

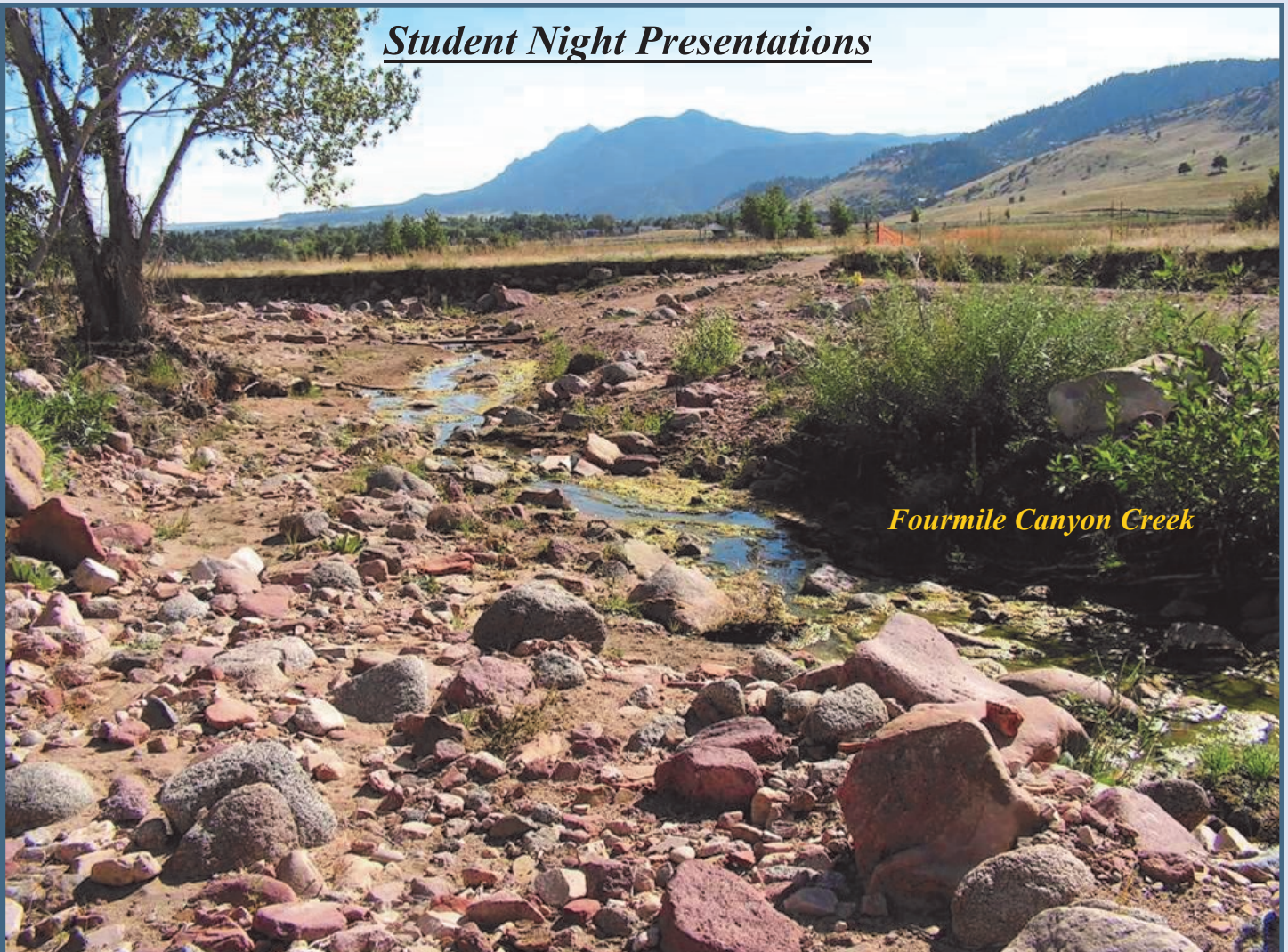


## ***Colorado Scientific Society***

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

*OCTOBER MONTHLY MEETING WILL FEATURE:*

### ***Student Night Presentations***



***Fourmile Canyon Creek***

**Monday, October 13th, 2014**



**Location—Benson 380, University of Colorado, Boulder**



We will load presentations starting at **6:00 pm** and have the main talks (next page) from **6:30-8:30** with 20 minutes per talk including discussion.

***Everyone is Welcome!***

# Student Night Participants and Presentations

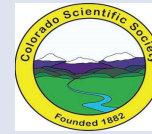
- **Comparison of Economic Risk from Post-Wildfire Debris Flows at Three Sites in the Western United States**  
Kevin McCoy, Department of Geology and Geological Engineering, Colorado School of Mines
- **Changes in Morphology In and Around the North St. Vrain River Due to the September, 2013 Flood**  
Linda Glickstein, Department of Earth Sciences, University of Northern Colorado
- **A Landslide Risk Evaluation and Reduction Matrix for Lower Income Communities in Guatemala City**  
Ethan J. Faber, Department of Geology and Geological Engineering, Colorado School of Mines
- **Lava Lake Thermal Pattern Classification Using Self-Organizing Maps and Relationships to Eruption Processes at Kilauea Volcano, Hawaii**  
Amy M. Burzynski, Department of Earth Sciences, University of Northern Colorado
- **Geology of the North Amethyst Au-Ag Epithermal Deposit, Creede District, Colorado**  
Mario Guzman, Department of Geology and Geological Engineering, Colorado School of Mines,
- **Using Geochemical Indicators to Distinguish High Biogeochemical Activity in Sediments**  
Amy M. Kenwell, Department of Geology and Geological Engineering, Colorado School of Mines







▶ CSS President's Message.....3



▶ Student Night .....2



▶ Calendar of Events.....4 & 5

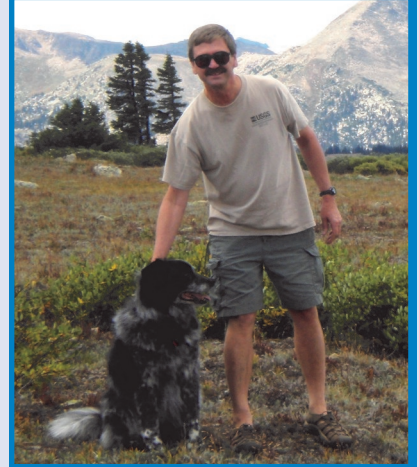


▶ Where Is That Rock?.....3

## CSS President's Message by Scott Lundstrom

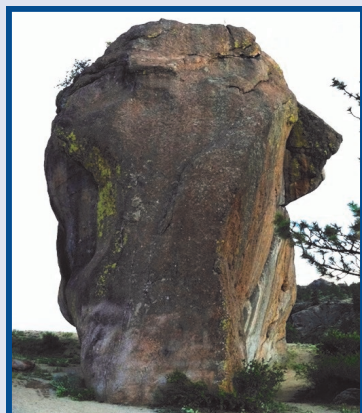
In September, we resumed our Fall Program with an excellent and both historically and scientifically engaging presentation by our Past President Emmett Evanoff. A few days later (and only this past weekend), CSS enjoyed another excellent field trip to view geomorphic effects of last years flood event in Boulder with observational focus and broader discussion along Fourmile Canyon Creek, thanks to leaders and organizers (including Sue, Rich, Pete, Jonathan, Sheila, and Cal) and about 35 participants.

This month we feature two of the major ways that CSS supports and interacts with graduate- and undergraduate- student research of University geoscience departments in our region and beyond. Our Student Night of Monday Oct. 13 will showcase a variety of very interesting talks on active research that address various environmental, engineering, economic, hydrologic, and geomorphic aspects of current geoscience issues. These presentations include several that were presented within the past few weeks at the national meetings of AEG (Association of Engineering Geologists) and SEG (Society of Economic Geologists), as well as some that are scheduled for near future talks such as at AGU. It is mutually beneficial to CSS and students of geoscience departments to support and encourage such quality contributions to Earth science. Our annual Memorial Fund Grants to support student research, as reported in this issue by Matt Sares, Chair of this years Grant Committee, and our Treasurer Don Sweetkind, continues to show our support of geoscience research and training in our Rocky Mountain region. Our support in these ways thus invests in the long term future of Geosciences in our region, and we thank each of our members and contributors to the Memorial Funds.

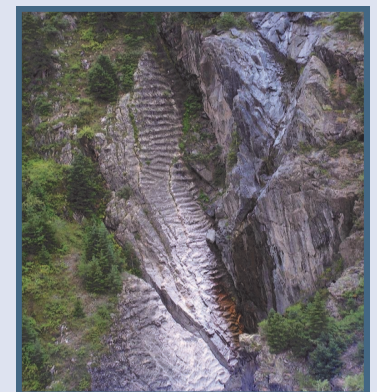


## Where is this Rock? By Pete Modreski

**This month's picture** is a bit of a "Colorado classic" exposure. If you have a guess, or a certainty about the location (and age) of this rock, write to Linda, [lbarton1611@gmail.com](mailto:lbarton1611@gmail.com). The first one (or more) to respond correctly will have their name "proudly splashed" in next month's newsletter.



**September's picture** was a follow-up to our December 2013 photo, which was a view through multiple road tunnels (first built for the Colorado Midland Railroad) through granite ridges along Chaffee County Road 371 just north of Buena Vista, and which I noted in the January answer, are located just south of "Elephant Rock". September's photo was thus of Elephant Rock itself—looking south, at the northbound elephant. In my January answer I said that I thought the rock was 1.7 Ga granodiorite, but I learned that this was slightly off. Rick Moscati (USGS) wrote back that he had dated, by zircon U-Pb SHRIMP, a sample of granite from Elephant Rock which Karl Kellogg supplied, and gave a concordia age of 1438 +/- 7 Ma.. Hence, it is one of the "Silver Plume age" (Berthoud Plutonic Suite) granites, not 1.7 Ga as I had tried to interpret from the adjoining quad's geologic map. Thanks, Rick!



# Student Research Grants Awarded from CSS Memorial Funds, Spring 2014

By Don Sweetkind and Matt Sares

Over the past 25 years, the Colorado Scientific Society has helped support the graduate research of over 250 students, awarding a total of over \$200,000 (an average of over \$800 per grant). This achievement is extraordinary for an organization of our size and, through member contributions, exemplifies the commitment of our members to promote high-quality research in the earth sciences. The five funds that award grants for student research are: the Tweto Fund for research in the Rocky Mountains; the Oriel Fund for research in the central and northern Rocky Mountains; the Eckel Fund for research in engineering geology; the Snyder Fund for research on Precambrian geology of the Rocky Mountains; and the Pierce fund for research on the Heart Mountain fault and Quaternary geologic problems.

This year we received 27 applications for Memorial Funds grants and we were able to provide research funds to 19 of those applicants. We awarded a total of \$12,300: \$3,400 from the Tweto Fund, \$2,300 from the Snyder Fund, and \$2,200 each from the Eckel, Oriel, and Pierce Funds. Overall, grants were awarded to 7 PhD, 10 Master's, and 2 Bachelor's degree students. The review panel, consisting of Matt Sares, Pete Modreski, and Lisa Fisher had the pleasure of reviewing the proposals and had a difficult time determining the "best" proposals because all were top-notch. In the below list, student grant awardees are listed with their degree program, university, and the title of the research project.

## **Eckel Fund**

**Melissa Foster**, PhD (CU), Fire and Flood: Calculating erosion rates associated with the Boulder Flood, 2013

**Derek Schook**, PhD (CSU), Using dendrochronology to extend Rocky Mountain river discharge records and understand floodplain geomorphology

**Scott Shahverdian**, MS (CSU), Mechanisms and controls on post-fire sediment storage and evacuation, South Fork Cache la Poudre Basin, CO

## **Oriel Fund**

**Kendra Johnson**, PhD (CSM), Degradation of the Hebgen Lake rupture (Montana) and application of diffusion coefficients to undated scarps in the N Rocky Mountains and Mongolia

**Dale Malinzak**, PhD (S.D. Mines & Tech), Vertebrate Paleontology, Paleobiogeography, and Paleocology of Late Maastrichtian Laramidia and Statistical Analysis of its Bearing on Hypotheses of Faunal Provinciality

**Trevor Atkinson**, MS (Utah St), Geochemical and Geophysical Characterization of the Mountain Home Air Force Base Geothermal Resource

**Doug Nichols**, BS (Colo. Mesa U), Age revision of the Miocene Browns Park Formation and Oligocene Bishop Conglomerate based on new detrital zircon studies, northwest Colorado

## **Pierce Fund**

**Hal Wershow**, MS (W. Washington U), Holocene glacial and paleoclimate reconstructions for the Lyman Glacier and the North Cascades, Washington

**Dan Scott**, MS (CSU), Physical Controls on Delta Formation and Carbon Storage in Mountain Lakes

**Nick Sutfin**, PhD (CSU), Geomorphic controls on floodplain sediment aggradation and riparian carbon retention in mountainous headwater streams of the Colorado Front Range

## **Snyder Fund**

**Victor Guevara**, PhD (Virginia Tech), Laurentia's oldest granulites? Probing for metamorphic evidence of collisional orogenesis on early Earth

**Tyson Berndt**, MS (KU), Metamorphic and structural evolution and provenance of the Blue Ridge area, Fremont County, Colorado

**Mario Guzman**, MS (CSM), Fluid Evolution and Gold Deposition of the North Amethyst Vein System, Creede District, Colorado

**Dominic Pyanoe**, MS (CSU), Fluid evolution in the polymetallic vein fields of the Montezuma Mining District, Colorado and exploration implications for a possible underlying base metal porphyry

## **Tweto Fund**

**Jordan Dickinson**, BS (Baylor), A seismo-lineament study of selected earthquakes near Trinidad, southern Colorado

**Josh Johnson**, MS (CU), New ways to decipher the past: Exhumation constraints on the Colorado Front Range by testing and developing helium thermochronometers

**Meredith Bush**, PhD (UT-Austin), Depositional Response of Southern Laramide Basins to Paleogene Tectonic Reorganization of North America: Evolution of the Galisteo-El Rito & Raton Basins

**Crystal Rauch**, MS (CSU), San Juan Formation: Evidence for pyroclastic origins of thick and extensive conglomerate

**Rachel Swihart**, MS (Bowling Green), Origin of Topaz Bearing Rhyolite Lava Domes: Geochemical Investigation of the Nathrop Volcanics

# Calendar of Events— October 2014

Colorado Scientific Society's regular meetings are held the 3rd Thursday of the month at the Shepherd of the Hills Presbyterian Church, 11500 West 20th Ave., Lakewood, CO.  
Unless otherwise advertised- Social time begins at 6:30 p.m. and talks start at 7:00 p.m.  
For more information, contact Scott Lundstrom, 303-917-2849, [pslundstrom@msn.com](mailto:pslundstrom@msn.com).

## Upcoming CSS Meeting Presentations:

**Monday, October 13th, 6:00 p.m. Student Night Presentations; Location—Benson 380, University of Colorado, Boulder**

We will load presentations starting at 6:00 pm and have the main talks below from 6:30-8:30 with 20 minutes per talk including discussion

Free admission. Public welcome!

## *OTHER EVENTS:*

**Thurs., Oct. 2, 4:00 p.m., Van Tuyl Lecture Series at Colorado School of Mines. Lecture- “Using Coupled Landscape, Atmosphere, and Socioeconomic System Models to Examine Water Sustainability Across the High Plains Aquifer.”** Speaker- David Hyndman, Michigan State University. Location- Berthoud Hall, Room 241, Golden. See- [http://inside.mines.edu/GE\\_Lecture-Series](http://inside.mines.edu/GE_Lecture-Series) for the full fall schedule.

**Fri., Oct. 3, 4:00 p.m., CSU Department of Geosciences Seminar. Lecture- “Do Precambrian Stromatolites Hold Clues to Continent Orientation and the Dynamics of the Ancient Earth-Moon System? Modeling and Measuring the Morphology of Fossil Algal Structures.”** Speaker- Gregory Ojakangas, Drury University. Location- Warner College of Natural Resources (NR) Building, Room 320, Fort Collins. For the full schedule see- <http://warnercnr.colostate.edu/geo-news-and-events/departments-seminars>.

**Tues., Oct. 7, 6:00 p.m., Metropolitan State University AIPG Student Chapter. Lecture- “The Science Behind Fracking.”** Speaker - Robert Single, Anadarko Petroleum. Location- Tivoli Turnhalle Auditorium, 900 Auraria Pkwy., Denver. Please RSVP by October 2<sup>nd</sup> as this event is by RSVP only. To reserve your spot, please send an email to [aipg.msudenver@gmail.com](mailto:aipg.msudenver@gmail.com) along with any question about fracking you would like answered during the Q&A session.

**Wed., Oct. 8, 4:00 p.m., CU Boulder Geological Sciences Colloquium. Lecture-“Fault Zone Geometry and Mechanics from Ground Based LiDAR and Other Profiling Tools.”** Speaker- Jamie Kirkpatrick, CSU. Location- Benson Earth Sciences Building Auditorium, Room 180, Boulder. Refreshments will be served at 3:30 on the 3rd floor. For the schedule of all upcoming talks see- <http://www.colorado.edu/geosci/colloquium.htm>. All are welcome

**Thurs., Oct. 9, 4:00 p.m., Van Tuyl Lecture Series at Colorado School of Mines, “Depositional Environments of Black Shales and The Anoxic-Dysoxic Dispute – The Williston Basin of North Dakota, USA, During Upper Bakken Times as a Key Example.”** Speaker- Sven Egenhoff, Colorado State University. Location- Berthoud Hall room 241, Golden. See- [http://inside.mines.edu/GE\\_Lecture-Series](http://inside.mines.edu/GE_Lecture-Series) for the full fall schedule.

**Fri., Oct. 10, 4:00 p.m., CSU Department of Geosciences Seminar. Lecture- “Subsurface Geological Features Associated with the 2011 Mw5.8 Central Virginia Earthquake Revealed by Magnetic, Gravity, and Radiometric Surveys.”** Speaker- Anjana Shaw, U.S. Geological Survey. Location- Warner College of Natural Resources (NR) Building, Room 320, Fort Collins. For the full schedule see- <http://warnercnr.colostate.edu/geo-news-and-events/departments-seminars>.

**Fri., Oct. 10, DIPS October Luncheon. Location- Wynkoop Brewing Company, 1634 18th St., Denver. Lecture-“Mystery of the Nile.”** Speaker- Pasquale Scaturro, Explorer, Adventurer, and Geophysicist. Members generally arrive at 11:30 am with the lunch buffet starting at noon. The talk generally starts at 12:20 pm to 12:30 pm and goes for 20 to 30 minutes. The cost for the lunch and talk is \$20 for members and \$24 for non-members. It is \$5 for just the talk. This will be based on his award winning IMAX film and book.

**Sat., Oct. 11, 10 a.m.- 2 p.m.. Friends of Dinosaur Ridge. The Last Dinosaur Discovery Day of the Year!** Location- Dinosaur Ridge, 16831 W. Alameda Parkway, Morrison, CO. Featuring- National Fossil Day and Girl Scout Day. You may stop either at the Dinosaur Ridge Visitors Center, or the new Discovery Center on the west side of Dinosaur Ridge, at the north entrance to Red Rocks Park. See- [www.dinoridge.org](http://www.dinoridge.org) for more info.





## Other Events Continued...

**Mon., Oct. 13, 11:30 a.m., Denver Mining Club. Lecture—"The Making of a Mine: Victor Project, Cripple Creek, Colo."** Speaker- Bill Reid. Location- Golden Corral Buffet & Grill, 3677 S. Santa Fe Dr., Sheridan. Purchase of buffet lunch is required. All are welcome. For full schedule see- <http://www.denverminingclub.org/>.

**Mon., Oct. 13, 6:00 p.m., CSS Student Paper Night, Benson Earth Sciences Building, Room 380, CU Boulder.**

**Wed., Oct. 15, 4:00 p.m., CU Boulder Geological Sciences Colloquium. Lecture—"TIMS U-Pb Work on Dating K-feldspar Porphyroblast in Pluton to Determine Their Growth Rate, and thus the Growth History of a Pluton."** Speaker- Mélanie Barboni, UCLA. Location- Benson Earth Sciences Building Auditorium, Room 180. Refreshments will be served at 3:30 on the 3<sup>rd</sup> floor. For the schedule of all upcoming talks see- <http://www.colorado.edu/geolsci/colloquium.htm>. All are welcome.

**Sat., Oct. 18, 6 pm- 9 pm. Rock Out for the Ridge 25th Anniversary Celebration of the Friends of Dinosaur Ridge. Location- Pinehurst Country Club, 6255 West Quincy Avenue, Denver. Lecture—"The Power of Dinosaurs." Speaker- Dr. Scott Sampson, author of "Dinosaur Odyssey." Dinner-\$75; Dinner with Dr. Sampson-\$150. Silent auction, live auction, and raffle of two custom made Adirondack chairs. Raffle tickets are \$5.00 each and are available at FODR Visitor Center, Discovery Center, and Rustic Relics Antiques and Minerals. RSVP. For more information contact Clare Marshall, [dinodiscovery@dinoridge.org](mailto:dinodiscovery@dinoridge.org) or call [720-407-8280](tel:7204078280).**

**Tues., Oct. 28, 3:00 p.m., the New Seminar Series at the Denver Museum of Nature and Science, VIP Room. Lecture- "TBD: Paleoclimates."** Speaker- Caspar Ammann, NCAR. See <https://www2.ucar.edu/news/experts/caspar-ammann> for background on the speaker.

### **YOU MAY ALSO BE INTERESTED IN—**

#### **Oct. 19-22, "Lindenmeier: Ancient Lives, Ancient Dreams Symposium in Ft. Collins."**

The symposium celebrating Soapstone Prairie Natural Area's Lindenmeier archeological site, the largest Paleoindian site in North America. This year marks the 80th anniversary of the Smithsonian Institution's visit to the National Historic Landmark. Scientists discovered a Folsom point wedged into an ancient bison bone at Lindenmeier, helping to prove the presence of humans at the location at least 10,000 years ago. The symposium, featuring Edwin N. Wilmsen as the keynote speaker (co-author with Frank H.H. Roberts of Lindenmeier: Concluding Report of Investigations). Registration and details are at [www.fcmod.org](http://www.fcmod.org).

#### **Additional Speakers-**

- Dr. Edwin Wilmsen, co-author of the "Lindenmeier Final Report," visiting from Scotland.
- Dr. Jason LaBelle, of Colorado State University, about current research onsite and the history of Lindenmeier
- Dr. Frederic Sellet, about the "Smithsonian Natural History Museum's Lindenmeier Collections."
- Dr. Nicole Waguespack of Kansas State University, about "Colorado Folsom-era Paleoindians at Barger Gulch."
- Dr. Cody Newton, Ph.D candidate, about the "Denver Museum of Nature and Science Lindenmeier Collections."
- Dr. Pegi Jodry of the Smithsonian, about "Stewart's Cattle Guard and Paleoindian Spirituality."
- Dr. Dennis Stanford of the Smithsonian, about the "Peopling of North America."
- Bridget Ambler, Curator, Anasazi Heritage Center.
- Local historians, museum curators and natural areas department staff.

The symposium is a once in a lifetime opportunity and includes presentations and panel discussions at the Northside Aztlan Center, a reception at the Fort Collins Museum of Discovery including a behind the scenes tour, a banquet at Rio Grande Restaurant with keynote speaker Edwin Wilmsen, an exhibit recreating the Smithsonian's Director's Tent, and a field trip to the Lindenmeier site and Soapstone Prairie Natural Area. Registration is \$175, and includes presentations Sunday through Tuesday, snacks, field trip (transportation/food not provided), dessert reception and banquet. Register at- [www.fcmod.org](http://www.fcmod.org). A variety of events and activities focusing on Soapstone Prairie Natural Area's historical and natural importance are being offered throughout 2014. For a full listing of events and activities, visit- [NatureTracker.fcgov.com](http://NatureTracker.fcgov.com), call 970-416-2815, or email- [naturalareas@fcgov.com](mailto:naturalareas@fcgov.com).

**Brilliant: Cartier in the 20th Century;** A special exhibition at the Denver Art Museum, November 16, 2014 – March 15, 2015. "The DAM will host the world-exclusive exhibition of Brilliant: Cartier in the 20th Century, featuring stunning jewelry, timepieces, and precious objects created between 1900 and 1975. This exhibition highlights Cartier's rise to preeminence, and the historical events pushing the brand's evolution as it transformed itself into one of the world's most prestigious names in jewelry and luxurious accessories. Organized by the DAM, the exhibition will be on view in the Anschutz and Martin and McCormick Galleries, on level two of the Hamilton Building. Special exhibition tickets will go on sale October 1st.. Reservations now can be made for groups of 10 or more. See- <http://www.denverartmuseum.org/exhibitions/brilliant-cartier-20th-century>



**\*\*Necklace worn by Countess of Granard, by Cartier London, Special Order, 1932, constructed of platinum, diamonds, and emerald (height at center 8.80 cm.) Photo: Vincent Wulveryck, Cartier Collection © Cartier.**





## Oct. 12-18 is International Earth Science Week

There should be some locally sponsored events; see <http://www.earthsciweek.org/> for these once they are posted, and much other info. Pete Modreski will lead two free public geology hikes for Earth Science Week: Green Mountain, Lakewood, 3:30 p.m. on Saturday, Oct. 11; and South Table Mountain, Golden, at 4:30 p.m. on Tuesday, Oct. 14. Please contact Pete, [pmodreski@usgs.gov](mailto:pmodreski@usgs.gov), if interested. For educators, **AGI Earth Science Week 2014 Teacher Packets** ("Toolkits") are available free courtesy of the USGS, for as long as the supply lasts (they are going fast). You may pick one up either at the USGS Library, located in Building 20, Denver Federal Center; or at Dinosaur Ridge, either at the main Visitor Center at 16831 W. Alameda Parkway, Morrison, or the new Discovery Center on the west side of Dinosaur Ridge at the Red Rocks Park north entrance (entrance #1). The 2014 ESW Packet theme is "Earth's Connected Systems", and includes posters and other educational material on Geologic Time, Caves, Climate, Evolution, Petroleum, Soil Science, Dinosaurs, Gemstones, an earth science calendar, and a pocket field notebook!

**Sat., Oct. 11, 3:30 p.m., Pete Modreski, USGS, will lead a free public Earth Science Week geology hike on Green Mountain, Lakewood CO, to examine local geology including petrified wood.** Meet at the Hayden Green Mountain Park trailhead on Alameda Parkway near W. Florida Dr. The round trip hike (about 3.5 miles, 600 feet climb) should take about 2.5 hours (sunset is 6:30). Contact Pete at [pmodreski@usgs.gov](mailto:pmodreski@usgs.gov).

**Mon, Oct. 13, 6:00 p.m., Cañon City Geology Club. Lecture- "The Fantastic Varied Geology of Big Horn Sheep Canyon."** Speaker- Dr. Robert Hickey, Salida Colorado Parks & Wildlife. Bob will provide an explanation of the geology of the Big Horn Sheep Canyon between Cañon City and Salida, including metamorphic rocks, the lower Paleozoic sedimentary rock column, rarely exposed Precambrian rocks, visible faults, magnificent folds, and other landforms. Everyone is welcome. Business meeting at 6:00 pm. Speaker at 7:00 pm. First United Methodist Church Fellowship Hall, northwest corner of 9th St. and Main, Cañon City. For more information call 719-275-9781.

**Wed, Oct. 15, 4:30 p.m., Free Public Geology Hike for Earth Science Week: South Table Mountain, Golden.** A short hike to the top of "Castle Rock" overlooking Golden, to see the Table Mountain lava flow and sedimentary rock of the Denver Formation. A 525 foot climb in 1/2 mile of trail. Meet at the trailhead at 18<sup>th</sup> and Belvedere Streets, Golden. For more information contact- [pmodreski@usgs.gov](mailto:pmodreski@usgs.gov).

**Sat., Oct. 18, 10:00 a.m., Free Public Lecture- "Cripple Creek's Foundation of Fortune: The 1894 Cross and Penrose Geological Survey."** Speaker- Steven Veatch. Location- The Cripple Creek & Victor Gold Mining Company (CC&V) Visitors Center, 371 E. Bennett Ave., Cripple Creek, CO. Limited seating, so please RSVP to 719-689-2341. "After the presentation, CC&V will pay admission for presentation attendees to visit the Cripple Creek Museum to see their Cross-Penrose Rock Collection."



### ***What is Earth Science Week?***

Since October 1998, the [American Geosciences Institute](http://www.american-geosciences.org/) (AGI) has organized this national and international event to help the public gain a better understanding and appreciation for the Earth Sciences and to encourage stewardship of the Earth. Traditionally held in the second full week of October, **Earth Science Week** encourages the understanding and promotion of earth science at local, state, national and international levels.

2007 marked the tenth annual Earth Science Week. Each year, AGI organizes Earth Science Week as a service to its member societies, with generous help from major partners which provide funding, donated materials, organize events and publicize the celebration. Continuing partners include the [United States Geological Survey](http://www.usgs.gov/) (USGS), the [American Association of Petroleum Geologists](http://www.aapg.org/) (AAPG) Foundation, the [National Park Service](http://www.nps.gov/) (NPS), [NASA](http://www.nasa.gov/), and [NOAA](http://www.noaa.gov/).

People in all 50 states and in more than five countries have participated in Earth Science Week events and activities, ranging from educators teaching Earth science activities in their classrooms to open houses held at major USGS field stations. State geological surveys are also key participants, and are responsible for having official proclamations issued by their state's governor.

## *CSS Sponsored Summer/Fall Field Trip*

### **CSS “Boulder Floods of Sept. 11-15 2013 and Impact on Landscape” Field Trip**

Our Sept. 27 Boulder field trip was very successful. Over 30 people met at Foothills Community Park at the northwest edge of Boulder (I think I counted 34), where we were shown maps, charts, and flood aftermath on-site in the field by quite a large and a well-informed group of co-leaders who have studied either the floods and debris flows themselves, or past flooding as recorded in Quaternary sediments and soils in the Boulder area. The co-leaders included Rich Madole (USGS emeritus), Peter Birkeland (CU emeritus), Sue Hirschfeld (CSS), Sheila Murphy (USGS), Jonathan Godt (USGS), Dave Sutherland (Boulder Open Space), Melissa Foster (CU grad student), Ralph Shroba (USGS), Elizabeth Black, and Cal Ruleman (USGS and CSS field trip chair, who said his job was easy, he only had to coordinate logistics). We took two trail walks in the open space areas that are part of Foothills Park, including the Old Kiln Trail along Fourmile Canyon Creek just south of Lee Hill Road, and saw old (Pleistocene) landslide deposits on the east side of the Dakota Hogback, the scars and courses of debris flows produced by the 2013 floods including one or two that “just missed” houses, the erosion and sediment deposits produced by the floods, and the older soil profiles nicely exposed by these events. The trip included clarifying the difference between a debris flow (fast, dense, turbulent) and an earthflow (slow, doesn’t really “flow”), and we learned the difference between Fourmile Creek and Fourmile Canyon Creek—two totally distinct creeks and watersheds. Peter Birkeland did his best to teach us a little more than we knew before about soils and soil profiles. --- Pete Modreski



*Literature about the 2013 floods:*

*Landslides in the Northern Colorado Front Range Caused by Rainfall, September 11–13, 2013, by Jonathan W. Godt, Jeffrey A. Coe, Jason W. Kean, Rex L. Baum, Eric S. Jones, Edwin L. Harp, Dennis M. Staley, and William D. Barnhart, USGS Fact Sheet 2013-3114, January 2014, 4 p. Online at: <http://pubs.usgs.gov/fs/2013/3114/>*

*New insights into debris-flow hazards from an extraordinary event in the Colorado Front Range, by Jeffrey A. Coe, Jason W. Kean, Jonathan W. Godt, Rex L. Baum, Eric S. Jones, David J. Gochis, and Gregory S. Anderson, GSA Today, October 2014, vol. 24, no. 10, pp. 4-10.*



## Researchers Reveal New Rock Formation in Colorado

Boulder, Colo., USA - An astonishing new rock formation has been revealed in the Colorado Rockies, and it exists in a deeply perplexing relationship with older rocks. Named the Tava sandstone, this sedimentary rock forms intrusions within the ancient granites and gneisses that form the backbone of the Front Range. The relationship is fascinating because it is backward: ordinarily, it is igneous rocks such as granite that would intrude into sedimentary rocks.

According to authors Christine Smith Siddoway and George E. Gehrels, to find sandstone injected into granite is utterly uncommon -- the extensive system that is found in Colorado may be unique in the world. There is evidence that the process of formation involved very large earthquakes, or possibly another type of catastrophic event, causing liquefaction of sediment, what they call "natural fracking" in a certain sense! Equally astonishing is the time of formation of the Tava sandstone, determined from detrital zircon analysis: the Tava proves to be from a time period ~750 million years ago, which was not known to be represented in the Colorado Rockies: the Cryogenian Period.

The article, published in *Lithosphere*, August 27, 2014, is:

Basement-hosted sandstone injectites of Colorado: A vestige of the Neoproterozoic revealed through detrital zircon provenance analysis; by Christine Smith Siddoway, Dept. of Geology, The Colorado College, Colorado Springs, Colorado, and George E. Gehrels, Dept. of Geosciences, University of Arizona, Tucson, Arizona.

I'm sure this article will generate much controversy. The sandstone clastic dike within the Pikes Peak batholith have usually been believed to be of early Paleozoic (Cambrian) age, or perhaps even late Paleozoic (Pennsylvanian), and the present study's dating based on the spectrum obtained of detrital zircon ages, will certainly be debated—though the data presented in the paper look convincing. --- Pete Modreski

*Another news/commentary article about this research was published by AAAS in Science – News – Earth, Sept. 29, 2014, <http://news.sciencemag.org/earth/2014/09/strange-formation-colorado-rockies-sheds-light-earths-past>.*



### ***New USGS Publication:***

**Geologic Map of Mars** (2014), USGS Scientific Investigations Map 3292, by Kenneth L. Tanaka and 8 coauthors, is a new geologic map of the planet showing unprecedented detail, at 1:20,000,000 scale. The color map, showing the nature and relative ages of the geologic units, includes polar views, a Correlation of Map Units diagram, Description of Map Units, and is accompanied by a 43-page pamphlet.

“Herein, we present a new global geologic map of Mars, which records the distribution of geologic units and landforms on the planet’s surface through time, based on unprecedented variety, quality, and quantity of remotely sensed data acquired since the Viking Orbiters. These data have provided morphologic, topographic, spectral, thermophysical, radar sounding, and other observations for integration, analysis, and interpretation in support of geologic mapping.”

You can view a thumbnail image of the map at <http://pubs.usgs.gov/sim/3292/> or download full size images of the map and booklet from the links given—see [http://pubs.usgs.gov/sim/3292/pdf/sim3292\\_map.pdf](http://pubs.usgs.gov/sim/3292/pdf/sim3292_map.pdf).

The printed map can be ordered by calling 1-888-ASK-USGS (1-888-275-8747) or ordered online at <http://store.usgs.gov>, for \$9.00 plus \$5.00 P&H; ask for USGS Product #391890.

## 2014 CSS Elected Positions

President:.....Scott Lundstrom, 303-917-2849, pslundstrom@msn.com  
President Elect:.....Paul Morgan, 303-866-2611, paul.morgan@state.co.us  
Treasurer:.....Don Sweetkind , 303-236-1828, dsweetkind@usgs.gov,  
Secretary:.....Lisa Fisher, 303-215-0480, lisa.fisher@escalantemines.com  
Past President.....Matt Sares, 303-866-3581 x8290, matt.sares@state.co.us

We are still seeking volunteers or nominations to fill several vacant posts. They are:

- ◆ **Outreach Chair**
- ◆ **Publicity Chair**
- ◆ **Hospitality Chair**
- ◆ **Program Chair**



**We will also gladly accept volunteers to serve on any and all of our standing committees. If you have any questions regarding the duties of these positions, please call your favorite officer, councilor, or chair.**

**Please consider volunteering—many hands make lighter work and we would love to have a larger pool of ideas and contacts!**

### **COUNCILORS**

2013–2015: Marieke Dechesne, mdechesne@usgs.gov  
2013–2015: Liz Pesce, pesce.e@gmail.com  
2014–2016: Celia Greenman, celia.greenman@earthlink.net  
2014–2016: Peter Barkmann, barkmann@mines.edu  
2012–2014: Rebecca Flowers, rebecca.flowers@colorado.edu  
2012–2014: Pete Modreski, pmodreski@aol.com

### **COMMITTEE CHAIRPERSONS**

Best Paper Award: Matt Sares, 303-866-3581 x8290, matt.sares@state.co.us  
Database Manager: Paul Morgan, 303-866-2611, paul.morgan@state.co.us  
Field Trips: Cal Ruleman, 303-236-7804, cruleman@usgs.gov  
History: Beth Simmons, cloverknoll@comcast.net  
Hospitality: Open  
Membership/Mentor: Liz Pesce, epesce@mines.edu  
Memorial Funds: Matt Sares, 303-866-3581 x8290, matt.sares@state.co.us  
Newsletter Editor: Linda Barton Cronoble, 720-338-1237, lbarton1611@gmail.com  
Outreach: Open  
Program: Open  
Publicity: Open  
State Science Fair: Chuck Weisenberg, 303-238-8806, cweisnrg@msn.com  
Webmaster: Barb Warden, 303-278-2701, bwarden@tablemtn.com

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



# Colorado Scientific Society

## Application and Membership Update Dues and Funds Contributions

Date \_\_\_\_\_

New Member \_\_\_\_\_

Renewing Member \_\_\_\_\_

\_\_\_\_\_  
(email address)

\_\_\_\_\_  
(Telephone)

\_\_\_\_\_  
(Last Name)

\_\_\_\_\_  
(First Name)

\_\_\_\_\_  
(Initial)

\_\_\_\_\_  
(Address)

The success of most Society activities depends on volunteer help. Please circle any activities for which you can provide assistance. We will pass your name on to the appropriate Committee Chairperson.

Field Trips

History

Outreach

Fund Raising

Newsletter

Program/Talks

### Annual Dues (January – December)

Regular Members \$20 \_\_\_\_\_

Corresponding Members \$10 \_\_\_\_\_

Student Members \$5 \_\_\_\_\_

**Memorial Funds:** These funds support research grants to graduate students in the Earth Sciences throughout the nation. *Please note if contribution is made in the memory of an individual.*

Ogden Tweto Memorial Fund \_\_\_\_\_

Steven Oriel Memorial Fund \_\_\_\_\_

Edwin Eckel Memorial Fund \_\_\_\_\_

Bill Pierce-Heart Mountain Fund \_\_\_\_\_

George Snyder Memorial Fund \_\_\_\_\_

Chuck Pillmore Memorial Fund \_\_\_\_\_

### Endowment Fund:

This fund is used to support the Society's monthly meetings and newsletter, field trips, family night, annual Emmons Lecture, invited speaker honorarium, 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

Or register and pay on-line using PayPal at:

<http://www.coloscisoc.org/membership/duespaypal.htm>