

Colorado Scientific Society

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

2008 President's Address

NON-TERMINAL METEORITE IMPACTS:
THE CASE FOR STUDYING SMALL CRATERING EVENTS
Matt Morgan, Colorado Geological Survey



Thursday, December 18, 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.

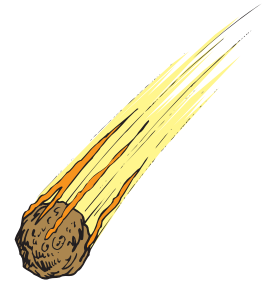
2008 Colorado Scientific Society President's Address

Abstract

Non-Terminal Meteorite Impacts: The Case for Studying Small Cratering Events

By Matt Morgan, Colorado Geological Survey

The importance of studying small meteorite impact craters ($D < 100$ m) has often been overshadowed by larger, and thus more damaging, cratering events. Recent small impacts have provided us with a wealth of information including, but not limited to: shock metamorphism, orbital mechanics, cratering dynamics, and meteorite science. The first scientific investigation of a small impact crater was conducted by H.H. Nininger in 1933 in Brenham, Kansas, after he was told of a site that was a "buffalo wallow." He dug two trenches across the site and proceeded to recover several thousand meteorite specimens totaling 1,200 pounds. The Carancas, Peru, impact event of September 2007 made international news when a 2-ton meteorite struck a riverbed south of Lake Titicaca. The impact created a crater nearly 50-feet wide and 16-feet deep, launching debris 650 feet into the air and registering the first-ever recorded seismic shockwave from a direct impact. The Wabar craters, located in Saudi Arabia's "Empty Quarter," contains grains of sand that have been welded together following the impact of a 3,500-ton iron meteorite that struck with a velocity of 15,000 miles per hour. The 13 kilotons of energy released from the impact blast is comparable to that of the atomic bomb dropped on Hiroshima, Japan, during World War II. From eyewitness accounts of the Sikhote-Alin, Russia, meteorite impact, scientists were able to deduce the meteoroid's origin between the orbit of Mars and Jupiter. Other small impact craters provided information about cratering dynamics that could not be simulated through laboratory exercises. By studying these events in their natural surroundings, we can gain a better understanding of how small craters form and the severity of the hazard posed by small-impact cratering events.



President's Message

Dear Society Members,

As 2008 draws to a close, the time has come for me to bid farewell and pass the famed silver gavel to Don Sweetkind. It has been my utmost pleasure to serve as your President for the last year. I have gained many friends and much experience that will be with me as I move forward.



I want to personally thank all of the council members and chairpersons for their support and help over the past year, a year that I believe was very successful, especially for outreach! We changed things up a bit by taking our families out for a field trip on Family Day, co-sponsored a Dinosaur Discovery Day with the Friends of Dinosaur Ridge, had a booth at the Jeffco Gem and Mineral Show, gave a talk on the CSS collection at the Denver Gem and Mineral Show, had two successful field trips where student participation was overwhelming, and gave our website a needed makeover. With all of these activities, it is no wonder that we gained 34 members over the last year. All of the council members, chairpersons, and regular members that helped out during the year deserve a big THANK YOU for a job well done! Let's keep those new members coming in.—*Matt Morgan*

2008 Student Awards



Members in attendance were treated to four outstanding talks by students from the Colorado School of Mines and the University of Wyoming. The judges awarded first prize of \$500 to Daniel Jones (UWYO Ph.D. student) for his presentation on “A refined interpretation of the Medicine Bow Orogeny, southeastern Wyoming: Implications for regional tectonics and crustal growth”; second prize of \$250 went to Sharon Bywater (UWYO M.S. student) for her presentation on “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”; third prize of \$100 went to Dawn Jobe (CSM M.S. student) for her presentation on “High-resolution geo-cellular modeling of Upper Morrow ‘A’ Sands at Postle Field, Texas County, Oklahoma”; fourth place of \$50 went to Tyler Benton (CSM undergraduate student) for his presentation on “Soil respiration following pulse precipitation events in a semiarid grassland”.



Congratulations to all of the students that participated in this year’s event!

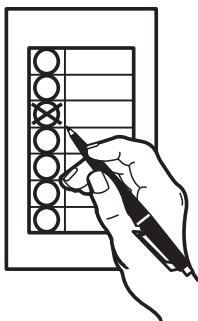


PAPER NEWSLETTERS COST MONEY—GO ELECTRONIC; \$AVE A TREE!!

Due to the cost of postage (upward of \$600 yearly), the CSS newsletter is going completely electronic if you have an e-mail address. In the past, you could receive both a paper copy and an electronic version of the newsletter. This practice will be discontinued. If you are still receiving a paper copy of the newsletter and YOU HAVE AN E-MAIL ADDRESS, please GO ELECTRONIC and help the CSS lower its overhead! Send your e-mail address to Erik Oerter at erik.oerter@state.co.us and he will include you on the electronic newsletter distribution list. Added bonus: the PDF version of the newsletter is in [COLOR](#).

2009 CSS Officer Nominees

The nominee for president-elect is Scott Minor (U.S. Geological Survey) and nominee for councilor is Jim Burnell (Colorado Geological Survey).



A verbal vote will be taken at the December meeting. We still need one more councilor for 2009-2012, so if you wish to be nominated or know someone who would be willing to serve, please contact Matt Morgan (matt.morgan@state.co.us).

FREE at the USGS Map Store...

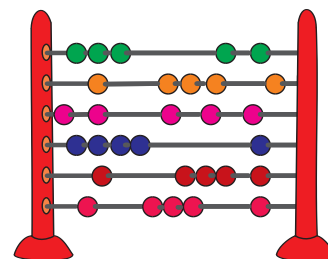
As in past years, bundles of “government surplus” topographic maps are being given away for use as gift wrapping (alternatively, “Suitable for Framing,” if you happen to get a map that you really like!). Available now through Christmas, in-person at the store only. Only at the Denver Fed. Ctr., Bldg. 810.



Colorado Scientific Society fiscal report for 2008

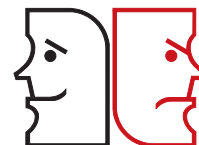
2008 saw the Society run a substantial deficit, due in large part to about half of the membership not paying annual dues. We have several large fixed expenses such as carrying corporate insurance, meeting room rental, the honorarium for the Emmons lecture, and prizes awarded for the State science fair and at our own student night. Field trip expenses were a challenge to anticipate, especially this fall during the spike in gasoline prices. We purchased a display board in order to advertise ourselves at local professional meetings, and we purchased a variety of supplies related to the archiving of Society historical documents.

Our bottom line can be improved if members pay their dues on time and if we try to reduce expenses where possible. We are currently looking at options for a less-expensive meeting room and in 2009 we will try to convert more members to the idea of receiving the newsletter via e-mail. Currently about half the membership receives the newsletter in paper form, requiring significant time and energy to duplicate, fold, affix address labels and postage, and at a considerable expense.



Expense Category	Income	Expense	Balance
DUES: Maximum potential dues = \$5225			
(113 members paid, still chasing past due)	\$2130		\$2130
Corporate Insurance		\$828	(\$828)
Meeting space (7x\$150 + \$265 Amer. Mtneerg Ctr; \$265 Green Center CSM for Emmons)		\$1315 (\$2365 in '09)	(\$1315)
Past President's Dinner	\$792	\$785	\$7
Emmons Lecture		\$1000	(\$1,000)
Student Night Awards (\$500; \$250, \$100, \$50)		\$900	(\$900)
Science Fair awards (\$100, \$75, \$75, and \$50)		\$300	(\$300)
Family Day	\$0	\$0	\$0
Website costs (\$22 per month; paid yearly)		\$240	(\$240)
June South Park field trip	\$720	\$787.30	(\$67.30)
Fall North Park field trip	\$2685 (plus \$936 from Pillmore Fund)	\$4253.93	(\$632.08)
Newsletter expenses		\$640	(\$640)
Display board			(\$432)
History/archive expenses		267.46	(\$267.46)
Typing (Pillmore committee)		\$100	(\$100)
State reporting fee		\$25	(\$25)
Food at CSS Council meetings		\$289	(\$109)
Post office box rental		\$26	(\$26)
Treasurer's expenses (Stamps for Treasurer, new checks and deposit slips)		\$120	(\$120)
Misc. expenses		\$50	(\$25)
TOTALS	\$7,263	\$11,951	(\$4688)

Good News!!! We have NEW members!!



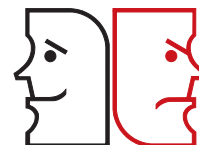
Colorado Scientific Society membership report, by Don Sweetkind

2008 saw an increase in the number of CSS members in all categories and an overall increase in membership of about 15% in the past two years (see table below). Our field trips always seem to bring in a few new members, as did the one-day volcanoes symposium we hosted at UNC in 2007. Credit also goes to Lee Shropshire for securing campus representative at all local four-year colleges that have geology programs or courses. These campus representatives have generated interest in the CSS among their students and several reps have themselves joined.

Take a moment and walk down the hall and ask a co-worker to join the Society. Most of us probably know at least one person who ought to be a member!

Member category	Year		
	2006	2007	2008
Regular	223	222	240
Corresponding	28	27	29
Student	9	14	27
Honorary	44	48	49
Total	304	311	345

Bad News!!! The OLD members need to pay their dues... (please) ...



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 this 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 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.

PLEASE support our future scientists by generously supporting the Colorado Scientific Society.

Thank you!!



DUES & FUNDS CONTRIBUTIONS COLORADO SCIENTIFIC SOCIETY

(Last Name) (First Name) (Initial) (current email address)

DUES: Dues are for the calendar year (January-December)

Regular Members (\$20, CO Front Range) _____

Corresponding Members (\$10) _____

Student Members (\$5, enrolled in college) _____

MEMORIAL FUNDS: These funds support earth-science research grants to graduate students throughout the nation. If your contribution is not specified, it will be distributed equally among the funds:

(A) Ogden Tweto Memorial Fund _____

(B) Steven Oriel Memorial Fund _____

(C) Edwin Eckel Memorial Fund _____

(D) Bill Pierce-Heart Mountain Fund _____

(E) George Snyder Memorial Fund _____

(F) Chuck Pillmore Memorial Fund _____

This contribution is made in the memory of: _____

ENDOWMENT FUND: This fund is used to support the Society's monthly meetings and newsletter, field trips, family night, annual Emmons Lecture, and special activities.

TOTAL CONTRIBUTIONS (DUES AND FUNDS): _____

Please make your checks payable to the Colorado Scientific Society
Send this form & your check to:

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



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

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. <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>

DIPS (Denver Intl. Petroleum Society) Friday, Dec. 12—Petroleum potential of the Nigerian Benue rift basins from the geology and geochemical perspectives, by Dr. Samuel Akande, Dept. of Geology and Mineral Science, University of Ilorin, Nigeria; Sabbatical Leave address, Dept. of Geosciences, Colorado State University, Fort Collins, CO. Wynkoop Brewing Company, 1634 18th Street, Denver. Gather at 11:30 am; Lunch served at Noon; Lunch price: \$15.00 for members and \$18 for non-members. Please e-mail Bob Zilinski, at rezilin@aol.com or call him at 303-885-0615 to make reservations before Wednesday, Noon, Dec. 10.

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. **Dec. 8**—Holiday Story Time. You've collected some interesting anecdotes in your career. Share one with the audience, in 5 minutes or so. **Dec. 15**—Auction of Mining Memorabilia. Check your attic, closet, & garage for items to donate, or come and look for that special gift. Books, rocks & minerals, jewelry, prospecting & mining supplies & equipment, and much more: Come help us celebrate our 117th anniversary! **Dec. 22 & 29**—No Meeting. Merry Christmas. Happy New Year. <http://www.denverminingclub.org>

Denver Museum of Nature and Science Dec. 10, 7:00 p.m., Bringing Dinosaurs to Life, by Kent Stevens, Ph.D., Computer and Information Science, University of Oregon. Phipps IMAX Theater; use IMAX evening entrance. \$12 member, \$15 non-member. <http://www.dmns.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. **Dec. 8**, Karin Hoal, Director, Advanced Mineralogy Research Center, CSM, Mineral Characterization for Geologists: Applications of Quantitative Mineralogy. 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>

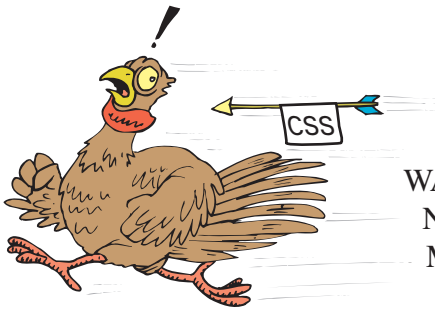
Friends of Dinosaur Ridge <http://www.dinoridge.org>. Admission is free, but donations are welcome. 16831 W. Alameda Parkway. Talks at 7:00 p.m. Visitor Center (303) 697-3466 or contact Beth Simmons at cloverknoll@comcast.net for info.

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. Upcoming: 2009 RMAG Structural Short Course by Don Stone, Jan. 27, 2009, 8:00 a.m., Review and Interpretation of Rocky Mountain Foreland Structures: Exploring Descriptive, Kinematic and Dynamic Analyses with Simple Tools, Models and Methodologies, and Avoiding Common Pitfalls. <http://www.rmag.org/events>.

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>

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

<http://www.coloscisoc.org>



WANTED:
New CSS
Members

OFFICERS

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President-Elect: Don Sweetkind, USGS, 303-236-1828, dsweetkind@usgs.gov
Treasurer: Don Sweetkind, USGS, 303-236-1828, dsweetkind@usgs.gov
Secretary: Lisa Fisher, CSM, 303-478-9427 (c), lfisher@mines.edu
Past President: Bill Nesse, UNC, 970-330-7183, nesse@ctos.com

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2007-2010: Tim McIntyre
2006-2009: Scott Minor, USGS, 303-236-0303, sminor@usgs.gov
2008-2011: Cal Ruleman, USGS, cruleman@usgs.gov
2008-2011: Lee Shropshire, UNC, 970-352-8778, leeshrop@comcast.net

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Best Paper Award: Matt Morgan, CGS, 303-866-2066, matt.morgan@state.co.us
Database Manager: Erik Oerter, CGS, erik.oerter@state.co.us
Field Trips: Karl Kellogg, kkellogg@usgs.gov
Graphics: Karen Morgan, CGS, 303-866-3529, karen.morgan@state.co.us
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