc (South Georgia and the Falkland Islands), is led by Ian Dalziel (University of Texas at Austin), Richard Alley (Penn State), Rob Dunbar (Stanford) and Rudolph Trouw (Federal University of Rio de Janeiro). Currently the trip is more than half full, but GSA wants to fill the spaces with geoscientists. Complete information is available at this web site: www.cheesemans.com/gsa





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 Colorado School of Mines 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 Pete Modreski, at 303-202-4766, pmodreski@aol.com

Café Scientifique Tues., Jan. 17, *Brian Hynek, Ph.D., Univ. of Colorado, Boulder*, “Mars: Are we alone?” Meets at the Wynkoop in LoDo, 1634 18th St., Denver, evening science talks at 6:30. Free, except for beer.
<http://www.cafescolorado.org>

CO-AIPG Jan. 17 *Jennifer L. Miskimins, Colorado School of Mines*, “Hydraulic Fracturing 101: What is it? Why we do it? And what work is going on at Mines?” Noon lunch & talk at 12:30 p.m. Wynkoop Brewing Company, 1634 18th Street, Morey/Brown Room, Denver. Price: \$25 per person with advance reservation, \$30 at the door, \$5 walk-ins for talk only. Reservations: Contact Steve Sonnenberg, sasonnenbg@aol.com or 303-895-7663 by Noon on January 13.

Colorado State University, Dept of Geosciences, Rm 320 Warner College of Natural Resources Bldg., Mondays, 4:00 pm. 970-491-5661. **Jan. 23,** *Vera Schulte-Pelkum, University of Colorado*. “TBA.” **Jan. 30,** *Dr. Svetoslav Georgiev, Geological Survey of Norway, AIRIE Program-CSU*. “TBA.” **Feb. 6,** *Dr. Kenneth Sims, University of Wyoming*. TBA. **Feb. 13,** *Dr. Guangpin Xu, Geological Survey of Norway, AIRIE Program-CSU*, “Using Re-Os geochronology to refine the geological time scale.” <http://warnercnr.colostate.edu/geo-training/>

Denver Mining Club Jan. 23 *Rich Goldfarb, USGS*, “Tectonics and gold metallogeny.” **Jan. 30** *Daniel Carr, Moonlight Mint*, “Private minting of copper, silver, and gold coins in Colorado.” The DMC meets on Mondays 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. Visitors always welcome. <http://www.denverminingclub.org>

Rocky Mountain Association of Geologists (RMAG) Jan. 23 *RMAG-PTTC ONE DAY COURSE, Dr. Nick Harris - Source Rocks 101*. Sign up at: http://www.rmag.org/i4a/ams/amsstore/category.cfm?category_id=13). **Feb. 15** *Dr. Joe Macquaker*, (tentative talk title) “AAPG DL (Shale).” Lunch at Noon; program begins at 12:20 p.m. Reservations by recording at 303-573-8621 ext. 1, until 10:30 a.m., prior Mon. Luncheon \$30. Talk only (no res.)—\$5. Location: Denver Marriott City Ctr., 17th & California. <http://www.rmag.org/i4a/pages/index.cfm?pageid=3286>.

Rocky Mountain SEPM Jan. 31 *Alan Carroll, Univ. of Wisconsin at Madison*, “Prospects and progress in the Green River Formation oil shale, Western U.S.” Reception at 11:30 p.m., lunch at 11:45 p.m., speaker at 12:15 p.m. Reservations: luncheons@rmssepm.org, before noon of preceding Friday. \$20.00 lunch, \$5 talk only. Wynkoop Brewing Company, 1634 18th St., Denver. <http://www.rmssepm.org/luncheons.shtml>

USGS Rocky Mountain Area Seminar Series Jan. 17 *Craig Manning, UCLA*, “In Deep Water: New insights into geologic fluids of the deep crust and upper mantle.” **Jan. 31** *Marieke Dechesne, DMNS & USGS*, “The Denver and Colorado headwaters basins: A look at Laramide deformation by observations from both sides of the Front Range, Colorado.” Tuesdays at 10:30 a.m., Bldg. 25 Lecture Hall, Denver Fed. Center, Kipling St. & 6th Ave., Lakewood. Use the main gate to enter Fed. Ctr. Building entrance and parking lot is on the east side of Bldg. 25. Contact: Peter J. Modreski, USGS, 303-202-4766, pmodreski@usgs.gov

Univ. of Colorado, Boulder, Geol. Sciences Colloquium Jan. 18 *Scott Tinker, BEG, UT-Austin*, “The Global Energy Transition: What will it take to make the switch?” **Jan. 25** *Scott Burns, Portland State*, “Urban Landslides: challenges to forensic engineering geologists.” **Feb. 1** *Jerry Magloughlin, CSU*, “The hottest fault rocks: friction melts and pseudotachylytes.” **Feb. 8** *David Bell, ASU*, “A mantle perspective on the post-Gondwana tectonomagmatic evolution of southern Africa.” **Feb. 15** *James Syvitski, CU-Boulder*, “The Anthropocene—a new geologic epoch?” Weds., 4:00 p.m., Benson Earth Sci. Auditorium, Rm. 180. Refreshments at 3:30 p.m. on the 3rd floor. <http://www.colorado.edu/geolsci/colloquium.htm>

February 21. Legislative Reception—“The Mineral and Energy Economy in Colorado.” Time: 5:00 to 7:30 pm. Venue: University Club of Denver—College Room, 1673 Sherman Street, Denver, CO 80203.

The American Institute of Professional Geologists is pleased to invite you to a **Legislative Reception** created to engage, inform, and educate legislators on the importance of the mineral and energy industries in the creation of jobs and economic sustainability in the State. For ticket purchases go to: <http://www.aipgcolorado.com/>, (\$20 in advance and \$25 at the door). Sponsorship and Exhibitor Space is available. For more information contact: Larry Cerrillo. Office: 303-674-6484. Cell: 303-921-1612. E-mail: cerrillo1@mindspring.com

Colorado Scientific Society
P.O. Box 150495
Lakewood, CO 80215-0495

<http://www.coloscisoc.org>



WANTED:
New CSS
Members

OFFICERS

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