

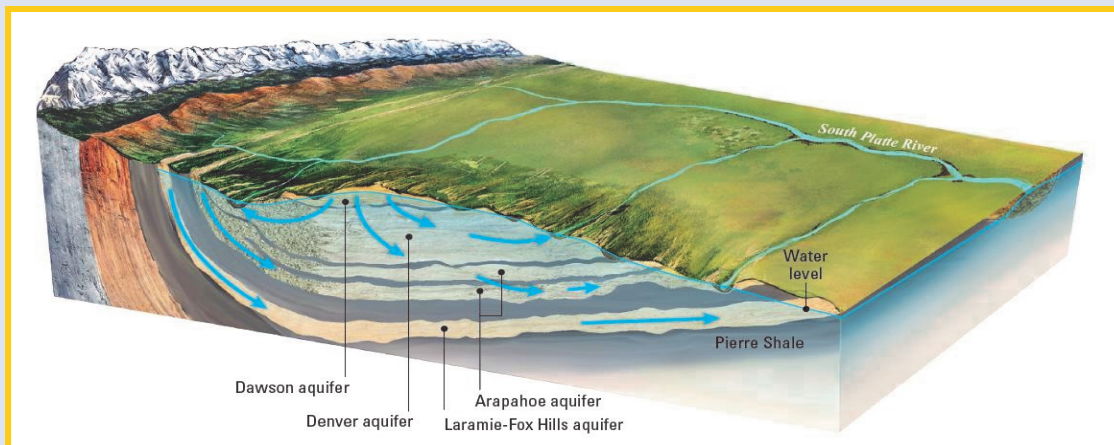


# Colorado Scientific Society

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

## April Meeting

### Simulation and Observations of the Denver Basin Aquifer System



By Suzanne Paschke- Associate Director for Hydrologic Studies  
at the U.S. Geological Survey Colorado Water Science Center

***And***

**Thursday, April 18th, 2013**

**Shepherd of the Hills Presbyterian Church**

**11500 W. 20th. Ave. (at Simms St.), Lakewood**

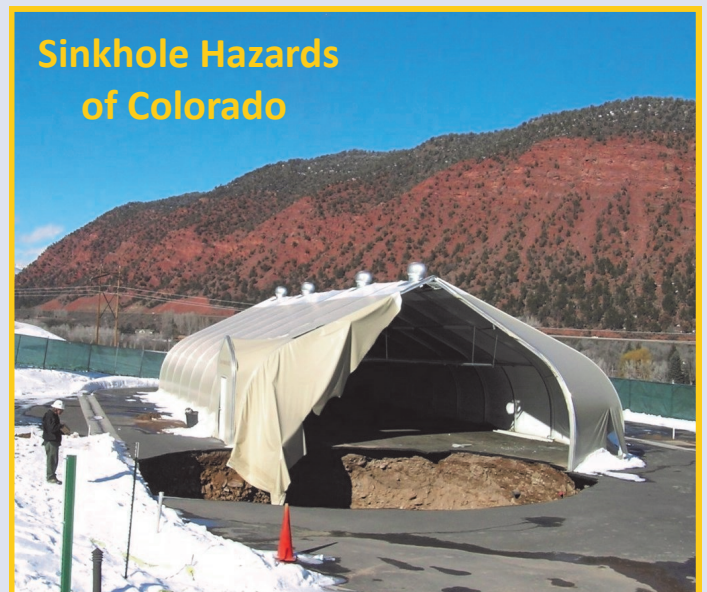
**Social half-hour—6:30 p.m.**

**Meeting time—7:00 p.m.**

***Everyone is Welcome!***



## Sinkhole Hazards of Colorado



By Jonathan L. White,  
Colorado Geological Survey

# **Abstracts**

## **Simulation and Observations of the Denver Basin Aquifer System**

**By Suzanne Paschke**

The Denver Basin aquifer system is a critical water resource for growing municipal, industrial, and domestic uses along the semiarid Front Range urban corridor of Colorado. The confined bedrock aquifer system is located along the eastern edge of the Rocky Mountain Front Range where the mountains meet the Great Plains physiographic province. Continued population growth and the resulting need for additional water supplies in the Denver Basin and throughout the western United States emphasize the need to continually monitor and reassess the availability of groundwater resources.

In 2004, the U.S. Geological Survey initiated large-scale regional studies to provide updated groundwater-availability assessments of important principal aquifers across the United States, including the Denver Basin. This study of the Denver Basin aquifer system evaluates the hydrologic effects of continued pumping and documents an updated groundwater-flow model useful for appraisal of hydrologic conditions. The updated model includes a fully three-dimensional geologic framework, explicit representation of streams and the alluvial aquifer, time-varying recharge and evapotranspiration boundary conditions, spatial variation of hydraulic conductivity and specific yield, and used recently-available modeling tools for improved model calibration and sensitivity analysis. The presentation will provide an overview of the updated model construction, calibration, and results.



## **Sinkhole Hazards of Colorado**

**By Jon White**

Sinkholes form from the collapse of the ground surface as the roof of an underground void or cavern fails and the void space propagates to the surface. The width of the underground roof failure that has “chimneyed” its way upwards to the surface is called the throat of the sinkhole. Sinkholes can be small or very large depending on the size of the cavern and width of the throat. Small sinkholes and mild ground depressions often result from the piping of fine-grained sediments into a bedrock fissure or pipe. Large sinkholes result when bridged sediments or rock catastrophically collapse into near-surface, deep voids so that vertical or bell-shaped holes spontaneously open at the surface with little or no warning.

In broad terms, sinkholes are grouped into two types, man-made and natural. Man-made sinkholes result from the intentional, or unintentional removal of underground material. The most common are mine subsidence features. Others are related to failures of underground culverts, broken water mains, or sewers where the surrounding soil or sediments have washed away. Naturally-forming sinkholes form from the dissolution of bedrock or the piping and dispersion of erodible, clay-rich, sediments with high sodium ion concentrations. It is the presence of slightly acidic or fresh water that causes dissolution.

The typical rock types that can dissolve are limestone, including other rocks composed of calcium carbonate and evaporite rocks composed of evaporite minerals such as halite, anhydrite, and gypsum. It is the dissolution of the rock that creates caverns, open fissures, subterranean and emergent streams, breccia pipes, subsidence sags, closed depressions, and sinkholes; landforms known collectively as karst morphology. The sinkholes and large piping voids that can form in clay-rich soils, generally in arid to semi-arid climates adjacent to deep arroyos, are referred to as pseudo-karst landforms. Most cataloged sinkholes in Colorado are from the dissolution of evaporite minerals. Evaporite rock is easily eroded and forms mountain valleys in Colorado. These valleys, with their proximity to surface water, were originally homesteaded so are now private lands and available for development.

Colorado has a history of both natural and man-made sinkhole occurrences. This presentation will identify areas in Colorado conducive to sinkhole formation and give examples of various types throughout the state. This presentation is based, in large part, on a recently completed Colorado Geological Survey publication, Colorado Map of Potential Evaporite Dissolution and Evaporite Karst Subsidence Hazards, which is available free on-line at <http://geosurvey.state.co.us/pubs/online/Pages/default.aspx>

## Biographies

**Suzanne Paschke** is presently the Associate Director for Hydrologic Studies at the U.S. Geological Survey Colorado Water Science Center. With 25 years of experience in hydrogeologic evaluation and water-quality assessments, recent projects include publication of the Denver Basin groundwater-flow model and evaluation of groundwater quality in the South Platte River basin as part of the USGS National Water-Quality Assessment Program. Previous experience includes software development and teaching at the International Ground-Water Modeling Center as well as hydrogeologic site investigations and modeling projects for private and government clients. Dr. Paschke holds a B.S. in Geology from the University of Wyoming and M.E. and Ph.D. degrees in Geological Engineering from the Colorado School of Mines.



**Jon White** is a senior engineering geologist at the Colorado Geological Survey with almost 30 years of professional experience. Jon's current focus is geologic and geologic hazard mapping. He has authored or coauthored numerous papers and publications, technical presentations, web-site content, geologic maps, and field trip guidebooks. Jon has worked in the areas of evaporite karst, swelling soils, collapsible soils, dispersive soils, rockfall, landslides, and debris flows. In 2009, he garnered the John C. Frye Award in Environmental Geology as lead author of the CGS publication, *Collapsible Soils in Colorado*.



## Don't forget...

The **GSA Leadership Meeting** is quickly approaching. The meeting will be held Saturday, **27 April at the Omni Interlocken Resort**. You may make your reservations at the Omni by calling the Reservation line: 1-800-THE-OMNI (reference Geological Society of America Leadership Meeting). GSA has secured guaranteed room rates as follows:

Room Rate: \$109 single/\$129 double (plus tax of 9.75%).

Please make your reservation by Monday, 8 April. Rates and rooms may not be available after this date.

Once you have made your reservations, please advise Pamela Fistell, [pfistell@geosociety.org](mailto:pfistell@geosociety.org) of your arrival/departure dates no later than April 8, 2013, that way we will have headcount information for meeting rooms and other activities. Additionally, when you send your travel information, remember to RSVP if you will be attending the reception at the Omni Interlocken Hotel, 5:00 - 7:00 PM, Saturday, 27 April.

HOTEL INFORMATION  
Omni Interlocken Resort  
500 Interlocken Blvd.  
Denver (Broomfield), Colorado 80021  
Phone: (303) 438-6600,  
Fax: (303) 438-7224





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## CSS President's Message

- by Matt Sares

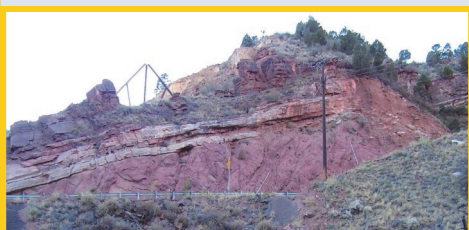
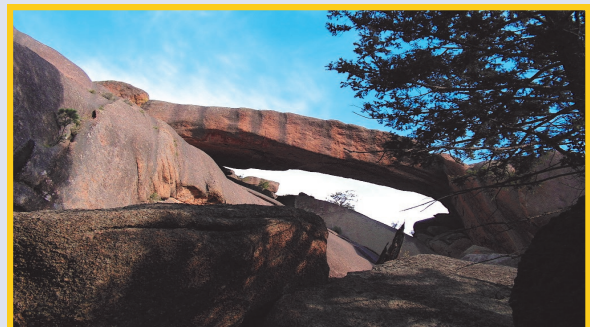


My last message focused on the explosion of data in the sciences. Of course that data must be produced through observations by a human or by a machine sensing some sort of stimuli – light, motion, electricity, sound, heat, etc. But, assembling that data into something meaningful is best done by the human mind and its amazing creativity. There is no replacement for getting in the field to observe, synthesize, and put forth hypotheses to prove or disprove. As the weather warms, many have thoughts of outdoor activities like gardening, hiking, swimming, and many other activities. For the geologist it brings thoughts of getting out of the office and searching the rocks to discover and decipher the clues they hold.

Because we live in Colorful Colorado there are many opportunities for field trips sponsored by many geological organizations. I encourage you to get out and enjoy them. There will be many field trips associated with the Geological Society of America Conference this autumn, including our own, Colorado Geology Then and Now: 1901 to 2013. If you have a half-day or whole day trip you would like to organize for CSS members this spring or summer, contact me and we'll get it announced at our monthly meeting and through email. Happy rockhounding!

### *Where is this Rock? By Pete Modreski*

Our April mystery rock location is a good one; I wonder if any other CSS folks have been to this spot? Hint, it's located within 50 miles of Denver, as the crow flies.



Our March prize goes to Bud Wobus, Prof. of Geosciences, Williams College, Mass., who wrote, "Looks like the nonconformity on Ute Pass between the Pikes Peak granite and the Sawatch (old US 24). Exactly correct! I took the picture looking up across Manitou Ave. (Bus.-24), the exit road from eastbound US-24 into Manitou Springs, from the Rainbow Falls scenic area on Serpentine Drive.



## Slabs of Ancient Tectonic Plate Still Lodged Under California

*Mar. 18, 2013—The Isabella anomaly* Indications of a large mass of cool, dehydrated material about 100 kilometers beneath central California is in fact a surviving slab of the Farallon oceanic plate. Most of the Farallon plate was driven deep into the Earth's mantle as the Pacific and North American plates began converging about 100 million years ago, eventually coming together to form the San Andreas fault.

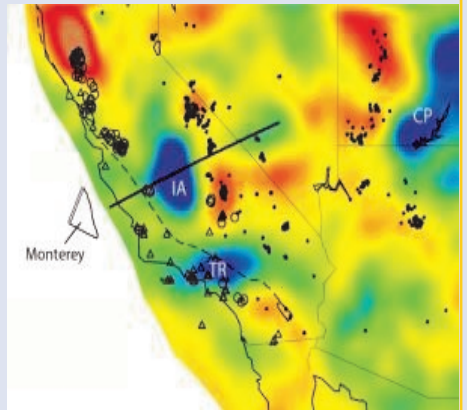
Large chunks of an ancient tectonic plate that slid under North America millions of years ago are still present under parts of central California and Mexico, according to new research led by Brown University geophysicists.

Around 100 million years ago, the Farallon oceanic plate lay between the converging Pacific and North American plates, which eventually came together to form the San Andreas fault. As those plates converged, much of the Farallon was subducted underneath North America and eventually sank deep into the mantle. Off the west coast of North America, the Farallon plate fragmented, leaving a few small remnants at the surface that stopped subducting and became part of the Pacific plate. But this new research suggests that large slabs from Farallon remain attached to these unsubducted fragments. The researchers used seismic tomography and other data to show that part of the Baja region and part of central California near the Sierra Nevada mountains sit atop "fossil" slabs of the Farallon plate. "Many had assumed that these pieces would have broken off quite close to the surface," said Brown geophysicist Donald Forsyth, who led the research with Yun Wang, a former Brown graduate student now at the University of Alaska. "We're suggesting that they actually broke off fairly deep, leaving these large slabs behind."

The findings are published in the Proceedings of the National Academy of Sciences. Geologists had known for years about a "high velocity anomaly" in seismic tomography data near the Sierra Nevada mountains in California. Seismic tomography measures the velocity of seismic waves deep underground. The speed of the waves provides information about the composition and temperature of the subsurface. Generally, slower waves mean softer and hotter material; faster waves mean stiffer and cooler material. The anomaly in California, known as the Isabella anomaly, indicated that a large mass of relatively cool and dehydrated material is present at a depth of 100 to 200 kilometers below the surface. Just what that mass was wasn't known, but there were a few theories. It was often explained by a process called delamination. The crust beneath the eastern part of the mountains is thin and the mantle hot, indicating that part of the lithospheric plate under the mountains had delaminated, broken off. The anomaly, scientists thought, might be the signature of that sunken hunk of lithosphere, which would be cooler and dryer than the surrounding mantle. But a few years ago, scientists detected a new anomaly under Mexico's Baja Peninsula, due east of one of the known coastal remains of the Farallon plate. Because of its proximity to the Farallon fragment, Forsyth and Wang thought it was very likely that the anomaly represented an underground extension of the fragment.

A closer look at the region showed that there are high-magnesium andesite deposits on the surface near the eastern edge of the anomaly. These kinds of deposits are volcanic rocks usually associated with the melting of oceanic crust material. Their presence suggests that the eastern edge of the anomaly represents the spots where Farallon finally gave way and broke off, sending andesites to the surface as the crust at the end of the subducted plate melted. That led Forsyth and his colleagues to suspect that perhaps the Isabella anomaly in California might also represent a slab still connected to an unsubducted fragment of the Farallon plate. So they re-examined the tomography data along the entire West Coast. They compared the Baja and Isabella anomalies to anomalies associated with known Farallon slabs underneath Washington and Oregon. The study found that all of the anomalies are strongest at the same depth, right around 100 kilometers. And all of them line up nearly due east of known fragments from Farallon. "The geometry was the kicker," Forsyth said. "The way they line up just makes sense."

The findings could force scientists to re-examine the tectonic history of western North America, Forsyth said. In particular, it forces a rethinking of the delamination of the Sierra Nevada, which had been used to explain the Isabella anomaly. "However the Sierra Nevada was delaminated," Forsyth said, "it's probably not in the way that many people had been thinking." His research colleague and co-author Brian Savage of the University of Rhode Island agrees. "This work has radically changed our understanding of the makeup of the west coast of North America," Savage said. "It will cause a thorough rethinking of the geological history of North America and undoubtedly many other continental margins."





# Calendar of Events- April

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 Matt Sares, tel. 303-717-3983, matt.sares@state.co.us

## Upcoming CSS Presentations :

**April 18-** Suzanne Paschke (USGS) - "Simulation of Groundwater Flow in the Denver Basin."

Jonathan White (CGS) – "Sinkhole Hazards in Colorado."

**May 16-** Don Rosenberry (USGS) - "Ground-Water/Surface-Water Exchange in Hyporheic Settings."

## Other Upcoming Geological Presentations:

**USGS Rocky Mountain Area Seminar Series** is held once every two weeks, 10:30-11:30 a.m., alternate Tuesday mornings, Building 25 Lecture Hall, Denver Federal Center, Lakewood, CO. Public is welcome. Park in the lot east of Bldg. 25 and use entrance E-14. For more information, contact Pete Modreski, tel. 303-202-4766, pmodreski@usgs.gov.

**April 9.** Dr. David John, USGS, Menlo Park CA. "Miocene volcanoes, hot springs, and gold deposits in the Bodie Hills, California and Nevada."

**April 23.** Joe Colgan, USGS, Menlo Park CA. "Regional Tectonic Setting of Miocene Extension and Magmatism in the Northern Great Basin."

**RMAG-** Luncheon, , Denver City Center Marriott, 11:30 a.m.; Lunch: 12:00 p.m.; Talk: 12:20 p.m. Lunch \$30/ Walk-in without lunch \$10. Please note: ONLINE REGISTRATION FOR THIS EVENT WILL CLOSE ON THURSDAY, April 4, 2013 AT 4:00PM

**April 10-** Ian Deighton and Pete Dotsey with TGS. "MaxG Basin Temperature Modeling."

**RMAG and PTTC** present the **2013 Spring Symposium, April 23**, Denver City Center Marriott "Making Money with Science"

Onsite Check-in Opens: 7:15 am. Go to [http://www.rmag.org/i4a/ams/amsstore/category.cfm?category\\_id=3](http://www.rmag.org/i4a/ams/amsstore/category.cfm?category_id=3) to register

Keynote Address: Chris Wright, CEO of Liberty Resources. Speaker: Maynard Johnson, Senior Technical Advisor, ProTechnics Division of Core Laboratories.

**Colorado School of Mines- Van Tuyl Lecture Series**, Golden, CO. Lectures held Thursdays 4-5 p.m. in Berthoud Hall, rm. 241. Refreshments served prior to lecture.

**April 4.** Dr. Ravi Anand, CSIRO-Australia, Association of Applied Geochemists Distinguished Lecturer. "Understanding Anomaly Formation through Transported Cover-Field and Experimental Approaches Implications to Mineral Exploration."

**April 11.** Dr. Jim McCalpin, GeoHaz Consultants, AEG/GSA Jahns Distinguished Lecturer, Joint Seminar with Heiland Lecture. "The Mountains are Falling Apart: A Spectrum of Mass Failures from Landslides through Deep-Seated Gravitational Spreading (Sackung) to 'Unfolding' of Folds."

**April 16.** SPECIAL VAN TUYL - Dr. Aaron Pieruska, U.S. Geological Survey. "Geometry of the Summit Magma Storage Reservoir of Kilauea Volcano: A View from High-Precision Lead Isotopes." **PLEASE NOTE THIS LECTURE WILL BE HELD IN BERTHOUD HALL 108 AT 4 P.M.**

**April 18.** Dr. Diogo Bolster, Notre Dame, Environmental Fluid Dynamics Laboratory, Dept. of Civil & Environmental Engineering & Earth Sciences. "Incomplete Mixing in Porous Media and its Impact on Reactions."

**April 25.** Dr. Graham Fogg, Univ. of Calif-Davis, Land Air Water Resources Department. "Is Groundwater Quality Sustainable in Irrigated Systems?"

**DENVER MINING CLUB LTD.** Local Chapter of the INTERNATIONAL ORDER OF RAGGED ASS MINERS, Established 1891.

Golden Corral Buffet & Grill 3677 South Santa Fe Drive, Sheridan, CO 80110 (Southwest side at Santa Fe Dr. & Hampden Ave.) (Purchase of buffet lunch required) Every Monday, except when noted 11:30 a.m.- 1:00 p.m. VISITORS ALWAYS WELCOME!

**April 29.** Lindsey V. Maness, Jr., Geologist. "Verifying and Dating Significant Bolide Impacts and How Prospectors Can Benefit from this Information."

**Western Museum of Mining & Industry Lecture.** Reception 6 pm, Lecture, 7 pm.

**April 11** Jacob Kershman, Neumann Systems Group, Inc., Converting Pollutants to Products from Coal-Fired Power Plants. 225 North Gate Blvd., Colorado Springs. For more information, see the web site: [www.wmmi.org](http://www.wmmi.org) or call the museum to RSVP at (719) 488-0880.

**Colorado Mineral and Fossil Show, April 19-21**, Ramada Plaza Hotel [formerly Holiday Inn - Central Denver], 4849 Bannock St., Denver; 10 a.m. – 6 p.m. Fri./Sat., 10-5 Sun.; free admission and parking.

## More Events

**AIPG 4th Annual Symposium**, “Marcellus, Utica, and Point Pleasant Shale: Energy Development and Enhancement by Hydraulic Fracturing.” **April 10-11**, (8:30 am - 5:00 pm Wednesday, 8:00 am - 12:00 noon Thursday). McKinley Grand Hotel, 320 Market Avenue South, Canton, Ohio. Hotel: (330) 454-5000 - \$94. Early registration prices have been extended!

AIPG Member - \$325 before April 1, 2013 - \$350 after April 1, 2013

Non-member - \$395 before April 1, 2013 - \$420 after April 1, 2013

Daily Registration - \$220 before April 1, 2013 - \$245 after April 1, 2013

Students - \$35

(\*conference registration includes conference program, lunch Wednesday, networking reception Wednesday, continental breakfast and breaks both days)

**The 58th Annual Colorado Science and Engineering Fair (CSEF)**, which takes place in the Lory Student Center at Colorado State University in Fort Collins on **April 11-13**, is greatly in need of volunteers, especially on Thursday April 11th. For more information on volunteering, please go to <http://www.csef.colostate.edu/Volunteers.htm>. To register as a volunteer, please go to [http://129.82.204.188/csef/vol/volunteer\\_form.php](http://129.82.204.188/csef/vol/volunteer_form.php). " [This is the short version; please email me and I'll forward the full email listing what jobs they particularly need more volunteers for. This is for volunteer helpers, not judges.]

### **University of Colorado Benson Earth Sciences Colloquium Schedule:**

Lectures held in lecture hall (380), Wednesdays 4pm. Refreshments are served at 3:30 on the 3rd floor. Schedule posted at: <http://www.colorado.edu/geolsci/colloquium.htm>

**April 3.** Alex Sessions, Cal Tech. TBA.

**April 10.** James McCalpin, Geohaz Inc. “LiDAR Reveals the Bare Earth: LiDAR Geomorphology and its Applications to Engineering Geology.”

**April 17.** Mike Oskin, UC Davis. TBA.

**April 24.** Kent Applegate, BHP Billiton. “The Future of Energy Coal.”

**May 1.** David Fike, Washington University. TBA.

### **CSU, Department of Geosciences Seminar Schedule**

Seminars are located in Warner College of Natural Resources Building, Room 320, Monday afternoon, and will begin at 4:00 pm unless noted otherwise. Schedule posted at <http://warnercnr.colostate.edu/geo-news-and-events/department-seminars>

**April 8.** James McCalpin, GEO-HAZ Consulting, Inc. Crestone “Ski Areas and their Slope Stability Problems:

The Colorado Story.” Event Contact Phone: (970) 491-5661. For more information: [warnercnr.colostate.edu](http://warnercnr.colostate.edu).

### **Denver Mining Club— April Schedule**

Every Monday, except when noted, 11:30 a.m. - 1:00 p.m. Golden Corral Buffet & Grill, 3677 South Santa Fe Drive, Sheridan, (Southwest side at Santa Fe Dr. & Hampden Ave.) Purchase of buffet lunch required. VISITORS ALWAYS WELCOME!

April 1.--Judy Colgan, Executive Director, Rocky Mountain Coal Mining Institute. RMCMI News and Update.

April 8.--John Googins, Applications Engineer/Owner, Aggregate & Mining Consultants, LLC. The New Panama Canal: Can You Dig It?

April 15.--John H. Wright, Explosives Engineer. South Pole Tunnel Project.

April 22.--Jessica Levental, CEO, Precious Metals Summit Conferences, LLC. Precious Metals Summit Conferences.

April 29.--Lindsey V. Maness, Jr., Geologist. Verifying and Dating Significant Bolide Impacts (and How Prospectors Can Benefit from this Information).

### **Denver Museum of Nature and Science- “Mammoths & Mastodons: Titans of the Ice Age.” February 15– May 27th.**

Life-size models, fossil tusks and skulls, touchable teeth, spear points, cave paintings, interactive displays, and monumental video installations bring the Ice Age back to life.

### **Western Museum of Mining & Industry Lecture, April 11, Reception 6 p.m., Lecture, 7 p.m. 225 North Gate Blvd., Colorado Springs.**

For more information, see the web site: [www.wmmi.org](http://www.wmmi.org) or call the museum to RSVP at (719) 488-0880.

Jacob Kershman, Neumann Systems Group, Inc., “Converting Pollutants to Products from Coal-Fired Power Plants.”

**FrackingSENSE free public lecture series** continues weekly **every Tuesday at 6:30 p.m.**, Hale 270, CU Boulder Campus. Kirby Wynn, Garfield County’s Lessons Learned about Oil and Gas Development: Building Relationships with Industry and the Community to Effectively Address Citizen Concerns; . See <http://centerwest.org/> for information and lecture topics for the whole series through May 21. [Note, there will be no program on April 9.]



## *Pleas and Thank Yous*



**Membership dues for this year (2013) are still being accepted.** You will find a dues payment form in this newsletter or on the CSS Web site: [www.coloscisoc.org/membership/dues.html](http://www.coloscisoc.org/membership/dues.html)

Dues payments are \$20 for regular members; \$10 for corresponding members (outside the Colorado Front Range area), and \$5 for students. You may pay dues by mailing a check to the CSS, or pay with a credit card using PayPal on the CSS website. If you are uncertain if you owe dues or of your member status, contact CSS Treasurer Don Sweetkind by phone at 303-236-1828 or by e-mail at [dsweetkind@usgs.gov](mailto:dsweetkind@usgs.gov). **Thank you!!**

### **Student Research Grants Deadline April 8, 2013!**

The Colorado Scientific Society invites students enrolled at an accredited college or university to apply for research grants to be awarded in late May 2013. Grants are generally awarded to students enrolled in a Masters or Ph.D. program, however applications from undergraduates conducting senior-level research will also be considered and are encouraged.

General grant categories:

- \*Field-oriented research on geology, geochemistry, and geophysics of the Rocky Mountain region,
- \*Engineering geology research (with no restriction on geographic area of interest),
- \*Studies on the Heart Mountain fault in N.W. Wyoming or a Quaternary study (with no restriction on geographic area of interest).

The grant amounts actually awarded may vary depending on the number of applicants, however typical amounts from the past years have ranged from \$600 to \$1200. Students can obtain application forms and a grant policy and procedure information directly from the CSS website at <http://www.coloscisoc.org/grants/grants.html>, or contact Pete Modreski, [pmodreski@usgs.gov](mailto:pmodreski@usgs.gov).

***Complete applications must be emailed or post-marked by April 8, 2013.***

***Please encourage your students or student colleagues to apply!***



### **Did You Know...?**

The April 22 Earth Day, founded by Senator Gaylord Nelson, was first organized in 1970 to promote ecology and respect for life on the planet as well as to encourage awareness of the growing problems of air, water and soil pollution. However, some people prefer to observe Earth Day around the time of the March equinox. In 1978, American anthropologist Margaret Mead added her support for the equinox Earth Day, founded by John McConnell. She stated that the selection of the March Equinox for Earth Day made planetary observance of a shared event possible.

### **Mark Your Calendar!**

Sunday, April 21, for the occasion of Earth Day (which is April 22), a geology/natural history hike on Green Mountain, Lakewood, CO, will be led by USGS Geologist Pete Modreski. Meet at 9 a.m. at the Hayden Green Mountain Park trailhead parking lot on Rooney Road, located about 2/3 mile north of Alameda Parkway or about 2 miles south of Colfax Ave. It will be about a 4 mile loop hike, finishing about 1 p.m. No charge and all are welcome.





## 2013 CSS Elected Positions

President:.....Matt Sares, 303-866-3581 x8290, matt.sares@state.co.us  
President Elect:..... Scott Lundstrom, 303-917-2849, pslundstrom@msn.com  
Treasurer:.....Don Sweetkind , 303-236-1828, dsweetkind@usgs.gov,  
Secretary:.....Lisa Fisher, 303-215-0480, lisa.fisher@escalantemines.com  
Past President.....Pete Modreski, 720-205-2553, pmodreski@aol.com.

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

♦ Outreach Chair

♦ Publicity 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  
2011–2013: Celia Greenman, celia.greenman@earthlink.net  
2011–2013: Ben Harrison, 303–417–9633, benjh@earthlink.net  
2012–2014: Paul Morgan, 303–866–2611, paul.morgan@state.co.us  
2012–2014: Rebecca Flowers, 303–492–5135, rebecca.flowers@colorado.edu

### **COMMITTEE CHAIRPERSONS**

Best Paper Award: Pete Modreski, 720-205-2553, pmodreski@aol.com  
Database Manager: Emily Taylor, 303–236–8253, emtaylor@usgs.gov  
Field Trips: Cal Ruleman, 303–236–7804, cruleman@usgs.gov  
History: Beth Simmons, cloverknoll@comcast.net  
Hospitality: Ben Harrison, 303-417-9633, benjh@earthlink.net  
Membership/Mentor: Liz Pesce, epesce@mines.edu  
Memorial Funds: Pete Modreski, 720-205-2553, pmodreski@aol.com  
Newsletter Editor: Linda Barton, 720-338-6201, lbarton1611@gmail.com  
Outreach: Open  
Pillmore Fund: Lee Shropshire, leeshrop@comcast.net  
Program: Open  
Publicity: Open  
State Science Fair: Chuck Weisenberg, 303–238–8806, cweisnbrg@msn.com

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

## Publications of Colorado Geology

To order in-stock publications call 1-888-ASK-USGS (888-275-8747) or purchase over-the-counter at USGS Map Store, Building 810, Federal Center, Lakewood CO, open weekdays 8 a.m. – 4 p.m. Items with a price listed below are in stock as printed copies; all others, only available online (free). For an electronic copy of this list, email [pmodeski@usgs.gov](mailto:pmodeski@usgs.gov)

- 1894 Historic map of Colorado, USGS, product #112161, \$12.00. See <http://store.usgs.gov/historicmapsfromlca/index.html>
- Colorado's Ancient Trees, 1999. Printed copies of this USGS poster are no longer in stock, but see "Growth-Form Characteristics..." The report is still available.
- Colorado Yule Marble—Building Stone of the Lincoln Memorial, by Elaine S. McGee, 1999, Bulletin 2162, 43 p., \$4.25. <http://pubs.usgs.gov/pdf/bulletin/b2162/>
- Development of Industrial Minerals in Colorado, by Belinda F. Arbogast and others, 2011, Circular 1368, 87 p. [limited copies are in stock, free of charge]. <http://pubs.usgs.gov/circ/1368/>
- Geologic Map of Colorado National Monument and Adjacent Areas, Mesa County, Colorado, by Robert B. Scott and others, 2001, Geologic Investigations Series I-2740, map + 40-p. booklet, \$9.00. <http://pubs.usgs.gov/imap/i-2740/>
- Geologic Map of the Bailey 30' x 60' Quadrangle, North-Central Colorado, by Chester A. Ruleman and others, 2011, Scientific Investigations Map SIM 3156, \$9.00. <http://pubs.usgs.gov/sim/3156/>
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- The Geologic Story of Colorado's Sangre de Cristo Range, by David A. Lindsey, 2010, Circular 1349, 14 p. <http://pubs.usgs.gov/circ/1349/>
- The Geologic Story of Gunnison Gorge National Conservation Area, by Karl S. Kellogg, 2004, Professional Paper 1699, 40 p., \$10.00. <http://pubs.usgs.gov/pp/2004/1699/>
- Geology along Trail Ridge Road, A Self-Guided Tour for Motorists, by Omer B. Raup, 2<sup>nd</sup> ed., 2005, 78 p. [Published by Rocky Mountain Nature Association, sold at USGS Map Store, \$14.95]
- Geology and Ore Deposits of the Uncompahgre (Ouray) Mining District, by Wilbur S. Burbank and Robert G. Luedke, 2008, Prof. Paper 1753, 107 p. + 7 plates, \$35.00. <http://pubs.usgs.gov/pp/pp1753/>
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- Pleistocene Glaciation in the Upper Platte River Drainage Basin, Colorado, by R.F. Madole and others, 1998, Map I-2644, \$9.00.
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# 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>