



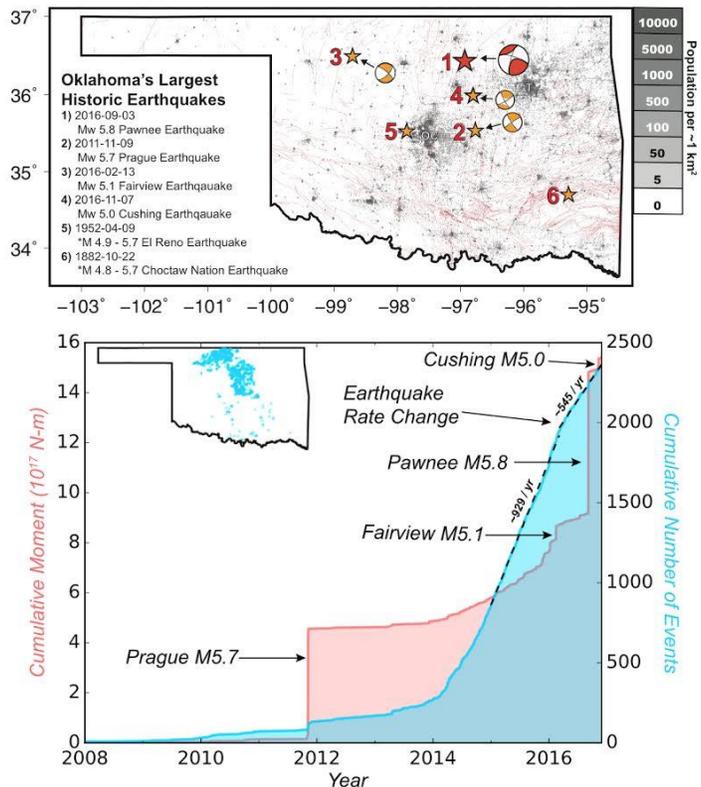
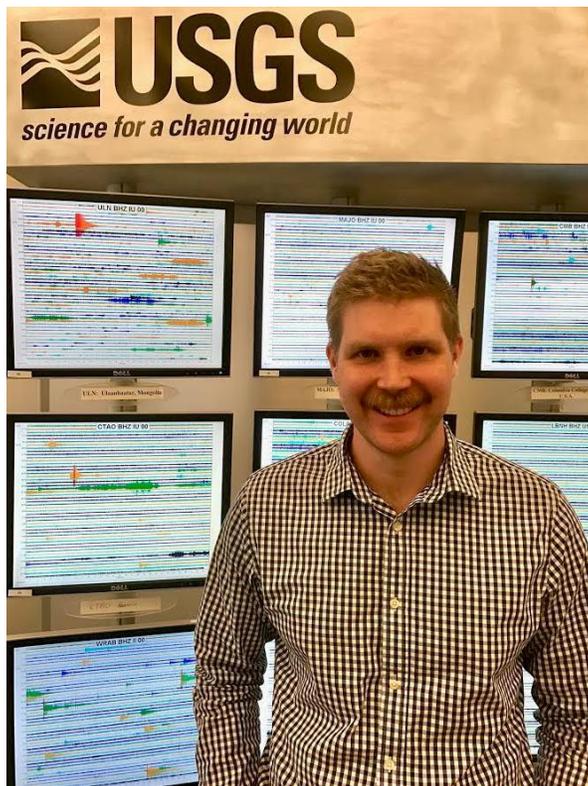
Colorado Scientific Society

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

March Meeting, Thursday, Mar. 16, 2017, 7:00 p.m.
Shepherd of the Hills Presbyterian Church, 11500 W. 20th Ave., Lakewood CO
Social time beginning at 6:30; meeting & program at 7:00

The far-reaching effects of wastewater injection: recent case studies of anthropogenic earthquakes

**William Yeck, Research Geophysicist, U.S. Geological Survey
National Earthquake Information Center, Golden, CO**



The far-reaching effects of wastewater injection: recent case studies of anthropogenic earthquakes, William Yeck, USGS

Anthropogenic earthquakes, primarily the result of deep fluid injection, currently contribute significantly to the overall earthquake hazard in the Central and Eastern United States. While the majority of these induced earthquakes currently occur in Oklahoma, Colorado has a long record of injection induced earthquake sequences that form the basis of our broader understanding of the phenomenon. The connection between fluid injection and seismicity was first observed in the early 1960's when a series of damaging earthquakes near Denver occurred due to the injection of waste fluids at the Rocky Mountain Arsenal. In response to these earthquakes, the USGS led an induced seismicity experiment in the late 1960's in Rangely, Colorado, that confirmed the hypothesis that seismicity correlates with increased fluid pressure. Since 1991, the Bureau of Reclamation has been monitoring induced earthquakes associated with fluid injection at Paradox Valley and has observed earthquakes up to ~20 km from the causative well. Elsewhere in Colorado, wastewater injection has increased the rate of earthquakes in the Raton Basin since 2001, including a damaging M 5.3 earthquake in 2011. Most recently, a 2014 M 3.2 earthquake was induced by wastewater injection near Greeley, Colorado, and rapid mitigation efforts were employed to prevent continuing seismicity.

The lessons learned from the case examples of Colorado-induced earthquakes give insight into the wide-scale induced seismicity in Oklahoma. Since the early 2000s, the rate of earthquakes in Oklahoma has increased dramatically, including the occurrence of significant and damaging events. Since 2011, Oklahoma has experienced four moderate sized (M5-6) earthquakes, three of which occurred in 2016. In contrast, only two moderate sized events, in 1882 and 1952, are historically documented. Combining observations from induced earthquakes in Colorado and Oklahoma, we now have a large dataset to evaluate the effectiveness of commonly employed mitigation strategies. Key observations from moderate sized earthquakes in Oklahoma include: (1) the existence or extent of causative fault is often unknown prior to an earthquake's occurrence, (2) induced earthquakes often occur with little to no foreshock activity, and (3) moderate sized earthquakes can occur at large distances (>15 km) from high-rate injection wells. The combination of these observations demonstrates the difficulties in mitigating associated earthquake hazards. In 2015, Oklahoma began regional mitigation strategies aimed at reducing the volume of injected fluid. The rate of earthquakes decreased in 2016 compared to 2015, which suggests that reducing volumes can reduce the earthquake rate. Still, 2016 hosted three moderate sized events and therefore had a substantially larger cumulative moment release as compared to previous years. The combination of detailed real-time monitoring, detailed source characterization research, and evaluation of yearly hazard estimates will continue to improve our understanding of the hazard presented by induced events.

Biography:

William Yeck is a research geophysicist with the U.S. Geological Survey National Earthquake Information Center, located at the Geologic Hazards Science Center in Golden, Colorado. His research focuses on improved real-time detection and characterization of earthquake sources, anthropogenic seismicity within the United States, and better spatio-temporal characterization of damaging earthquake sequences for long-term hazard assessment. Will received his B.S. in Physics at the University of Wisconsin – Madison and a Ph.D. in Geophysics at the University of Colorado at Boulder. His Ph.D. research primarily addressed issues of crust and upper mantle structure and the associated kinematic evolution of the Rockies during the Laramide orogeny. During his Ph.D., Will worked at the U.S. Bureau of Reclamation studying earthquakes induced by fluid injection at Paradox Valley, Colorado.

COLORADO SCIENTIFIC SOCIETY, SCHEDULE OF TALKS AND TOPICS FOR 2017

- January 19 Giff Miller, INSTAAR and Geological Sciences, University of Colorado: **An Arctic perspective on contemporary warming**
- Feb. 16 Cal Ruleman, Geology and Environmental Change, USGS: **Late Neogene Tectonic and Volcanic Fragmentation and Middle Pleistocene Climate-Driven Drainage Integration of the Southern Rocky Mountains**
- March 16 Will Yeck, National Earthquake Information Center, USGS: **The Far-Reaching Effects of Wastewater Injection: Recent Case Studies of Anthropogenic Earthquakes**
- April 20 Scott Denning, Atmospheric Sciences, Colorado State University: **Climate models and global change**
- May 10 (tentative but probable date), **CSS Annual Past Presidents Dinner**. Definite time, location, and cost are still to be confirmed. We have an idea for a special feature presentation of general interest at this dinner! All are welcome and invited to attend. One purpose of the dinner is to introduce and recognize past presidents of the Society who are able to attend. Another is just to give members of the CSS a chance to socialize and get to know one another better.
- May 18 (Emmons Lecture) Julie Brigham-Grette, University of Massachusetts-Amherst: **Too Warm, Two Poles: How Past Super Interglacials Should Inform Future Coastal Policy** (to be held at the American Mountaineering Center, Golden)
- Aug. 25-26 **CSS Flat Tops/White River Plateau Field Trip**, led by James Hagadorn
- Sept. 21 **Student Paper Night** (to be held at Arbor House, Maple Grove Park)
- Oct. 19 Suzette Morman, Crustal Imaging and Characterization, USGS: **Using Geoscience to Augment Environmental Public Health Studies**
- Nov. 16 Simone Marchi, Southwest Research Institute, Boulder, **Planetary Geology** (exact title TBA)
- Dec. 21(?) Marith Reheis, Emeritus USGS: **President's address** (Arbor House, Maple Grove Park (exact date to be confirmed))

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FYI – “Geology Train” on the Cumbres & Toltec Scenic Railroad, June 18.

Once a year, the Cumbres & Toltec Scenic Railroad schedules a special “Geology Train”, which in addition to making their regular 64-mile train trip from Antonito CO to Chama NM, makes several extra stops where passengers get off to study geology in the railroad cuts, accompanied by a geologic guide(s). Lunch is included, and the return is by motor coach.. I’m told that reservations for the Geology Train usually fill up quite early in the season. Tickets for the Geology Train cost \$161 (the regular trip fare is \$96). Full information is on their website at <http://cumbrestoltec.com/> . I have this info thanks to Peter Barkmann, who I believe has been involved in preparing the geologic guide for this trip.



March 2017 President’s Message , Marith Reheis, Emeritus, U.S. Geological Survey

Marith is currently off “merrily, merrily, merrily, merrily” floating down the Grand Canyon (and studying lots of geology), so we have no current message from her, and she will regrettably not be at the March meeting. But I’ll just repeat the statement she quoted in her February message about the upcoming **March for Science**, now confirmed for April 22:

“The website states: “The March for Science is a diverse, nonpartisan group that defends and celebrates publicly funded and publicly accessible science as a foundation of American freedom and prosperity. Science guides nearly every aspect of our lives and it is critical that political leaders and policymakers support scientific research and incorporate science into their decision making.” If you are interested in forthcoming information, please visit their website: <https://www.marchforscience.com/> . --- Marith”

A March for Science event is planned for Denver, at Civic Center Park, April 22, 10 a.m. – 3 p.m. Their official information site (this url works for anyone) is, <https://www.facebook.com/events/1349869341753329/> .

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Colorado Scientific Society booth at the WIPS “Journey to the Jurassic-Exploring the Morrison Formation” Symposium, March 4-5 at the Green Center, CSM. Our thanks to Jim Reed, also to Bob Reynolds, for spending some time at the booth, talking to symposium attendees. Pete M. set up the booth.

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Welcome new members!

We are pleased to welcome the following new members who have joined the Colorado Scientific Society in recent months; city of residence, if known*, is shown in parentheses:

John Babos
Clair Bailey (El Paso, TX)
Marsha Barber (Golden, CO)
David Bufalo
Angela Casale (Denver, CO)
Terry Cookro (Denver, CO)
Michael F. Doe (Lakewood, CO)
Luke Ferricher
Andy Flurkey (Golden, CO)
Cassie Geraghty (Pullman, WA)
Paula L. Hansley (Louisville, CO)
Elisa Klitze
Jay S. Leaver (Denver, CO)
Jacob Lybrook (Superior, CO)
Joyce Trygstad Nelson (Golden, CO)
Jim Paces
Adam R. Parker (Louisville, CO)
Markus B. Raschke (Boulder, CO)
Jim Reed (Golden, CO)
May Ellen Wickham

If you meet any of these new members at our meeting, please introduce yourselves and make them feel welcome!

*New members—some of you have joined and paid dues, but did not give us a mailing address, just your email. Please write to us some time, and send either a complete address, or at least the town in which you live, so our records can be more complete and to help us know more about who our members are. Thanks!

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Chuck Naeser, 1940-2016 - Obituary

Longtime Colorado Scientific Society member Dr. Charles Wilbur (Chuck) Naeser, 76, passed away on November 18, 2016, from complications of lymphoma. His 38-year career as a Research Geologist at the U.S. Geological Survey (USGS) began in 1967, first in Menlo Park, California, then in Denver for 22 years, and from 1993 in Reston, Virginia. Beginning with his Ph.D. thesis, Chuck was a pioneer in the emerging field of fission-track thermochronology, a technique for determining the age and thermal history of rocks, which was in its infancy when he began his career. Chuck was an author on more than 330 papers and abstracts reporting the results of his own research. Chuck retired from his long and distinguished career at the USGS in 2005. Along with his wife, Dr. Nancy D. Naeser, he remained in active research as a Scientist Emeritus at the USGS in Reston until the time of his death.

In recognition of his work, Chuck was elected a Fellow of the Geological Society of America (1974), received the Colorado Scientific Society 1980 Best Paper Award, was selected by Life magazine as a member of their hypothetical ideal 15-person international dream team to study the origins of early man (December 1981 issue), and was awarded the Department of Interior Meritorious Service Award (1993). He was elected a Councilor of the Colorado Scientific Society in Denver (1982-1984).
---Don Sweetkind

Frank Adler, 1921-2017 – Obituary

Frank Adler was a member of the Colorado Scientific Society from at least 1993 until his death.



“Frank Adler of Littleton passed away on Friday, February 3th - two days after celebrating his 96th birthday. A native of New York, Frank graduated the Colorado School of Mines in 1945, with a degree as a Geological Engineer. He worked for virtually his entire working career for Phillips Petroleum Company. He contributed to many critically important stratigraphic surveys of North American natural resources. Before and after his retirement, Frank was a fencing instructor for the Mile High Fencing Club, in Lakewood; a volunteer guide for Dinosaur Ridge, in Morrison; a member of the Denver Mining Club and the Colorado School of Mines Alumni Association. He is survived by his daughter, Annette, and his two grandsons, Robert and Sam.

Published in Denver Post from Feb. 10 to Feb. 19, 2017.” From:

<http://www.legacy.com/obituaries/denverpost/obituary.aspx?n=frank-adler&pid=184089333&fhid=31888>

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February’s “Where is this Rock” : I received one very prompt correct reply to this picture, from Dick



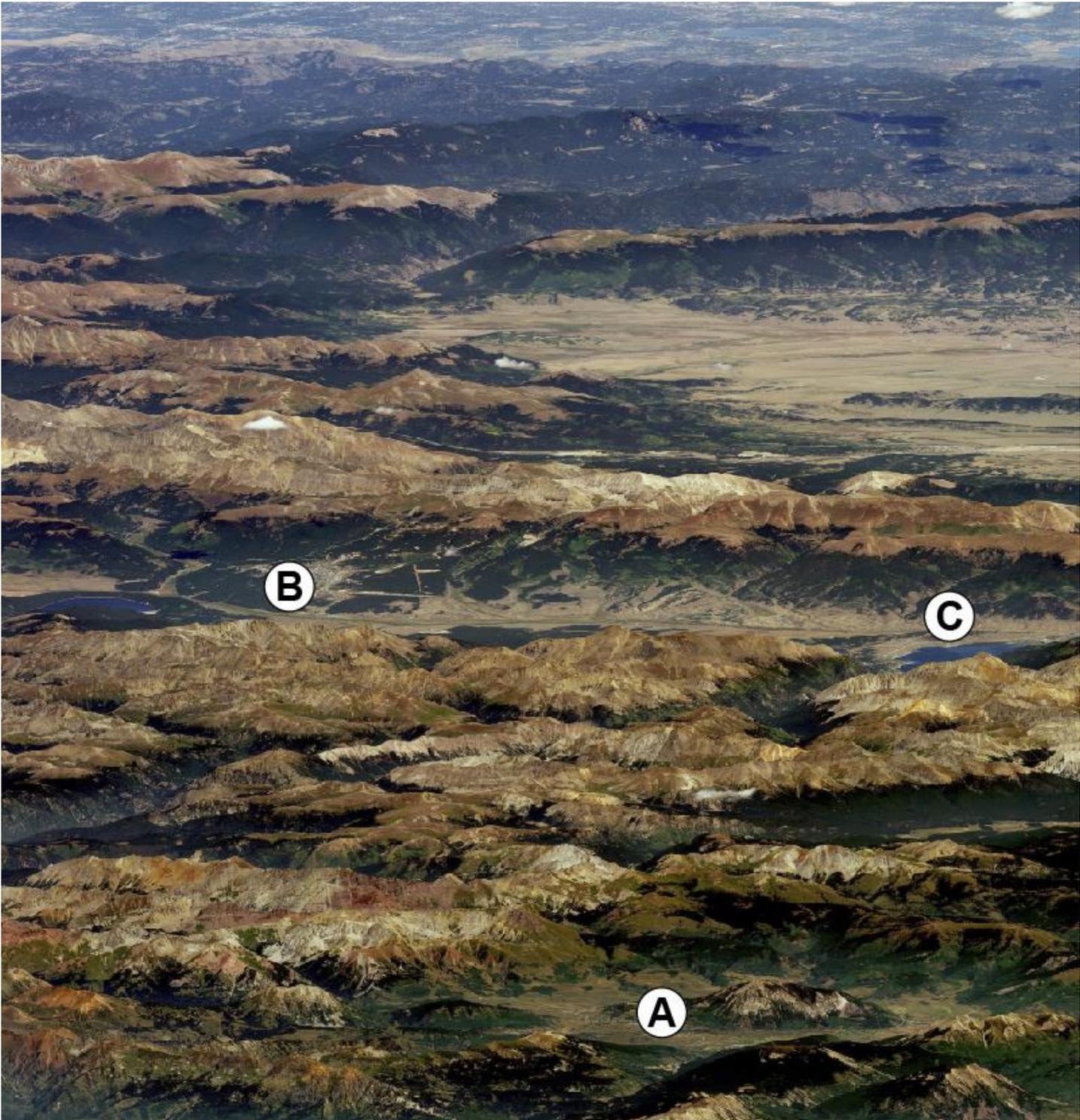
Nielson: “I believe this is a photo taken along the bank of Clear Creek about one mile east of Youngfield Ave. I speculate that it may be some fine grained sediments related to glacial activity deposited in Clear Creek near the end of Rocky Mt. glaciation.” (One earlier guess was Mt. Vernon Creek or Bear Creek.) Dick was quite right about the location. It’s along Clear Creek, just west of Prospect Park,

Wheat Ridge. The gray, fine-grained material forming the bank is part of the Denver Formation—this should be from the Cretaceous part of the section. Overlying it is young stream gravel, Quaternary alluvium, the cobbles of which are eroding off and collecting in the modern stream bed. Just upstream of the site of this photo, outcrops of slightly more resistant sandstone of the Denver Formation forms the bed of the stream, sculpted by the stream flow into fluted channels and potholes, visible when the stream level is low, as it is now.

I have not received any further information or ideas as to what are the odd “tubular” structures in rock from Peña Blanca, New Mexico, pictured in our January “Where is this rock. I’ll share more insight about this, if any is forthcoming!

March “What are these places?” This month, instead of a rock or outcrop to identify, your challenge is to identify the three places that are labeled on the image [contributed by Don Sweetkind] on the following page. Don writes: “This is a low-angle shot of central Colorado captured by DigitalGlobe’s WorldView-3 satellite when it was in orbit at 17,000 miles per hour and 400 miles west of California above the Pacific Ocean. The image is courtesy the “Daily Overview” at www.dailyoverview.com . Please identify: the mountain to the right of the label “A”, the mountain below the label “B”, and the lake below the label “C”. It is cheating if you ask Vince Matthews or Cal Ruleman for the answers! Please email your guesses to pmodreski@aol.com.” Answers next month! [P.S., one more question added by Pete “for extra credit”, name the lake to the left of “B”.]





Colorado Scientific Society dues are \$25 for regular members, **\$20 if dues renewals are paid before Jan. 31 of each year**, \$10 for corresponding members (outside the Colorado Front Range area) and only \$5 for students. A Lifetime Membership is now available, for \$395.00. Mail a check to the CSS or pay with a credit card using PayPal on the CSS website. Please contact CSS Treasurer Don Sweetkind at 303-236-1828 or dsweetkind@usgs.gov if you are uncertain of your dues or membership status. Extra payments to contribute to our Memorial Funds or Endowment Fund are always most welcome; you'll see a list of them on the membership form attached to this newsletter, or see our website at <http://www.coloscisoc.org/membership/dues.html>.

Colorado Scientific Society, P.O. Box 150495, Lakewood CO 80215-0495 <http://www.coloscisoc.org>

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Calendar of Coming Events

Wed., Mar. 15, 4:00 p.m., "Chasing a Geochemical Ambulance--- the Science Behind a Major Lawsuit" by Don Runnells, Professor Emeritus, CU; CU-Boulder Geological Science Colloquium, Benson Earth Sciences Room 180; all are welcome, "refreshments will be served at 3:30 p.m. in the 2nd floor atrium". The talk sounds particularly interesting: "Dr. Runnells has served as a technical expert on numerous legal cases involving the geochemistry of water and wastes associated with mining and other industrial sites. One such case was a lawsuit brought by a group of homeowners against the small mining company that provided the sand aggregate that was used in the exterior stucco on about 600 up-scale houses in Scottsdale, Arizona. Shortly after the houses were completed, unsightly streaks of orange stain began to appear on the exterior stucco walls. All efforts to cover the staining failed and construction experts concluded that the stucco would have to be removed from the homes and replaced with new stucco. The homeowners ultimately filed a lawsuit for \$60,000,000 against the mining company. Dr. Runnells was hired as a consultant by the law firm that represented the mining company. He was asked to investigate the cause of the staining and, if possible, to determine who might have been at fault. Dr. Runnells will take us from the beginning of his investigation to the final results, presenting exactly the same information that he prepared for the jury at trial. The audience will then have a chance to act as members of the jury and vote for the guilt or innocence of the mining company."

Thurs, Mar. 16, 7:00 p.m., monthly meeting of the Colorado Scientific Society, featuring a talk by Will Yeck, National Earthquake Information Center, USGS: **The Far-Reaching Effects of Wastewater Injection: Recent Case Studies of Anthropogenic Earthquakes.** At Shepherd of the Hills Church, 11500 W. 20th Ave., Lakewood. All are welcome. Social time 6:30, meeting begins at 7. See www.coloscisoc.org for an abstract and more info.

Fri.-Sat.-Sun., Mar. 31-Apr. 2, Fort Collins Gem & Mineral Show, sponsored by the Fort Collins Rockhounds Club, at the McKee 4-H Building, Larimer County Fairgrounds/The Ranch, I-25 exit 259. 4-8 p.m. Fri., 9-6 Sat., 10-5 Sun.

Fri., Apr. 7, 3:00 p.m., Reef Communities from the Great Lakes of the Eocene, by Mark Loewen, Univeristy of Utah. Denver Museum of Nature & Science Earth Sciences Colloquium, VIP Room, DMNS, all are welcome, Museum admission not required to attend.

Thurs., Apr. 13, 7:00 p.m., Heritage Exhibit Lecture at the Western Museum of Mining and Industry, Colorado Springs: Mindy S. Vogel, Geologist, U.S. Forest Service, **"Rock, Paper, Forest Service: A Summary of Mining and Permitting on Forest Service Lands."** A Heritage Lecture to accompany the new temporary exhibit (Feb. 9 – June 3), **"Minerals We Use Everyday: Mined from Our National Forests"**. To attend this free lecture, please call 719-488-0880 or respond by e-mail at rsvp@wmmi.org (a 6 p.m. reception will probably precede the lecture). For more information see the WMMI website, <http://www.wmmi.org/home> .

Fri., Apr. 14, 6:45 p.m., North Jeffco Gem & Mineral Club Silent Auction. APEX Community Center, 6842 Wadsworth Blvd., Arvada. Setup at 5:30, auction begins at 6:45. All are invited.

Fri.-Sat.-Sun., Apr. 14-17, Colorado Mineral and Fossil Spring Show, Crowne Plaza Hotel - Airport, 15500 E. 40th Ave. Denver, CO; 9 a.m. to 6 p.m. Fri. & Sat., 9-5 Sunday. Free admission. See <http://www.rockygems.com/colorado-mineral--fossil-spring-show-2017.html> .

Saturday evening at the show, 6-9 p.m., will be the **2nd Annual Colorado School of Mines Geology Museum Fundraiser & Social**, including a silent & vocal auction.

Thurs, Apr. 20, 7:00 p.m., monthly meeting of the Colorado Scientific Society, featuring a talk by Scott Denning, Atmospheric Sciences, Colorado State University, “**Climate models and global change**”. At Shepherd of the Hills Church, 11500 W. 20th Ave., Lakewood. All are welcome. Social time 6:30, meeting begins at 7. See www.coloscisoc.org for more info.

Sat., Apr. 22, 9 a.m., an **Earth Day Geology Hike on North Table Mountain**, to include seeing the Table Mountain lava flows, the Denver Formation, and the zeolite locality in the middle lava flow at a former paving stone quarry. A 1.3-mile hike each way; meet at 9 a.m. at the trailhead at Easley Way & Ulysses Way, on the southeast side of North Table Mountain. To be led by Pete Modreski, USGS. For more info contact pmodreski@usgs.gov, 303-202-4766.

Sun., Apr. 23, noon (lunch), 1 p.m. (lecture), “**Geology of South Park**”, presentation at the monthly meeting of the Florissant Scientific Society, by Peter Barkmann, Colorado Geological Survey. Probably to be held at the Dinosaur Ridge, Dinosaur Discovery Center, Morrison. See <http://www.fss-co.org/> for details. All are welcome. Peter plans to follow up this talk by leading a 1-day geology field trip across South Park, tentatively scheduled for Sunday, June 25.

Sat.-Sun., April 29-30, 9 a.m. – 4 p.m., “**Announcing another ridiculously exciting Book/Garage Sale**” at the **Colorado School of Mines Geology Museum** 1310 Maple St., Golden. “Thousands of maps; hundreds of books, journals, minerals, fossils, etc. Prices vary by item or box. Most prices will drop throughout the event. Information: 303-273-3815.”

Sat., May 13, Dinosaur Discovery Day – Boy Scout Day at Dinosaur Ridge, Morrison, CO. Scouts as well as the public are invited.” Parking will be off-site at the Bandimere Speedway overflow lot located east of C-470 and south of Alameda along S. Rooney Road. Signs will be posted. Parking is \$5 per car, paid as you enter. More than 80 earth scientists and other volunteers, including certified Merit Badge Counselors, assist with the event.” There is a registration fee for participating Scouts, and a \$4 per person charge for persons (over age 3) who wish to take a bus tour of the ridge (no charge for just a walking tour). For full information see <http://www.dinoridge.org/scoutdays.html#bsa> . The next Dinosaur Discovery Day will be Saturday, June 10.

Sat., May 13, Friends of Mineralogy, Colorado Chapter, Silent Auction. Clements Community Center, 1580 Yarrow St., Lakewood CO, 12:00-4:00 (setup begins at 10:30 a.m., auction begins at 12:00, verbal auction 1:00, all tables will close by 3:00 p.m., checkout follows).

Fri.-Sat.-Sun., June 2-4, Pikes Peak Gem & Mineral Show, sponsored by the Colorado Springs Mineralogical Society. At Mortgage Solutions Financial Expo Center, 3650 N. Nevada Ave., Colorado Springs.

Fri.–Mon., July 21-24, Gold and Silver Deposits in Colorado, a symposium cosponsored by the Friends of the Colorado School of Mines Geology Museum and DREGS (Denver Region Exploration Geologists Society). “The event will feature two days of talks (July 22 - 23) and two days of field trips (July 21 and 24) to historic Colorado gold and silver mining areas.” **Call for Papers:** Proposals to give a presentation at the symposium are due by March 15; submit to Pete Modreski, pmodreski@usgs.gov.

2017 DMNS EARTH SCIENCES COLLOQUIUM SERIES

Location: Denver Museum of Nature & Science, VIP Room (Enter the museum and make a hard left, pass the gift shop on your right, bathrooms on the left, and then the TRex Café on the right; the VIP room is at the far NE corner of the museum, just past the set of 3 TRex Café cash registers). Time: 3:00 - 4:00pm. * Museum admission not required to attend *

Fri., Apr. 7, Mark Loewen (University of Utah), **Reef Communities from the Great Lakes of the Eocene**

Fri., May 12, Simone Hoffman (New York Institute of Technology), **The Evolution of Sensory Systems in Mammals**

Mon., May 22, William Clyde (University of New Hampshire), **Hyperthermals: Extreme Global Warming Events in the Geological Past**

Fri., Sept. 22, Raymond Rogers (Macalester College), **Twenty Years of Paleontological Adventure & Discovery on the Great Red Island, Madagascar**

Mon., Oct. 9, Graham Young (Manitoba Museum), **Tropical fossils from the edge of the Arctic**
Thurs., Nov. 2, Jaelyn Eberle (University of Colorado, Boulder), **Life at the Top of the Eocene Greenhouse World**
Tues., Dec. 5, Ellen Currano (University of Wyoming), **Seeing the forest through the leaves - from Ethiopia to the Rocky Mountains**

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For more lecture series during the year see:

Colorado Café Scientifique in Denver, monthly lectures on science topics held either at Blake Street Station or Brooklyn’s, Denver; open to the public, no charge other than refreshments you may choose to purchase; see <http://cafescicolorado.org/> .

CU Geological Science Colloquium (Wednesdays, 4 p.m.) see <http://www.colorado.edu/geosci/colloquium.htm>

CSU Dept. of Geoscience Seminars (Fridays, 4 p.m.), see <http://warnercnr.colostate.edu/geo-news-and-events/department-seminars>

Van Tuyl Lecture Series, Colorado School of Mines, (Tuesdays, 4 p.m.): http://inside.mines.edu/GE_Lecture-Series

Denver Mining Club (Mondays, 11:30), see <http://www.denverminingclub.org/>

Denver Region Exploration Geologists Society (DREGS; 1st Monday, 7 p.m.), <http://www.dregs.org/index.html>

Florissant Scientific Society (FSS); meets monthly in various Front Range locations for a lecture or field trip; meeting locations vary, normally on Sundays at noon; all interested persons are welcome to attend the meetings and trips; see <http://www.fss-co.org/> for details and schedules.

Rocky Mountain Map Society (RMMS; Denver Public Library, Gates Room, 3rd Tuesday, 5:30 p.m.), <http://rmmaps.org/>

Western Interior Paleontology Society (WIPS; Denver Museum of Nature & Science, 1st Monday, 7 p.m.), <http://westernpaleo.org/> .

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New CSS Officers for 2017 (elected at the December 21, 2016 meeting)

President..... Marith Reheis, 303-277-1843, marith16@gmail.com
 President Elect..... Bob Raynolds, bob.raynolds@dmns.org
 Past President..... Peter Barkmann, 303-384-2642, barkmann@mines.edu
 Secretary..... Lisa Fisher, 303-215-0480, lisa.fisher@alumni.mines.edu
 Treasurer..... Don Sweetkind, 303-236-1828, dsweetkind@usgs.gov

Councilors

2015-2017: Bruce Geller, bgeller@mines.edu, 303-273-3823
 2015-2017 Pete Modreski, pmodreski@usgs.gov, 303-202-4766
 2016-2018: Linda Barton Cronoble, lbarton1611@gmail.com, 720-338-1237
 2016-2018: Melissa Foster, melissa.ann.foster@gmail.com, 707-498-2484
 2017-2019: Jim Reed, jim@rockware.com
 2017-2019: Chris Morrison, chris-morrison@comcast.net

Committee Chairpersons

Database Manager: Paul Morgan, 303-384-2648, morgan@mines.edu
 Field Trip Chair: Cal Ruleman, 303-236-7804, cruleman@usgs.gov
 GSA Meeting Co-chairs, Lisa Fisher & Libby Prueher
 History Chair: Beth Simmons, cloverknoll@comcast.net
 Hospitality Chair: Linda Barton Cronoble, 720-338-1237, lbarton1611@gmail.com
 Membership Chair: Bob Raynolds, bob.raynolds@dmns.org
 Newsletter Editor: Pete Modreski, 303-202-4766, pmodreski@aol.com or pmodreski@usgs.gov
 Outreach Chair: open
 Past Presidents’ Best Paper Award, Peter Barkmann, 303-384-2642, barkmann@mines.edu
 Publicity Chair: open

State Science Fair: Chuck Weisenberg, 303-238-8806, cweisnrg@msn.com *new volunteers wanted!*
Student Programs Chair: Melissa Foster, Melissa Foster, melissa.ann.foster@gmail.com, 707-498-2484
Student Research Grants Chair: Peter Barkmann, 303-384-2642, barkmann@mines.edu
Webmasters: Chris Morrison, chris-morrison@comcast.net, and Barb Warden, bwarden@tablemtn.com

New CSS Dues Structure

At our January CSS Council meeting, the Council voted to change the dues structure. Regular annual membership will now be \$25 (up from the previous longtime rate of \$20), *however*, any renewing member paying their dues for the upcoming year no later than Jan. 31 of each year, will receive a reduced rate of \$20. A new category of Lifetime Membership has been established, with a onetime payment of \$395.00. The dues rate for Corresponding Members (those who live beyond the Front Range area and who cannot regularly attend meetings) will remain at \$10, and the Student Member rate will remain at \$5. Members are always encouraged to consider making an extra contribution to one of the Society's Memorial Funds or to the Endowment Fund. A membership form showing the new rates was attached to last month's newsletter. You may also pay dues online, at <http://coloscisoc.org/membership-payment/>, with payment by Paypal or credit card, or you may always mail a check to **Colorado Scientific Society, P.O. Box 150495, Lakewood CO 80215-0495**.

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For more news & information about the Society, always check our website, www.coloscisoc.org, or search for us, Colorado Scientific Society, and “like” us on Facebook. Anyone can view our facebook page, whether you have an account or not, at <https://www.facebook.com/groups/511533159044226/>.