



Colorado Scientific Society

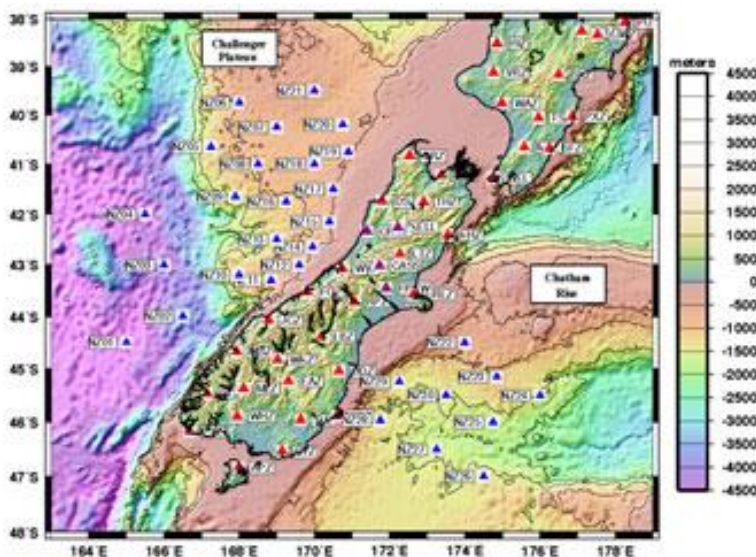
The objective of the Society is to promote the knowledge and understanding of Earth science, and its application to human needs

*Thursday, January 19 meeting, 7:00 p.m. (social time 6:30)
Shepherd of the Hills Church, 11500 W. 20th Ave., Lakewood CO*

Program: MOANA and HOBITSS Ocean Bottom Seismic Experiments: Information on Deep Structure, Anisotropy, and Slow Slip beneath New Zealand

by

*Dr. Anne Sheehan
Professor of Geophysics
University of Colorado, Boulder*



February meeting program, abstract:

MOANA and HOBITSS Ocean Bottom Seismic Experiments: Information on Deep Structure, Anisotropy, and Slow Slip beneath New Zealand

Dr. Anne Sheehan, Professor of Geophysics, University of Colorado, Boulder

In my talk I will provide an overview of two recent ocean bottom seismic experiments designed to explore the deep structure and tectonics of New Zealand. The Marine Observations of Anisotropy Near Aotearoa (MOANA) experiment included a one year deployment of 30 broadband ocean bottom seismometers (OBS) installed off both coasts of the South Island of New Zealand from January 2009 to February 2010. Deployed with approximately 100 km spacing, this array of OBS has an aperture of approximately 1000 km spanning the Challenger Plateau, the South Island, to the Chatham Rise. I will give an overview of the experiment and research, including studies of mantle anisotropy and seismic tomography. On a much different scale, the Hikurangi Ocean Bottom Investigation of Tremor and Slow Slip (HOBITSS) experiment is a collaborative US-Japan-New Zealand experiment and includes 15 ocean bottom seismometers and 24 seafloor pressure gauges deployed at the Hikurangi subduction margin. The instruments were deployed in May 2014 and will remain on the seafloor for one year. The experiment was designed to record a slow-slip event at the subduction zone. Slow-slip events are earthquakes that take several weeks to happen, so they are better recorded by geodetic means such as GPS than by seismometers. In October 2014 a significant slow-slip event was recorded by Hikurangi onshore GPS. When the HOBITSS seafloor instruments are recovered in June 2015 we will see how well the slow slip event was recorded on the seafloor pressure gauges, which should allow us to better characterize the event.

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President's February message – Paul Morgan, Colorado Geological Survey



With almost a month gone in 2015 and a high of 72 degrees today (January 27) I am thinking how fortunate we are to be geologists in Colorado. There is rarely a month in the year when we cannot go somewhere in the state to view interesting geology and learn something new.

In our January meeting I was very encouraged by the very strong turnout for Jon White's excellent presentation on the May 2014 West Salt Creek landslide in Mesa County, Colorado. Jon honored the three local men who were killed in the slide with his detailed description of the event and evidence of the speed and magnitude of the catastrophe that overwhelmed the victims essentially instantly. As a geologic event Jon presented the geology with very impressive photographic evident indicating different phases in the rockslide and continued long-term

instability in material immediately downslope from the headscarp. Jon indicated that a critical time could be coming up with ponding of water below the headscarp and potential overflow from spring runoff. Jon concluded with an examination of similar valleys to West Salt Creek around Grand Mesa and prediction that similar landslides are likely and that landslides that have been mapped previously as multiple slides may actually be single large events.

(continued on next page)

(president's message, continued)

2014 was an eventful year for landslides in the U.S. with the Oso mudslide in Washington on March 22, 2014 with forty-nine fatalities and the West Salt Creek landslide on May 25, 2014, the subject of Jon's talk, with three fatalities. Ice is a mineral/rock with a very low melting point, and as of January 27, there have been four fatalities in the U.S. associated with snow/ice avalanches in the 2014-15 winter season, with two of the fatalities in Colorado. I bring up these events and human impacts not to be morbid, but as a reminder of speed of some geologic events. The 2013 floods around Boulder and Denver are another example of sudden events with a major geologic and human impact. As we examine the rock record how many of these events do we see? Evidence of snow avalanches probably does not remain until the following season. Can geologic evidence of previous flood events or landslides be used to predict the recurrence interval or these events or is this evidence lost by erosion or buried? Although geologic time is measured in tens of millions of years, important events are measured in weeks, days, or even minutes.

For the February meeting we are moving almost to the other side of the world, from the continents to the oceans, and from the surface to deep within the lithosphere. I do not know how long I will be able to continue the pattern but I am trying to alternate Colorado talks with talks on topics further afield. Our February speaker is not a stranger to CSS: Anne Sheehan, Professor of geophysics at the University of Colorado at Boulder and CIRES Fellow. Together with her graduate students, Anne has been working for many years on the tectonics of the Rio Grande rift, the Wyoming Bighorn Mountains, and other areas close to home. She also has projects in the Himalaya, and is currently working on the complex lithospheric plate-boundary interactions around New Zealand using ocean bottom seismometers. This work will be the subject of her February CSS talk. Plate tectonics is a simple concept, but plate boundaries are still relatively poorly understood. This study is looking deep into the plate boundary that cuts through New Zealand using land and ocean bottom seismometers to understand the deformation at depth. I am hoping for another great audience for Anne's presentation to see the structure and movements on the cryptic side of the lithosphere.

I was heartened to see the contributions in the jar for refreshments at the January meeting. Those contributions are the main budget for meeting refreshments so please keep them coming. Fifty cents or a dollar from every attendee would keep the refreshment budget healthy. Another way to contribute is to bring snacks.

We are off to a great start to the year and I look forward to seeing as many of you as possible at our next meeting on February 19.

Paul

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In our January newsletter we neglected to include a biography paragraph about the speaker, Jonathan White, who gave the talk, "The May 2014 West Salt Creek landslide in Mesa County, Colorado". Here is some more about Jon:

Jon White is a licensed professional geologist with 30 years of experience. Jon received his BS in Geology from Eastern Illinois University in 1983 and moved to Denver in 1984 to find work. After a 3-year stint in the Rocky Mountain oil and gas industry and later temporary positions for the Colorado Dept. of Transportation, he was offered a full-time position in 1990 by the Colorado Geological Survey (CGS) who staffed the I-70 Glenwood Canyon Project Geotech Office, and has been an engineering geologist with them ever since. At the completion of the I-70 project he returned to Denver and continued further education and training, including graduate course work from the University of Colorado and Colorado School of Mines. Jon's current focus is geologic mapping, geologic hazard assessments, landslide investigations, and surficial processes and geomorphology in semi-arid to arid terrains. He is the senior author of most of the recent geologic hazard

investigations at CGS. Jon has authored over 60 published abstracts, maps, posters, and papers, including a GSA/AASG award-winning book on collapsible soils in Colorado. He has also written web-site content, geologic field-trip guidebooks, and given numerous invited presentations.

Also, we'll note that of the three photo images of the landslide that were included in our January newsletter, the two panorama photos of the landslide were oblique aerial photos taken by J. White, CGS, May 26, 2014. The third image, with Jon White standing in front of the landslide, was taken by M. Morgan, CGS, June 25, 2014.

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January's Where is this Rock photograph was correctly identified by two people, Beth Simmons and Bud Wobus (Beth's email arrived a short time before the other, so she once again takes first prize!). This conical hill is Signal Butte, a geologic curiosity as it is composed of Eocene hornblende andesite, intruded within the Pikes Peak Granite; it is interpreted as a volcanic neck. It is located about 7.5 miles southwest of Westcreek and about 8.5 miles northeast of Florissant, "in the middle of nothing else but Pikes Peak Granite as far as the eye can see". A good trail leads to the top. The butte is nicely shown on USGS Scientific

Investigations Map 3156, Geologic map of the Bailey 30' x 60' quadrangle, north-central Colorado, by Ruleman, Bohannon, Bryant, Shroba, and Premo (2011). These authors describe it as "...a porphyritic hornblende andesite, emplaced as a series of four hypabyssal plugs (Goss, 1985) and has a sphene fission-track age of 43.3 +/- 3.9 Ma (Marvin and others, 1974) and a zircon fission-track age of 42.2 +/- 2.1 Ma (Naeser, unpub. data)." They note that similar andesitic flow-breccia and ash-flow tuff is exposed within a paleovalley 2 km southeast of Kenosha Pass, and beneath Wall Mountain Tuff just northwest of Hartsel. And, "Goss, 1985", cited in their text, is Goss, C.H., 1985, Petrology, geochemistry, geomorphology, and origin of Signal Butte, Teller Co., Colorado: Williamstown, Massachusetts, Williams College, Ph. D. dissertation, 116 p. A graduate student of Bud Wobus!

Where is this Rock? -- February



For this month, our "mystery picture" will continue with the theme from last month of a pyramid-shaped feature, and from several past months, of a human-constructed feature of stone. What do you think? I'm not giving any other clues—except that it's made of granite, and it's BIG! You may send your answer/guess to Pete Modreski, 303-202-4766, or pmodreski@aol.com.

Are you willing to help us find ways to “Outreach” and expand CSS membership?

Several of our officers/committee chairs are going to get together soon to brainstorm new ideas for making CSS better known in the earth science community and getting more new members, including students. They would *love* to have some more of you join them to talk about ideas for doing this. If interested, please contact either Linda Barton Cronoble, 720-338-1237, lbarton1611@gmail.com; Lisa Fisher, lisa.fisher@escalantemines.com; or Liz Pesce, pesce.e@gmail.com.

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Calendar of Coming Events

Thurs., Feb. 5, 4:00 p.m., **Van Tuyl Lecture Series** at Colorado School of Mines; Lesli Wood, CSM, **"Water, Water Everywhere: Mars, the "Dry" Planet"**; Berthoud Hall Room 241. see http://inside.mines.edu/GE_Lecture-Series for the complete Spring Term schedule.

Thurs., Feb. 5, 6:00 p.m., **the Friends of the Colorado School of Mines Geology Museum** kicks off a monthly informal lecture series on the first Thursday evening of each month. Topics for this series will run the gamut across geology, mineralogy, mineral collecting, mining, and mining history. All talks will be held in the conference room (201) directly across from the Geology Museum at 1310 Maple Street, Golden, CO 80401. “Please join us on Thursday, February 5, for **"Creede: A Caldera Full of Silver"**. Our speaker will be Ed Raines, Collections Manager for the CSM Geology Museum. Ed is also President of the Mining History Association, author of "Historic Photos of Colorado Mining", and was the recent on-camera subject matter expert for a C-SPAN presentation on Boulder County's silver mining history. Socializing and munchies commence at 6:30 p.m., and the talk will start at 7:00 p.m.

Mon., Feb. 9, 6:00 p.m., **the Canon City Geology Club** meets at the Methodist Church Fellowship Hall on the northwest corner of 9th St. and Main, Canon City. David Camerlo will discuss **the clays of Fremont and Custer Counties** and how he uses them to create ceramic works of art. Everyone is welcome. More information: jgerring@gmail.com or 719-942-3647.

Wed., Feb. 11, 4:00 p.m., University of Colorado Geological Sciences Colloquium, **Evolution of El Niño: New Perspectives from Biomarker Proxies**, by Mark Pagani, Yale; Benson Earth Sciences Building 180. See <http://www.colorado.edu/geolsci/colloquium.htm> for the full Spring Term schedule.

Thurs., Feb. 12, 4:00 p.m., **Van Tuyl Lecture Series** at Colorado School of Mines; Roger Slatt, University of Oklahoma: **"Sequence Stratigraphy, Geomechanics, Microseismicity, and Geochemistry Relationships in some Unconventional Resource Shales"**. Berthoud Hall Room 241.

Thurs., Feb. 12, 6:00 p.m., Heritage lecture and Exhibit Opening at the Western Museum of Nature and Science, Colorado Springs; **Molybdenum and the History of the Climax Mine**, by Mike McDonald, General Manager of the Henderson Mine and former GM of the Climax Mine in Leadville Colorado. Reception at 6 pm and lecture at 7 pm. All Heritage Lectures at WMMI are always free, but please RSVP to 719-488-0880 or rsvp@wmmi.org to reserve a seat.

Please note! A annual book and map sale at the Colorado School of Mines Library normally held during Presidents’ Day week in February will **NOT** be held this year. The sale will return next year. However, there **will** be a sale of books and minerals at the **CSM Geology Museum**, the weekend of April 25-26.

Tues., Feb. 17, 10:30 a.m., USGS Rocky Mountain Seminar, Christine Smith-Siddoway (Colorado College), **Cryogenian sandstone in Colorado: A new terrestrial record for Rodinia revealed through detrital zircon provenance analysis**. Building 25 auditorium, east side entrance E-14, Denver Federal Center.

Thurs., Feb. 19, 7:00 p.m., monthly Colorado Scientific Society meeting; **MOANA and HOBITSS Ocean Bottom Seismic Experiments: Information on Deep Structure, Anisotropy, and Slow Slip beneath New Zealand**, by Dr. Anne Sheehan.

Sun., Feb. 22, 1:00 p.m., meeting of the Florissant Scientific Society in at the Woodland Park at the library a(gathering room on lower level). We usually meet for lunch at the Casa Grande Mexican restaurant just down Highway 24 from the library at 11:30. Jay Temple, longtime FSS member and consulting geologist, will speak on **Climate Change and the Sun**. All are welcome; no charge. Please contact Beth Simmons, cloverknoll@comcast.net, for more information.

Feb. 27 – Mar. 1, Gem and Mineral Show, sponsored by the Denver Gem and Mineral Guild, at Jefferson County Fairgrounds, Golden. No admission charge, and free parking.

Tues., Mar. 3, 10:30 a.m., USGS Rocky Mountain Seminar, James Jones (USGS Anchorage), **Late Cretaceous through Oligocene magmatic and tectonic evolution of the western Alaska Range**.

Thurs., Mar. 12, 3:00 p.m., VIP Room, DMNS Earth Science Seminar, David Krause, SUNY Stonybrook, **"Bizarre and marvelous dinosaurs and other vertebrates of Madagascar: Insights into the southern end of the world"**.

Thurs., Mar. 19, 7:00 p.m., monthly Colorado Scientific Society meeting; speaker TBA.

Science Fairs: You can still register to help at the Denver Metro or the State science fairs. And, please note, volunteers (to assist at a variety of “odd jobs” at the fairs) are very much needed, as well as judges:

Wed., Feb. 25, Denver Metropolitan Regional Science & Engineering Fair 10:00 a.m.-5:00 p.m. at the Denver Museum of Nature & Science. Lunch will be provided. To register as a judge please visit the website at <http://denversciencefair.com/>. For more information on judging contact Meredith Tennis at meredith.tennis@ucdenver.edu .

Thurs., Apr. 9: The 60th Colorado Science and Engineering Fair, at Colorado State University in Fort Collins. “Now that the Lory Student Center remodel is complete, there will be 100 more projects than in the past.” The sign-up deadline for judges is Feb. 28; register online at <http://www.csef.colostate.edu/Judges.htm> .

See <http://warnercnr.colostate.edu/geo-news-and-events/department-seminars> for the spring schedule of **CSU Department of Geosciences Seminars** (Fridays, 4 p.m.), which begin Jan. 30. And, Denver Mining Club luncheon meetings (Mondays, noon) are posted at <http://www.denverminingclub.org/> ; Denver Region Exploration Geologists Society (DREGS; 1st Monday, 7 p.m.), <http://www.dregs.org/index.html> ; and Western Interior Paleontology Society (WIPS; 1st Monday, 7 p.m.), <http://westernpaleo.org/> .

Emmons Lecture, April 16: The CSS 2015 Emmons Lecture will take place on Thursday, April 16, at the American Mountaineering Center auditorium, 710 10th St., Golden, at approx. 7 p.m. The speaker will be Dr. Tom Barclay, NASA Ames Research Center and the Bay Area Environmental Research Institute; his topic will be **“The Search for Earth-like Planets”**. Tom was recently named Director of the Kepler K2 mission, to continue the search for exoplanets using the Kepler spacecraft.

Upcoming symposia:

Mar. 14-15, 2015, “Fossils and Flight” will be the semi-annual “Founders Symposium” sponsored by the Western Interior Paleontology Society. It will be held at the Green Center, Colorado School of Mines campus, Golden, CO. “The symposium will explore “what the fossil record reveals about how life conquered the skies” and will include over a dozen speakers, half-day fossil workshops, a field trip, a poster session, exhibits, and a gallery of paleontology-related art displays. For more information see http://westernpaleo.org/symposiums/2015_pages/about-2015.html .

Mar. 21, a one-day workshop/seminar on “**Color in Minerals**” will be held on the Colorado School of Mines campus, sponsored by the Friends of the CSM Geology Museum. Featured presenter will be Dr. George R. Rossman, Caltech, well known for his research on spectroscopy and color of minerals (see his group’s website at <http://minerals.gps.caltech.edu/index.html>). More information will be forthcoming.

July 11-12, 2015, a mini-symposium on the mineral occurrences and geology of the **Gunnison, Colorado area** is being planned by the Friends of the Colorado School of Mines Geology Museum, to include both lectures and field trips. The meeting HQ will be on the Western State Colorado University campus in Gunnison. The symposium is still in the planning stages; more information will be available later in the spring.

Special exhibits continuing in 2015:

Steps in Stone: Walking Through Time, at the University of Colorado Museum of Natural History, CU campus, Boulder. “A new exhibition that features real fossil tracks and trackways from the University of Colorado Museum of Natural History collections”. Open 9-5 weekdays, 9-4 Saturdays, 10-4 Sundays; closed on university holidays. Exhibit runs through December 2015; see <http://cumuseum.colorado.edu/> .

Brilliant: Cartier in the 20th Century continues at the Denver Art Museum through March 15. “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. See: <http://www.denverartmuseum.org/exhibitions/brilliant-cartier-20th-century>

Molybdenum and the Climax Mine, at the Western Museum of Mining and Industry, Colorado Springs; exhibit opening on Feb. 12, with a free Heritage Lecture on the History of the Climax mine. See <http://www.wmmi.org/> .

Our reminder again – please pay dues for 2015 if you haven’t yet! A dues form is in this newsletter and on our website, <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 **only** \$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. Please contact CSS Treasurer Don Sweetkind at 303-236-1828 or dsweetkind@usgs.gov if you are uncertain of your dues and 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).

2015 CSS Elected Officers

President.....Paul Morgan, 303-384-2648, morgan@mines.edu
President Elect.....Peter Barkman, 303-384-2642, barkmann@mines.edu
Treasurer.....Don Sweetkind, 303-236-1828, dsweetkind@usgs.gov
Secretary.....Lisa Fisher, 303-215-0480, lisa.fisher@escalantemines.com
Past President..... Scott Lundstrom, 303-917-2849, pslundstrom@msn.com

Councilors

2013-2015: Marieke Dechesne, 303-236-1289, mariekedechesne@gmail.com
2013-2015: Liz Pesce, pesce.e@gmail.com
2014-2016: Celia Greenman, celia.greenman@earthlink.net
2014-2016: (vacant position, to be filled)
2015-2017: Bruce Geller, 303-273-3823, bgeller@mines.edu
2015-2017 Pete Modreski, 303-202-4766, pmodreski@aol.com

Committee Chairpersons

Best Student Paper Competition: Scott Lundstrom, 303-917-2849, pslundstrom@msn.com
Database Manager: Don Sweetkind, 303-236-1828, dsweetkind@usgs.gov
Field Trips: Cal Ruleman, 303-236-7804, cruleman@usgs.gov
History: Beth Simmons, cloverknoll@comcast.net
Hospitality: Jack Krajewski, gijack08@gmail.com
Membership/Mentor: Liz Pesce, pesce.e@gmail.com
Student Research Grants: Scott Lundstrom, 303-917-2849; csslund15@gmail.com
Newsletter Editor: Pete Modreski, 303-202-4766, pmodreski@aol
Outreach: Linda Barton Cronoble, 720-338-1237, lbarton1611@gmail.com
Program: Open
Publicity: Open
State Science Fair: Chuck Weisenberg, 303-238-8806, cweisnbrg@msn.com
Webmaster: Barb Warden, 303-278-2701, bwarden@tablemtn.com

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Our website: <http://www.coloscisoc.org>



Colorado Scientific Society

Application and Membership Update Date _____ Dues and Funds Contributions

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
Fund Raising

History
Newsletter

Outreach
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
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Or register and pay on-line using PayPal at:

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