

# Colorado Scientific Society

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



**Unroofing and uplift history of  
the Grand Canyon region of the  
Colorado Plateau from apatite  
(U-Th)/He thermochronometry  
and future directions in the new  
(U-Th)/He lab at CU-Boulder**

*by*

**Rebecca Flowers  
University of Colorado—Boulder**

**My adventure to the driest,  
coldest, and windiest place  
on Earth**

*by*

**Laura Wolton  
NOAA,  
Tropospheric Surface Ozone program**



View of Mt. Erebus from McMurdo Station

**NEW  
LOCATION!!**

**Thursday, February 16, 2012**

**Shepherd of the Hills Presbyterian Church**

**20th Ave. at Simms St., Lakewood**

**Social half-hour—6:30 p.m. Meeting time—7:00 p.m.**

**NEW  
LOCATION!!**

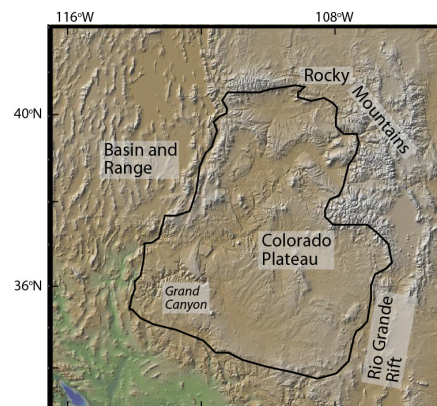
## February Talks

### Abstracts

#### Unroofing and uplift history of the Grand Canyon region of the Colorado Plateau from apatite (U-Th)/He thermochronometry and future directions in the new (U-Th)/He lab at CU-Boulder

by Rebecca Flowers

University of Colorado Boulder



The source of buoyancy for the ~1.9 km elevation gain of the Colorado Plateau since Late Cretaceous time, and its relationship to carving of the ~1.5-km-deep Grand Canyon by the Colorado River, are longstanding and controversial problems. We used apatite (U-Th)/He thermochronometry throughout the southwestern quadrant of the Colorado Plateau to address these issues. The data document overall southwest to northeast unroofing from plateau margin to plateau interior during denudation phases in Late Cretaceous/Early Tertiary (80 to 55 Ma), mid Tertiary (28 to 16 Ma), and Late Tertiary (<6 Ma) times. Distributions of apatite dates suggest that eastern Grand Canyon samples from the basement and the Kaibab surface nearby had similar Early to mid-Tertiary thermal histories, despite their ~1,500 m of stratigraphic separation. If these models are correct, they indicate that a significant ( $\geq 1,000$ -m deep) paleo-Grand Canyon was carved in post-Paleozoic sediments in this region during Early Tertiary time. Kilometer-scale topographic relief would require substantial uplift during the Sevier/Laramide, pointing toward hydration of the lithospheric mantle, partial lithospheric removal, or dynamic topography associated with evolution of the Farallon slab as causative mechanisms for the initial rise of the Colorado Plateau. The evidence for an Early Tertiary paleo-Grand Canyon also has intriguing implications for the paleodrainage evolution of the Colorado River, and runs counter to the widespread view of a Late Tertiary origin for the canyon.

A new (U-Th)/He thermochronology lab is being established at the University of Colorado, Boulder. Over the last fifteen years, (U-Th)/He thermochronology has evolved from a newly emergent technique to a broadly used tool for addressing problems in earth science. Like in the example above, apatite (U-Th)/He dating has been widely applied to decipher the thermal histories of rocks in the upper few kilometers of the Earth's crust and thereby gain insight into burial and unroofing, topographic development and elevation change, and the underlying controls on these processes. However, innovative applications of the method continue to emerge, including diverse hydrocarbon exploration studies to predict hydrocarbon maturation through reconstruction of basinal thermal histories, new work to decipher the origin and evolution of hydrothermal ore deposits, and sediment tracer investigations to quantify the spatial distribution of relief change and catchment erosion. The explosion of new studies on minerals such as goethite, magnetite, zircon, monazite, calcite, and clinker have enabled new applications ranging from dating soil development and determining coal fire frequency, to providing new angles for constraining the influence of climate change on the rates and patterns of landscape evolution. We plan to pursue a variety of new research avenues in the new CU-Boulder lab, and are interested in exploring collaborative opportunities with others in the region.

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#### My adventure to the driest, coldest, and windiest place on Earth

by Laura Wolton

NOAA

South Pole Station in Antarctica is located at 9,300' (2900m), however the equivalent pressure elevation, based on polar atmospheric conditions, will vary from 10,800' (3300m) to 13,120' (4,000m). On average, it is the driest place on earth and actually considered a desert because of its minimal precipitation, which is on average less than 1 inch per year. The remote, elevated and dry conditions make the South Pole an excellent place for research. However, the challenges to research in Antarctica and particularly at the South Pole can be many, including wind, months of darkness, isolation and extreme cold.

Laura Wolton runs the Tropospheric Surface Ozone program at NOAA. She recently visited McMurdo Station and South Pole Station, Antarctica, to calibrate ozone monitors that reside at the stations, a visit that was timed with the 100th anniversary of Scott's arrival at the South Pole. Her talk about travel, atmospheric research, work and fun at the two stations is accompanied by a photo show.

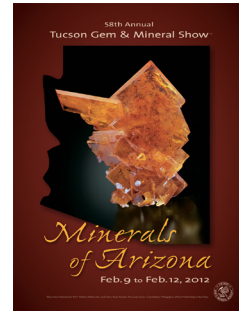




## President's Message, by Pete Modreski

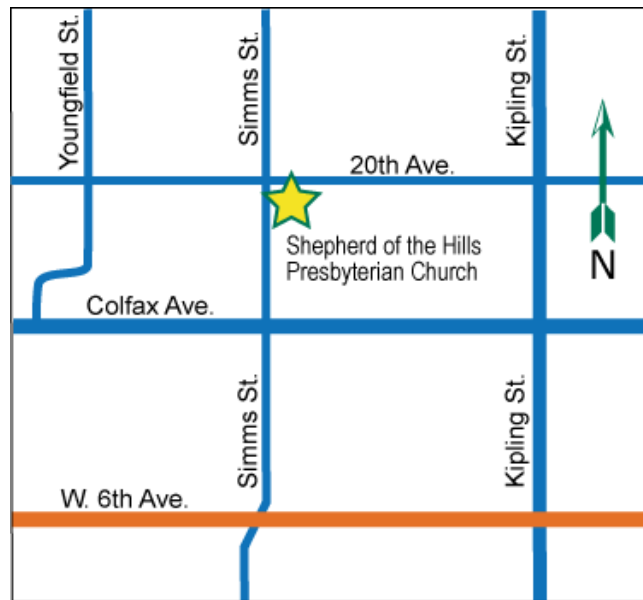


At press time, Pete is at the Tucson Gem and Mineral Show and he promises to give us a full report in the next newsletter!



Map to the CSS February meeting on Thursday, February 16:

Shepherd of the Hills Presbyterian Church  
11500 West 20th Avenue  
Lakewood, Colorado 80215





### Interesting Web sites (thank you Bruce):

A very nice article and beautiful pictures on **Yemeni silver** and the reemergence of a traditional craft:  
<http://www.saudiaramcoworld.com/issue/201201/silver.the.enduring.craft.of.yemeni.silver.htm>

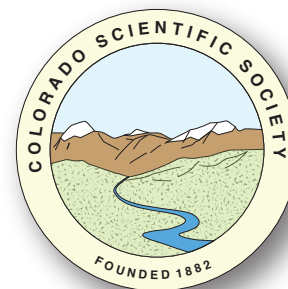
The January 2012 issue of the Utah Geological Survey's, "Survey Notes" that includes articles on **stromatolites, honeycomb weathering, and "energy issues."**  
<http://geology.utah.gov/surveynotes/snt44-1.pdf>

If you missed the Rocky Mtn. PBS NOVA showing of "**Ice Age Death Trap**," the story of the Snowmass fossil find, *you can view the video at:*  
<http://video.rmpbs.org/video/2191520252>



**Members**, our annual Memorial Funds Grant Program is under way for 2012. Flyers have been sent out to universities and organizations to distribute to their students. The information will also be published on our website. If you know of a deserving student, please encourage them to apply!

— Lisa Fisher, 2012 Memorial Fund Chair,  
 303-215-0480 (c),  
[lisa.fisher@escalantemines.com](mailto:lisa.fisher@escalantemines.com)



### From Bruce Geller, Director, CSM Geology Museum:

#### Announcing our 4th Used Book Sale *and* Garage Sale at two locations on the CSM Campus: Museum

1310 Maple Street, Golden, CO

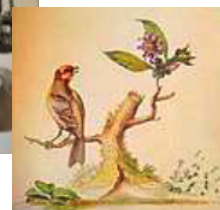
**February 20-24, 2012**

**9 A.M.–4 P.M. daily**

Hundreds of books, journals, professional and hobbyist magazines, USGS folios, maps, brochures, rocks, equipment, etc.

Prices individually marked. Most prices will be reduced 50% daily.

Information: 303-273-3815



(1) Arthur Lakes Library, 1400 Illinois St., Golden Day 1 prices are \$10 for hardcovers, \$5 for softcovers, and \$2 for maps; prices for remaining inventory are reduced each day. Onsite sealed-bid Silent Auction for more valuable items will be held on Monday, Feb. 20, 10 am to 12 noon. For more info and the bid list of silent auction items see:  
[http://library.mines.edu/LB\\_Book\\_Sale](http://library.mines.edu/LB_Book_Sale)



(2) CSM Geology Museum, 1310 Maple Street, Golden ; books and other items with a special focus on geology and minerals. For more information and weekday vehicle parking permit rules see the Museum website:  
[http://www.mines.edu/Geology\\_Museum](http://www.mines.edu/Geology_Museum) or call 303-273-3815.



## Earth Science Meetings and Talks

*Newsletter items must be received by the 25th of each month.*

**Colorado Scientific Society's** regular meetings are held the 3rd Thursday of the month at the 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 Pete Modreski, at 303-202-4766, [pmodreski@aol.com](mailto:pmodreski@aol.com)



**Café Scientifique Tues., Feb. 21,** *George DeMartino, Ph.D., Josef Korbel School of Intl. Studies, Univ. of Denver*, “Do economists need ethics?” Meets at the Wynkoop in LoDo, 1634 18th St., Denver, evening science talks at 6:30. Free, except for beer. <http://www.cafescolorado.org>

**CO-AIPG Feb. 21** *Stephen A. Sonnenberg, Professor and Boettcher Chair in Petroleum Geology, Colorado School of Mines*, “Polygonal Fault Systems: A new structural style for the Niobrara Formation, Denver Basin, CO.” Noon lunch & talk at 12:30 p.m. Wynkoop Brewing Company, 1634 18th Street, Morey/Brown Room, Denver. Price: \$30 per person with advance reservation, \$35 at the door, \$5 walk-ins for talk only. Reservations: Contact Steve Sonnenberg, 303-895-7663 or [sasonnenbg@aol.com](mailto:sasonnenbg@aol.com) by Noon on February 17.

**Colorado State University, Dept of Geosciences**, Rm 320 Warner College of Natural Resources Bldg., Mondays, 4:00 pm. 970-491-5661. **Feb. 20,** *Dr. Kenneth Sims, University of Wyoming*, “TBA.” **Mar. 5** *Dr. Joe Sertich, DMNS*, “TBA.” <http://warnercnr.colostate.edu/geo-training/>

**Denver Mining Club Feb. 27** *Mark Greaves*, Hidee Mine, “Mines of Death Valley, California.” The DMC meets on Mondays at the Littleton Country Buffet near Bowles and Wadsworth (8100 W. Crestline Ave., in the shopping center) 11:30–1:00. Purchase of lunch required. Visitors always welcome! <http://www.denverminingclub.org>

**Rocky Mountain Association of Geologists (RMAG) Feb. 15** *Dr. Joe H.S. Macquaker, AAPG Distinguished Lecturer*, “Are shales really that dull? Shining light into dark places and the effect of opening Pandoras Box.” Program begins at 4:00 p.m. Reservations by recording at 303-573-8621 ext. 1, until 10:30 a.m., prior Mon. Luncheon \$30. Talk only (no res.)—\$5. Location: Denver Marriott City Ctr., 17th & California. <http://www.rmag.org/i4a/pages/index.cfm?pageid=3286>.

**Rocky Mountain SEPM Feb. 28** *David Pyles, Chevron Ctr. of Research Excellence, CSM*, “Hydrodynamic fractionation of minerals in distributive sedimentary deposits: Implications for reservoir quality.” Reception at 11:30 p.m., lunch at 11:45 p.m., speaker at 12:15 p.m. Reservations: [luncheons@rmssepm.org](mailto:luncheons@rmssepm.org), before noon of preceding Friday. \$20.00 lunch, \$5 talk only. Wynkoop Brewing Company, 1634 18th St., Denver. <http://www.rmssepm.org/luncheons.shtml>

**SME Colorado Section Feb. 16** *Fred Menzer, Vice President, Colorado Operations for Climax Molybdenum Company*, “Update on Climax and Henderson.” RSVP to Cathy Begej by noon on Monday, Feb. 13. Email: [CathyBegejSME@gmail.com](mailto:CathyBegejSME@gmail.com); Phone: 720-889-6112 [http://www.maggianos.com/en/Denver-South\\_Englewood\\_CO/Pages/LocationLanding.aspx](http://www.maggianos.com/en/Denver-South_Englewood_CO/Pages/LocationLanding.aspx)

**USGS Rocky Mountain Area Seminar Series Feb. 14** *Pete DeCelles, Univ. of Arizona*, “TBA. Dr. DeCelles’ research is focused on structure and kinematics of major thrust-belt mountain ranges and associated sedimentary basins.” Tuesday at 10:30 a.m., Bldg. 25 Lecture Hall, Denver Fed. Center, Kipling St. & 6th Ave., Lakewood. Visitors are welcome. Use the main gate to enter Fed. Ctr. Building entrance and parking lot is on the east side of Bldg. 25. Contact: Peter J. Modreski, USGS, 303-202-4766, [pmodreski@usgs.gov](mailto:pmodreski@usgs.gov)

**Univ. of Colorado, Boulder, Geol. Sciences Colloquium Feb. 15** *James Syvitski, CU-Boulder*, “The Anthropocene—a new geologic epoch?” **Feb. 22** *Zach Sharp, Univ. of New Mexico*, “A unifying hypothesis for lunar volatiles.” **Feb. 29** *Geoff Abers, LDEO, GeoPRISMS Distinguished Lecture*, “Imaging with geophysics: The heat and water cycling in modern subduction zones.” **Mar. 7** *Delores Robinson, Univ. of Alabama, CIRES visitor*, “Controls on the evolution of the Himalayan thrust belt.” Weds., 4:00 p.m., Benson Earth Sci. Auditorium, Rm. 180. Refreshments at 3:30 p.m. on the 3rd floor. <http://www.colorado.edu/geolsci/colloquium.htm>

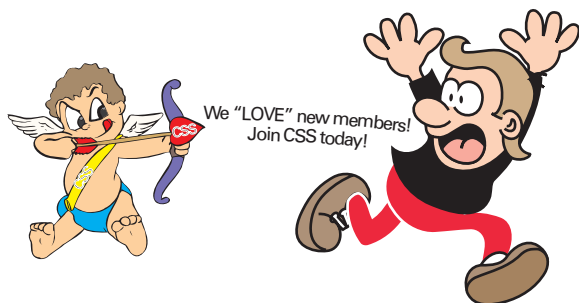
**February 21. Legislative Reception**—“The Mineral and Energy Economy in Colorado.” Time: 5:00 to 7:30 pm. Venue: University Club of Denver—College Room, 1673 Sherman Street, Denver, CO 80203.

**The American Institute of Professional Geologists** is pleased to invite you to a **Legislative Reception** created to engage, inform, and educate legislators on the importance of the mineral and energy industries in the creation of jobs and economic sustainability in the State. For tickets go to: <http://www.aipgcolorado.com/>, (\$20 in advance and \$25 at the door). Sponsorship and Exhibitor Space is available. For more information contact: Larry Cerrillo. Office: 303-674-6484. Cell: 303-921-1612. E-mail: [cerrillo1@mindspring.com](mailto:cerrillo1@mindspring.com)



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

**<http://www.coloscisoc.org>**



## **OFFICERS**

President: Pete Modreski, USGS, 303-202-4766, pmodreski@aol.com  
President-Elect:  
Treasurer: Don Sweetkind, USGS, 303-236-1828, dsweetkind@usgs.gov  
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Past President: Lisa Fisher, Escalante Mines, Inc., 303-215-0480 (c),  
lisa.fisher@escalantemines.com

## **COUNCILORS**

2010–2012: Lee Shropshire, UNC, 970-352-8778, leeshrop@comcast.net  
2010–2012: Liz Pesce, pesce.e@gmail.com  
2011–2013: Matt Sares, CGS, 303-866-2611, matt.sares@state.co.us  
2011–2013: Ben Harrison, 303-417-9633, benjh@earthlink.net  
2012–2014: Paul Morgan, CGS, 303-866-2611, paul.morgan@state.co.us  
2012–2014: Rebecca Flowers, CU Boulder, 303-492-5135,  
rebecca.flowers@colorado.edu

## **COMMITTEE CHAIRPERSONS**

Best Paper Award: Lisa Fisher, Escalante Mines, Inc., 303-215-0480 (c), lisa.fisher@escalantemines.com  
Database Manager: Emily Taylor, 303-236-8253, emtaylor@usgs.gov  
Field Trips: Cal Ruleman, USGS, 303-236-7804, cruleman@usgs.gov  
Graphics: Lisa Rukstales, USGS, 303-236-5547, lrukstales@usgs.gov  
History: Beth Simmons, cloverknoll@comcast.net  
Hospitality: Ben Harrison, 303-417-9633, benjh@earthlink.net  
Membership/Mentor: Mitchell Reese, 575-317-4864, mreese83@gmail.com; Liz Pesce, epesce@mines.edu  
Memorial Funds: Lisa Fisher, Escalante Mines, Inc., 303-215-0480 (c), lisa.fisher@escalantemines.com  
Newsletter Editor: Lisa Rukstales, USGS, 303-236-5547, lrukstales@usgs.gov  
Outreach: Sue Hirschfeld, 720-565-9302, eqdoc@ix.netcom.com  
Pillmore Fund: Lee Shropshire, UNC, 970-352-8778, leeshrop@comcast.net  
Program: **VOLUNTEERS NEEDED! CONTACT PETE MODRESKI FOR MORE INFO.!**  
Publicity:  
Science Fair: Chuck Weisenberg, 303-238-8806, cweisenbrg@msn.com  
Webmaster: Table Mountain Web Design, 303-278-2701, bwarden@tablemtn.com



**\*\* STOP! Do NOT recycle this until after the talk! Please help us with publicity by posting at least the front page of this Newsletter on a bulletin board. Thank you!**