



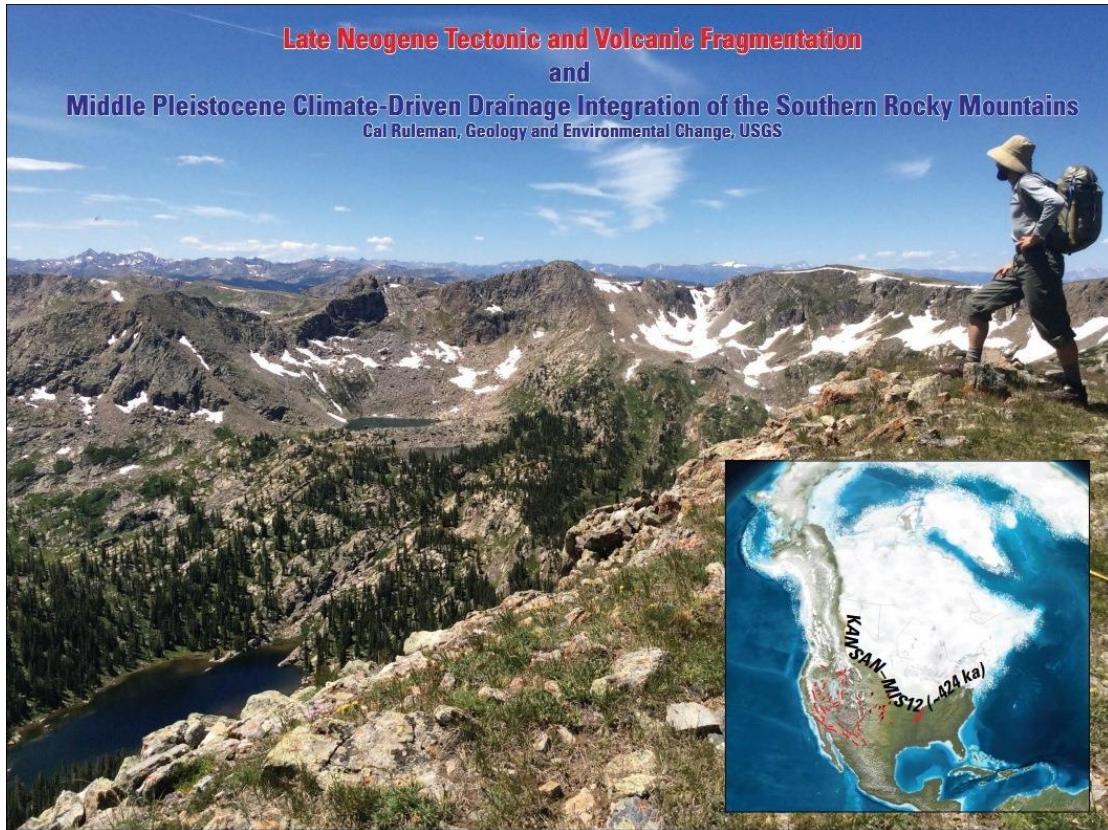
# Colorado Scientific Society

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

**February Meeting, Thursday, Feb. 16, 2017, 7:00 p.m.**  
Shepherd of the Hills Presbyterian Church, 11500 W. 20<sup>th</sup> Ave., Lakewood CO  
Social time beginning at 6:30; meeting & program at 7:00

## Late Neogene Tectonic and Volcanic Fragmentation and Middle Pleistocene Climate-Driven Drainage Integration of the Southern Rocky Mountains

**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, by Cal Ruleman, U.S. Geological Survey**

## **Abstract:**

The southern Rocky Mountains have long been a focus for lithologic, structural, and geomorphic studies. Building on this previous work using newly developed geomorphic, chronologic, geodetic, geophysical, and pedologic analyses, I am developing a unified model to explain the timing and mechanism for regional middle Pleistocene incision, determine regional correlations, and resolve discrepancies between bedrock and surficial geologists. Recent work within the San Luis Valley, Sawatch Range, and upper Arkansas Valley demonstrate a linkage between the Lake Alamosa highstand ~385 ka, maximum basin fill elevation, and deposition of the first Pleistocene diamicton above generally finer-grained deposits of the Santa Fe Group and Dry Union Formation. These boulder diamictons have been previously mapped around the region as QTd or Tg (Quaternary-Tertiary diamicton or Tertiary gravel) depending on the breadth of geologic time the author was familiar with and focusing on. They were also generally interpreted to be the result of rapid tectonic uplift. The presence of ~640 ka Lava Creek B ash in the underlying, lower-energy deposits of the Santa Fe Group provides a maximum age for the diamicton and indicates a <640ka dramatic change in the basin-fill sedimentology leading to deposition of coarse axial gravels linking previously closed, and disconnected intermountain basins adjacent to the high elevations. We interpret these sedimentologic and geomorphic relationships to indicate the regional onset of major middle Pleistocene glacial episodes younger than MIS 16, ~676-621 ka. Within the San Luis Valley, maximum aggradation elevation, basin integration processes, and incision into the Rio Grande gorge occurred even later, <420 ka (MIS 12), coeval to placement of the first diamicton on Poncha Pass. Poncha Pass is where intermountain tectonically-fragmented basin stratigraphy meets the Front Range piedmont Pleistocene stratigraphy along the Arkansas River and through the Royal Gorge. Regional geologic mapping and topographic correlations demonstrate that similar relationships (i.e., coarse bouldery deposits with a silty clay matrix capping interfluves and overlying/pre-dating deeply incised topography) exist in the Aspen region and across South Park, along the Black Canyon of the Gunnison and Eagle River, and potentially adjacent to any region above 3600 m (~12,000 feet).

The geomorphic sequence is as follows: 1) deposition of extensive Rocky Flats-correlative alluvium on adjacent Rocky Mountain piedmonts and continued tectonically-induced aggradation within Rio Grande rift basins (>640 ka)(>MIS 16); 2) eruption of the Lava Creek B tephra from the Yellowstone caldera complex ~640 ka; 3) subtle landscape dissection and deposition of inset Verdos-correlative alluvium containing Lava Creek B ash on piedmonts (i.e., Front Range/Denver , San Juan, Wind River, and Bighorn Basins)(~MIS 15-13, ~621-478 ka; 4) San Luis basin spillover and integration into Rio Grande and widespread deposition of diamicton on Poncha Pass and around the perimeter of high altitude mountains (MIS 12-11, 478-374 ka); 5) intermountain deep-canyon incision and adjacent Front Range and San Juan Basin piedmont incision and widespread deposition of Slocum-correlative alluvium on flanking piedmonts (MIS 11-7, ~374-191 ka). All younger deposits and landforms are deeply inset into the topography and easily distinguishable. Coeval to glacially-induced middle Pleistocene Southern Rockies incision, Great Plains neotectonics and the evolution of the Arkansas River-Sand Creek-South Platte fluvial system can be directly related to the timing of Laurentide “Kansan” glaciation, the southernmost and most expansive Laurentide icesheet during the Pleistocene. Tentative correlations suggest that Front Range Bear and Clear Creek drainages have the same geomorphic sequence, explaining peculiar deposits and geomorphic relations between Green and North and South Table Mountains and the Continental Divide.

## About the speaker:

Cal Ruleman studied geology at the University of Montana and Montana State University and has been performing geological investigations for the last twenty years in various tectonic and geomorphic settings including Montana, Idaho, Wyoming, Nevada, Colorado, New Mexico, Alaska, Suriname, South America, Afghanistan, and Nepal. He joined the U.S. Geological Survey in 2007. His work has ranged from Archean to Holocene with a focus on geomorphology and landscape evolution. In addition to geologic mapping, paleoseismology, and geomorphic analyses, he employs various Quaternary relative and absolute dating techniques including pedology,  $^{3}\text{He}$ -,  $^{10}\text{Be}$ -, and  $^{26}\text{Al}$ -surface exposure dating, and U-Th soil carbonate dating techniques to resolve geologic problems. His geologic mapping and investigations within the Rocky Mountains from western Montana to northern New Mexico address: 1) temporal and spatial migration of intermountain neotectonics, 2) the timing and process of gorge formation and deep incision below glaciated regions, 3) timing of Last Glacial Maximum ~22 ka and rates of deglaciation, 4) timing of onset and sequence of major Pleistocene glaciations of North America, and 5) bedrock structural development of the region over multiple tectonic episodes. Building upon the lithologic, structural, and geomorphic findings of our predecessors, he combines newly developed geomorphic, chronologic, geodetic, paleoseismologic, geophysical, and pedologic analyses to develop unified models explaining the timing and mechanism for regional middle Pleistocene incision, quantifying geomorphic processes, determining regional correlations, and attempting to resolve discrepancies between traditional bedrock and surficial geologists.



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## 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 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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### ***February 2017 President's Message , Marith Reheis, Emeritus, U.S. Geological Survey***



We are off to a good start with an excellent turnout for January's talk by Giff Miller (University of Colorado, INSTAAR) on an Arctic perspective on 20<sup>th</sup> Century warming. This talk provoked a couple of lively discussions and drew in seven new members. Welcome! We'll continue with a thought-provoking effort by Cal Ruleman (USGS) to synthesize new ideas on the late Cenozoic tectonic, geomorphic, and incision history of the entire southern Rocky Mountains—next year, North America! (just kidding) In March, Will Yeck of the National Earthquake Information Center (USGS) will present a timely talk on new research regarding the triggering of earthquakes caused by wastewater injection. I will be taking a vacation from president duties, however, for field work in the Mojave Desert and a 28-day rowing trip through the Grand Canyon.

At least one major field trip is being planned to the White River Plateau and nearby area. This trip will be held on the weekend of August 26-27 and led by James Hagadorn. You may recall that we tried to organize this trip late last summer but most folks were so involved in preparing for the GSA Denver meeting that it didn't happen. The trip will certainly include a look at Devonian strata and fossils, and can also include other possible topics depending on who wants to be involved, such as other Paleozoic units, gypsum quarries near Eagle, glaciation of the White River Plateau, and formation of a coalesced through-going Colorado River. Overnight options include spending the night camping in the Flat Tops or in Deep Creek, or staying in a motel in Eagle. We will keep you posted as plans develop and also on possible day trips in late spring or early summer in the Front Range area.

Unless you were someplace really isolated, you have undoubtedly heard much about the so-called "Women's March" held in Washington and many other places in January. But you may not know that another march is being planned that I would hope all of us, no matter what political persuasion, can and should support: A scientists' march! It is presently in the planning phase, and no date has yet been set. 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

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**January's "What is this rock?"** I have not received any suggestions as to what these structures from Peña Blanca, New Mexico are (one email in response, but, nothing going out on a limb to offer an origin). I have written to the photographer, David Montgomery, and will see if he can give any more details about the location. I hope to follow this up with more info in the future!



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**February, "Where is this Rock?"**: Here is a my rock photo for February, for you to identify the location (and age of) the rocks--or sediments--shown. This time, it is one of my own photos, and it's from right here within the metro area—but where? Write to pmmodreski@aol.com (I'll be out of town, so, any mail to my USGS address won't be read by me till mid-month).



**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](mailto: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

**Thurs., Feb. 2**, 4:00 p.m., Van Tuyl Lecture at Colorado School of Mines, **Vorticity in Structural Geology, an Emerging Concept**, by Lans Taylor, University of Utah. Berthoud Hall Room 241, all are welcome. For the complete Van Tuyl schedule see [http://inside.mines.edu/GE\\_Lecture-Series](http://inside.mines.edu/GE_Lecture-Series).

**Thurs., Feb. 2**, 7:00 p.m., **The end of the Laramide Orogeny as we know it: The switch from porphyry copper to Au/Ag veins**, by William A. Rehrig, exploration geologist. Friends of the Colorado School of Mines Geology Museum's "First Thursday" lecture series on the CSM campus in the Ben H. Parker Student Center, Ballroom E, Maple Street, Golden. Socializing begins at 6:30 PM and the lecture will start at 7:00. Admission is free and all are welcome.

**Mon., Feb. 6**, 7:00 p.m., **Dike Modes Along the Western Continental Margin of South America**, by James M. Wise. DREGS monthly meeting, Berthoud Hall Room 241, Colorado School of Mines, Golden. All welcome.

**Mon, Feb. 6**, 7:00 p.m., **Comparative Trilobite Taphonomy from the Near-shore to Outer Shelf Settings, Latest Early Cambrian of the Southern Great Basin**, by John Foster, Museum of Moab. At the monthly meeting of the Western Interior Paleontologists Society (WIPS), Ricketson Auditorium, Denver Museum of Nature & Science. All welcome.

**Tues., Feb. 7**, 10:00 a.m., **The State-of-the-art of Lunar Science: We've Only Scratched the Surface**, by Justin Hagerty, USGS, Flagstaff, AZ. USGS Rocky Mountain Science Seminar, Building 25 Auditorium, Denver Federal Center. Enter DFC by Gate 1 off Kipling St., enter Building 25 via east side door E-14. Visitors are welcome.

**Tues., Feb. 7**, 3:00 p.m., **Ginkgo CO<sub>2</sub> Barometer**, by Rich Barclay, Smithsonian Institute, the first Denver Museum of Nature & Science Earth Sciences Colloquium for 2017. VIP Room, DMNS, all are welcome, Museum admission not required to attend.

**Thurs., Feb. 16**, 4:00 p.m., Van Tuyl Lecture at Colorado School of Mines, **Meeting the exploration challenge for undiscovered Zn-Pb ores**, by Dave Leach, CSM Dept. of Geology & Geological Engineering. Berthoud Hall Room 241, all are welcome. For the complete Van Tuyl schedule see [http://inside.mines.edu/GE\\_Lecture-Series](http://inside.mines.edu/GE_Lecture-Series).

**Thurs, Feb. 16**, 7:00 p.m., monthly meeting of the Colorado Scientific Society, featuring a talk by Cal Ruleman, USGS, **Late Neogene Tectonic and Volcanic Fragmentation and Middle Pleistocene Climate-Driven Drainage Integration Cenozoic of the Southern Rocky Mountains**. At Shepherd of the Hills Church, 11500 W. 20th Ave., Lakewood. All are welcome. Social time 6:30, meeting begins at 7.

**Sun., Feb. 19**, 12 noon, **New Developments in the Rattlesnake Hills of Central Wyoming**, by Tim Brown, at the monthly meeting of the **Florissant Scientific Society**. "Hear a geologic discussion of the Rattlesnake Hills and get an update on the exploration activities [for gold deposits]." All are welcome. "The FSS is an informal group of people interested in geology and we get together once a month for a talk or a field trip. This is a great group as there are no dues, no officers and no board meetings! We always start these meeting with a pot luck lunch that starts at noon followed by the presentation at 1:00. The talk will probably last around 45 minutes." This month's meeting will take place in the Osborne Center, Room B215, UCCS campus, Colorado Springs (I-25 exit 146, Garden of the Gods Road to Austin Bluffs

Parkway). For more info or exact directions contact Tim at tim@gfgrresources.com or 719-306-3065, or Beth Simmons at [cloverknoll@comcast.net](mailto:cloverknoll@comcast.net).

**Thurs., Feb. 23**, 4:00-6:00 p.m., **Student Research Fair, Colorado School of Mines Dept. of Geology and Geological Engineering & Geophysics**. Ben Parker Student Center, ballrooms A-B-C. Poster presentations by graduate and undergraduate students; all are welcome.

**Fri.-Sat.-Sun., Feb. 24-26**, Gem and Mineral Show, sponsored by the **Denver Gem and Mineral Guild**; Jefferson County Fairgrounds, 10-6 Fri. & Sat., 10-5 Sun.; free admission.

**Sat.-Sun., March 4-5, Journey to the Jurassic – Exploring the Morrison Formation**, WIPS (Western Interior Paleontological Society) 10<sup>th</sup> Founders Symposium. Green Center, Colorado School of Mines campus, Golden.

**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.-Sat.-Sun., Apr. 14-17, Colorado Mineral and Fossil Spring Show**, Crowne Plaza Hotel - Airport, 15500 E. 40th Ave. Denver, CO. See <http://www.rockygems.com/colorado-mineral--fossil-spring-show-2017.html> .

**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.”

## **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 \*

**Tues., Feb. 7**, Rich Barclay (Smithsonian National Museum), **The Ginkgo CO<sub>2</sub> barometer**

**Tues., Feb. 21**, Brent Breithaupt & Neffra Matthews (Bureau of Land Management), **Pterosaur Paleobiology: Insights from Photogrammetric Ichnology**

**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/geolsci/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](http://inside.mines.edu/GE_Lecture-Series)

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

**Denver Region Exploration Geologists Society** (DREGS; 1<sup>st</sup> 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, 3<sup>rd</sup> Tuesday, 5:30 p.m.),

<http://rmmaps.org/>

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

<http://westernpaleo.org/> .

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**Upcoming Science Fairs – Looking for Judges.** Judges (and other types of volunteers too) are being sought for the regional and state science fairs:

**The 2017 Longs Peak Science and Engineering Fair** will be on **Tuesday, February 14**, at the Island Grove Event Center, 425 N. 15<sup>th</sup> Avenue, Greeley (shuttle service will be available from UNC). “We are anticipating higher numbers of grade 5-12 students than we’ve ever had before. Over 400 student researchers from Weld, Larimer, & Jackson County will compete for a chance to move on to state-level competition .The students will present their creative project ideas! Please share this message with anyone who might have an interest in helping with the event, check your schedules and ask for time off that day from your classes or work so that you can lend your expertise to judging and/or project inspections that day. Qualifications: Interest in youth STEM education is a must; a degree in a STEM field is NOT needed or required. Volunteers needed (training provided day of fair) include Project Board Inspectors, 7:15am – 9:00am; Morning Judges, 8:00am – 12:30pm; Afternoon Judges, 12:15pm – 5:00pm; All-Day Judges, 8:00am – 5:00pm. Volunteers may register at [www.lpsef.org](http://www.lpsef.org) .

**The 2017 Denver Metro Regional Science & Engineering Fair** will take place on the CU-Denver campus on **Friday, February 17**. “We are always looking for mentors, volunteers, and judges.” To register as a judge, see <http://denversciencefair.com/> . They ALSO need volunteers to help in advance on their Scientific Review Committee, as well as for Display and Safety, “Wayfinders”, and photographers—all this is on their web page.

**The 2017 Colorado State Science & Engineering Fair** “will be held on **Thursday, April 6** so mark your calendars now! We need you! Grand Awards Judging is an all-day event and judges need to be in attendance at the fair from 10 a.m. - 5:30 p.m.” To sign up as a Grand Award Judge (that’s the name for judges for the main competition) register online at <http://www.csef.colostate.edu/Judges.htm> . Volunteers are also needed for numerous categories of help in addition to judging; see their website for this too. **P.S., CSS members**, if someone would like to assist Chuck Weisenberg in reviewing earth science projects at the State Science Fair for the awards that the Society presents there, please contact Chuck, or contact CSS President Marith Reheis.

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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, cweisnbrg@msn.com  
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](mailto: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 is attached to this newsletter. You may also pay dues online, at <http://www.coloscisoc.org/membership/dues.html>., 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](http://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/>.