



Founded in 1882, the objective of the Society is to promote the knowledge and understanding of Earth science, and its application to human needs. Samuel Franklin Emmons, 1841-1911, was “Geologist in Charge” of the Colorado Division of the U.S. Geological Survey when it was established in 1879 and was the first president of the Society.

February 2024 Colorado Scientific Society Newsletter

CSS March Meeting

Thursday, March 21, 2024 at 7:00 p.m.

Calvary Church, Golden, and via Zoom

The tale of the 2022 Chaos Canyon landslide: an ice-rich debris slide in Rocky Mountain National Park

Kate Allstadt, U.S. Geological Survey



A USGS geologist in front of the Chaos Canyon landslide about two weeks after it occurred.

Photo credit USGS/K.Allstadt

Abstract: On 28 June 2022, ~2 million cubic meters of ice-rich debris mobilized from the southeast flank of Hallett Peak in Rocky Mountain National Park. The material slid rapidly for about 245 m into Chaos Canyon, a popular bouldering destination in the park. The slide stopped when it reached a deposit composed of massive boulders filling the valley floor that has been previously mapped as a relict rock glacier. Several climbers were bouldering near the toe of the landslide when it occurred. The group narrowly escaped and caught parts of the event on video, resulting in substantial nationwide media coverage. In this talk, I will detail a multifaceted investigation in which we used eyewitness accounts, field and remote sensing techniques, historic climate data, and seismic recordings to unravel the mysteries of this unusual landslide sequence and the events leading up to it. Direct observations of melting blocks of icy debris in the landslide deposits, coupled with decades of slope deformation patterns correlated with warming temperatures, strongly suggest permafrost degradation was a major contributing factor.

The full study is publicly available here:

[**The 2022 Chaos Canyon landslide in Colorado: Insights revealed by seismic analysis, field investigations, and remote sensing**](#)

Biography: Kate Allstadt has been a Research Geophysicist at the USGS Geologic Hazards Science Center in Golden, CO since 2015. Kate conducts multidisciplinary approaches, commonly incorporating seismic and geophysical techniques, to study landslide, earthquake, and volcano hazards. She currently focuses on earthquake-triggered ground failure, near-real-time earthquake impacts, seismic monitoring of debris flows and lahars, and studies of massive rapid landslides using seismic methods and numerical modeling. Kate completed her PhD in Seismology at University of Washington in 2013 and her MS in Engineering Seismology jointly at the Université Joseph Fourier, Grenoble, France and ROSE School, Pavia, Italy.

In-person Meeting at Calvary Church Golden; and via Zoom

All are welcome – no admission charge

6:30 pm – Social time at in-person meetings

6:45 pm – Join Zoom meetings

7:00 pm – Meeting and Program begin. Please arrive early.

Church doors are locked, and **no one will be at the door to let you in after 7:00 pm.**

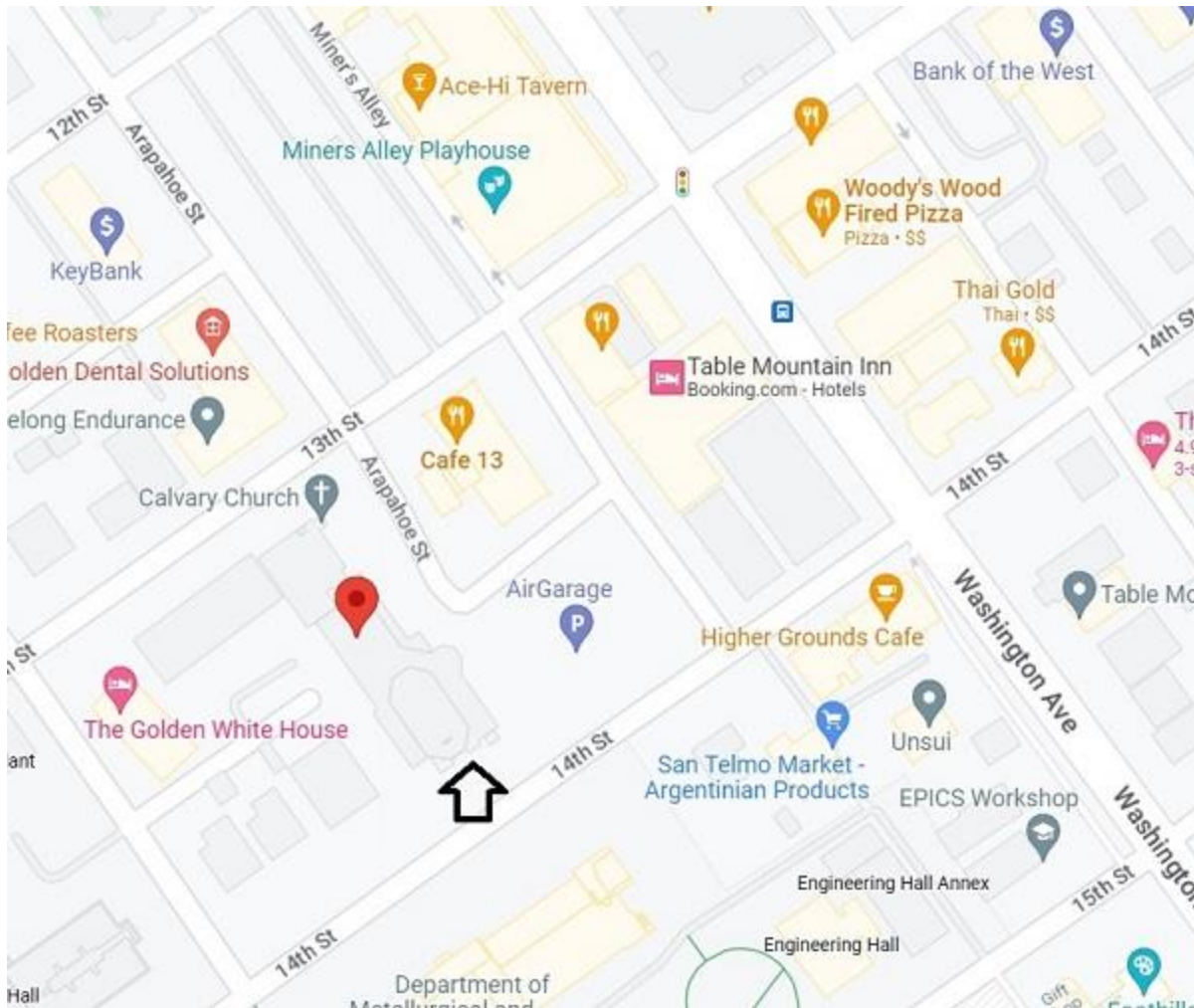
See the details about our in-person meeting at Calvary Church in Golden after the Abstract and Bio.

You may always see all this information about our coming meetings on our website, <https://coloscisoc.org/>.

CSS is inviting you to our meeting on Thursday March 21st at 7:00 pm.

Click to Join CSS Zoom Meeting
from PC, Mac, Linux, iOS or Android

[For other Zoom options, click here.](#)



Calvary Church in Golden. Enter at arrow on map.

[Calvary Church Golden](#)

Click on link to open a Google map.

Enter from 14th St., go in by the main glass doors at [906] 14th St.

Do **not** enter via the old church above 13th St.

From the 14th Street entrance go down the hallway following Colo Sci Soc signs to Community Rooms 1 and 2, where we meet.

The church doors must stay locked, and we will have a person to let you in at the doors off 14th st.

They want to see the presentation too, so **please arrive before 7:00 pm.**

There will be a phone number that you can text to be let in if you arrive late.

Parking

On street parking is available close by, along 14th St and west of Washington Ave in Golden.

The AirGarage parking structure, which can be entered from Arapahoe St., is \$3.00 for three hours.

Red Rocks Park – CSS No Moss Field Trip

Saturday, March 30th 2024, 9:00 AM to noon

Steve Cumella will lead this trip.



Red Rocks Amphitheater

Join Steve Cumella on Saturday March 30th for a 3-hour tour of the spectacular Fountain outcrops in Red Rocks Park near Morrison, Colorado. Park in the Upper North Lot (see attached map) and meet at 9:00 AM at the top of the Amphitheater. From there, we will walk 2.25 miles through the Amphitheater and along the Trading Post Trail for a cumulative 675' of elevation gain and 670' of elevation loss. Park entry is free and all are welcome to join us for this Colorado Scientific Society No Moss Gathering. Bring your expertise, your questions, your curiosity, and most of all – have fun!

The Pennsylvanian-age Fountain Formation is spectacularly exposed at the Red Rocks Amphitheater near Morrison, Colorado. The Fountain is composed of thick-bedded arkosic sandstones and conglomerates interbedded with dark maroon mudstones. The Fountain is believed to have been deposited by alluvial fans being shed eastward from the Ancestral Front Range. On this fieldtrip we will examine sedimentary features of the Fountain. Surprisingly, no detailed modern sedimentologic study has ever been done on the Fountain at Red Rocks, so we can discuss how well the features we observe fit within an alluvial fan model. Fortunately, high-resolution Google Earth imagery is available for the Red Rocks area and this imagery offers the opportunity to attempt to correlate the Fountain stratigraphy. The attached Google Earth images show possible Fountain correlations. (See the “Red Rocks, Google Earth Dec 2020, Cumella” PDF below. The colored lines on the images show possible correlations.) During the fieldtrip we can see how well these correlations hold up.

Flyer for [Red Rocks Park No Moss Gathering 3-30-24](#).

Print and bring it with you.

Images showing correlations: [Red Rocks, Google Earth Dec 2020, Cumella, 5.4 MB](#)

Print this and it bring it with you.

“Where’s That Rock?”

This quiz *used* to be a regular feature of our newsletter, but somehow (blame it on covid?) it just fell by the wayside and way dropped. (The fault was solely that of your newsletter editor (me), who originated the feature some years back but, well, then just always seemed to so busy that it was all I could do to get a newsletter written at all, and emailed out to the membership barely in advance of our monthly meeting.) I have decided I was ready to bring it back, and least for this month, and hopefully thereafter!



Here is a geologic photo. Your challenge is to figure out where (usually but not always, in Colorado) it is and hopefully, what geologic formation it represents. If you care to make a guess, please just email it to me at pmodreski@gmail.com, and next month I’ll report on what and where it exactly is and who guessed it correctly!

Best of luck! --- Pete





DENVER MOUNTAIN PARKS FOUNDATION
www.DMPF.NET

Matthews/Winters Park
(Jefferson County Open Space)

Red Rocks Park
(Denver Mountain Park)

Upper North Lot - park here

Top of Amphitheater - meet here

Trading Post Trail

Red Rocks Park

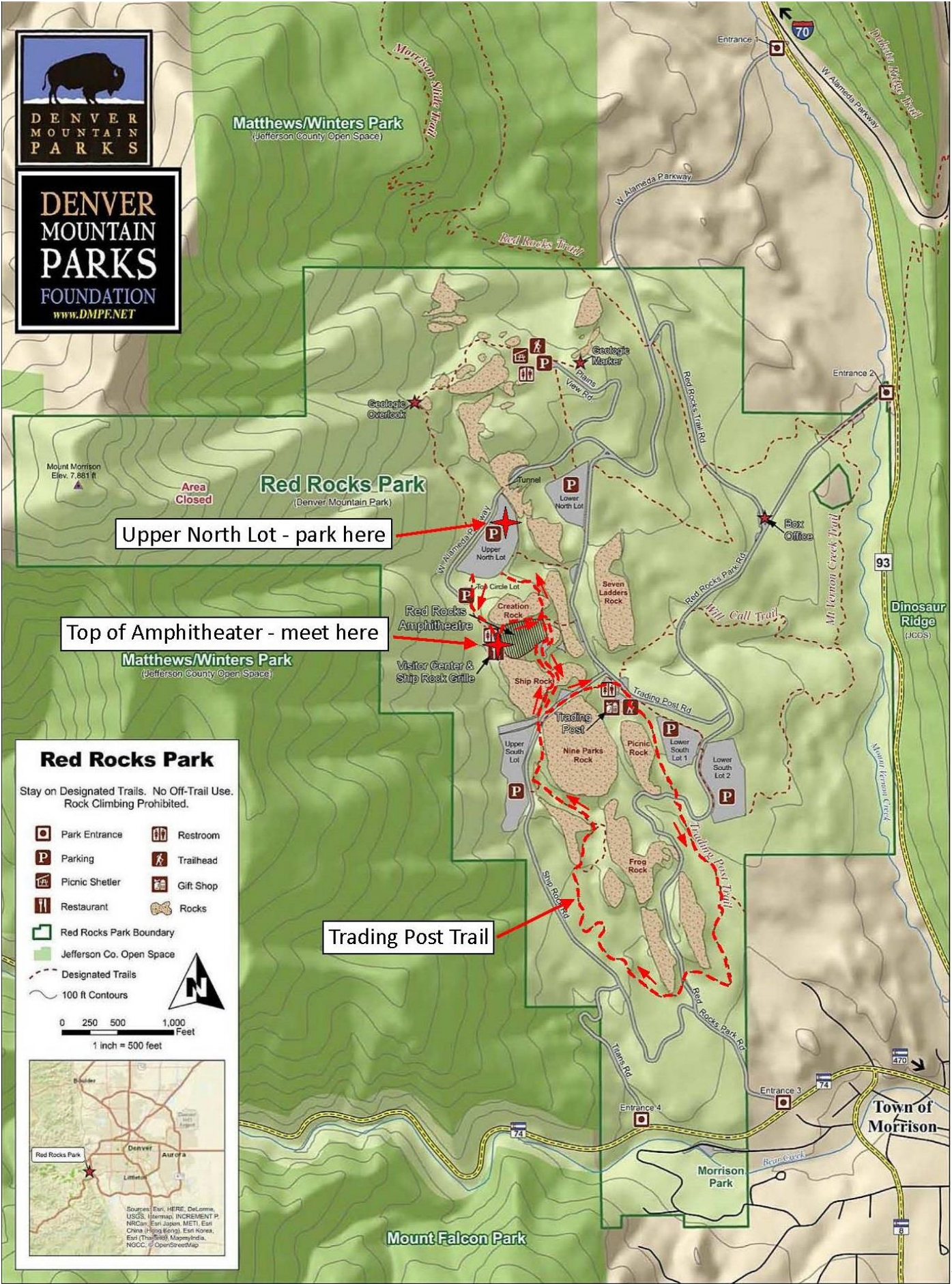
Stay on Designated Trails. No Off-Trail Use.
Rock Climbing Prohibited.

	Park Entrance		Restroom
	Parking		Trailhead
	Picnic Shelter		Gift Shop
	Restaurant		Rocks

Red Rocks Park Boundary
 Jefferson Co. Open Space
 Designated Trails
 100 ft Contours

0 250 500 1,000 Feet
1 inch = 500 feet

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NCCO, OpenStreetMap



CSS 2024 Meetings

CSS March Meeting

The tale of the 2022 Chaos Canyon landslide: an ice-rich debris slide in Rocky Mountain National Park

Thursday, March 21, 2024 at 7:00 p.m.

Kate Allstadt, U.S. Geological Survey

In-person Meeting at Calvary Church Golden or Join us on Zoom

CSS April Meeting and Emmons Lecture

Tales from the Field: Using Modern Earth to Assess Life on Ancient Mars

Thursday, April 18, 2024 at 7:00 p.m.

Brian Hynek, University of Colorado

In-person Meeting at Calvary Church Golden or Join us on Zoom

CSS May Meeting

Minerals and Elements

Thursday, May 16, 2024 at 7:00 p.m.

Peyton Jackson, American Clean Resources Group

In-person Meeting at Calvary Church Golden or Join us on Zoom

CSS Past Presidents Dinner – September

Topic TBA

Thursday, September 19, 2024 at 7:00 p.m.

David Goodwin and **Peter Roopnarine**, California Academy of Sciences

Mount Vernon Canyon Club or Join us on Zoom

CSS October Meeting

Topic TBA

Thursday, October 24, 2024 at 7:00 p.m. – note a week later than normal

Harrison Gray, U.S. Geological Survey

In-person Meeting at Calvary Church Golden or Join us on Zoom

CSS November Meeting and Student/Member Poster Night

Thursday, November 21, 2024 at 7:00 p.m.

In-person Meeting at Calvary Church Golden or Join us on Zoom

CSS December Holiday Potluck, Meeting and President's Address

Quaternary Records of Spring Ecosystems

Tuesday, early December 2024 at 5:30 p.m. (exact date TBA)

Jeff Pigati and **Kathleen Springer**, U.S. Geological Survey

In-person Potluck Dinner at New Terrain Brewing Company or Join us on Zoom

Watch Zoom Recordings of Recent CSS Meetings!

Most recent CSS presentations are recorded on Zoom. Follow the links on our website in the titles for each presentation to see abstracts, biographies of the speakers and video recordings of our meetings.

Please don't forget or neglect to pay your CSS dues for 2024! And consider making an extra contribution to one of our memorial funds or endowment fund!

You may pay dues online or print out a PDF of the membership form and mail it to us with a check. Continuing your membership in CSS will enable us to continue all our ongoing programs, including our field trips, virtual meetings, Student Research Grants, and more.

See [Membership and Donations](#) for the CSS membership PDF and our online membership payment form.

Regular CSS Membership is \$25;

Student Membership, \$5;

Life Membership, \$395.

Send your membership payment, if not done through [our online membership payment form](#), to Colorado Scientific Society P.O. Box 150495 Lakewood, CO 80215-0495.

Thank you!

Field trips to come

We are planning to have some additional “No Moss” short field trips, and one or more full-day or weekend field trips, during the year; we’ll be informing you (and see our website!) as specific trips are scheduled. Some likely trips being discussed include: Faulting on Green Mountain; Gateway Mesa (Castle Rock) Open Space and the Castle Rock Conglomerate; geologic structures along Coal Creek; Eldorado Springs Canyon; and, building stones in downtown Denver historic buildings. Our Red Rocks Park field trip/hike will be on March 30 (info above in the newsletter).

We’ll hope to see you at many or all of these coming events!

---Pete Modreski, CSS newsletter editor; you can always write to me at pmodreski@gmail.com

CSS officers and councilors for 2024 are:

Jeff Pigati – President

Shannon Mahan – President Elect

Cal Ruleman – Past President

Patrick Sullivan – Secretary

Jim Paces – Treasurer

Chris Morrison – Chair, Webmaster

Pete Modreski – Newsletter

Julie Herrick – Councilor 2022–2024

Lesli Wood – Councilor 2022–2024

Michael Frothingham – Councilor 2023–2025

Kassandra Lindsey – Councilor 2023–2025

Susan Slomski – Councilor 2024–2026

Nathan Rogers – Councilor 2024–2026

Sylvia Nicovich – Chair, Field Trips

Available from the CSS—Did you know?

The Geology of Boulder County, with 25 Field Trips, 2004, by Raymond Bridge, 490 pages, Lone Eagle Publications. \$20.00. Copies of this book were donated to the CSS by the family of the author (deceased)

Colorado Scientific Society T-Shirts; also \$20.00

Ask to see these NEW T-shirts at any of our CSS meetings! [You’d know better about these, and would have seen them, if you come to our meetings in person!]

Coming Earth Science Events from ours and other organizations, March 2024 and beyond, updated 3/17/2024---from Pete Modreski, pmodreski@aol.com or pmodreski@gmail.com

Wed., Mar. 20, The Wonders of Colorado's Glacial Landscape, first in a series of three free online lectures by Vince Matthews, past Colorado State Geologist. The succeeding presentations will be on March 27 and April 3. From the WrightED lecture series of the Wright Opera House, Ouray, CO. See the attached announcement for how to register; presented via Zoom at 10 a.m., but will be recorded and if you register these can be viewed at any time on your own. See <https://thewrightoperahouse.org/events/lectures/wrighted-lecture-series> .

Thurs., Mar. 21, 7:00 p.m., social time 6:30, The 2022 Chaos Canyon landslide: An ice-rich debris slide in Rocky Mountain National Park, by Kate Allstadt, USGS. Colorado Scientific Society monthly meeting, at Calvary Church, Golden, All are welcome; live and via zoom. See <https://coloscisoc.org/> for details and the Zoom link.

Fri.-Sun., March 22-24, Fort Collins Gem and Mineral Show, 4-8 p.m. Fri., 9-6 Sat., 10-4 Sun., at The Ranch/Larimer County Fairgrounds, Thomas M. McKee 4-H Building; the Fort Collins Rockhounds Club 61st annual show.

Thurs., Apr. 9, 2-3 p.m., Denver Museum of Nature and Science, Earth Sciences Colloquium series: Revisiting the mechanisms and thresholds of mass extinction. Cori Myers, Univ. of New Mexico. Talks are in-person-only, from 2-3 pm in Ricketson Auditorium (not the VIP Room as in previous years). Ricketson Auditorium is on the 1st floor near the West Atrium. Museum admission not required to attend. Enter through Staff/Volunteer entrance, 50' east of main visitor entrance, and let Security know you're attending the talk, they will direct you to walk through the *Space Odyssey* exhibit until you see the park and then turn right toward Ricketson Auditorium. All are welcome to attend. The Colloquium schedule for the rest of the year is attached as a separate file. The first several lectures have already taken place, and the Museum was closed for the Mar. 14 talk due to the snowstorm.

Fri.-Sun., April 12-14, Colorado Mineral and Fossil Spring Show, Crowne Plaza DIA, 15500 E 40th Ave., Denver CO 80239. No admission charge.

Thursday, April 18, 2024 at 7:00 p.m., CSS meeting and Emmons Lecture, Tales from the Field: Using Modern Earth to Assess Life on Ancient Mars, by Brian Hynek, University of Colorado. In-person Meeting at Calvary Church Golden or Join us on Zoom.

Fri.-Sun., May 3-5, Southern Colorado ("SOCO") Rock and Mineral Show, 10 a.m. to 6 p.m. daily, at Colorado Springs Convention Center, 3960 Palmer Park Blvd., Colorado Springs, Colorado. For more info see www.socorockandmineralshow.com or contact SOCO Rock & Mineral Show, (719) 280-7091. This is a new commercial gem and mineral show venture so I do not have any recommendations about what it may be like. The website promises: demonstrations, indoor and outdoor vendors, presentations, rock auction, live music, craft beer garden and wine bar, food trucks, kids activities, games, supply sales, geology clubs, door prizes, gold mining tips and more. Admission \$5 or \$10 multi-day pass, kids 12 and under free.

Sat., May 4, 12:00-3:00 p.m., Colorado Mineral Society Silent Auction, held at Wheat Ridge United Methodist Church, Exhibition Hall, 7530 W. 38th Ave. (just east of Wadsworth). All are welcome to attend, and to bring specimens to sell in the auction (minimum donation of 20% of selling price to the club). Setup begins at 11 a.m.; there will be a vocal auction as well as silent auction tables.

Thurs., May 16, 7 p.m., CSS meeting, **Minerals and Elements**, by Peyton Jackson, American Clean Resources Group. In-person Meeting at Calvary Church Golden or Join us on Zoom.

Sat., May 18, 12:00-3:00 p.m., **Friends of Mineralogy, Colorado Chapter, Silent Auction**, held at Wheat Ridge United Methodist Church, Exhibition Hall, 7530 W. 38th Ave. (just east of Wadsworth). All are welcome to attend, and to bring specimens to sell in the auction (minimum donation of 20% of selling price to the club). Setup begins at 11 a.m.; there will be a vocal auction as well as silent auction tables.

Fri.-Sun., June 7-9, Pikes Peak Gem and Mineral Show, at the Norris Penrose Event Center, 1045 Lower Gold Camp Road, Colorado Springs, sponsored by the Colorado Springs Mineralogical Society (founded in 1936). The 2024 show theme is "Petrified Wood". Fri. 12 noon-7 p.m., Sat. 10-5, Sun. 10-4.

Thurs.-Sun., June 13-16, A Mineralogical Symposium, sponsored by the Colorado Chapter, Friends of Mineralogy: **Mineral Oddities: Pseudomorphs, Twinning, Inclusions, and more**. "Friends of Mineralogy Colorado Chapter will be hosting a symposium on June 13-16, 2024, to be held in Berthoud Hall on the Colorado School of Mines campus, Golden. The 2024 Symposium webpage is now live, with dates and preliminary details: <https://friendsofmineralogycolorado.org/symposium/> . We will be updating this page throughout the spring as additional details become available pertaining to registration, field trips, the mineral photography workshop, etc. On the symposium webpage, you will find a link to "RSVP" and join the dedicated symposium email list. **If you are tentatively interested in attending the symposium, we would greatly appreciate it if you could fill out that form; it will be very helpful to us in our planning.** You can access the form here as well: <https://docs.google.com/forms/d/e/1FAIpQLSeA9XvwGdXliCKi9pXJmuPBT1t8-u9sTRuhN5y1yP8KW9R9xMQ/viewform> ."

The symposium will include field trips on June 13, a mineral photography workshop on June 14 conducted by Jeff Scovil plus an evening reception at the Colorado School of Mines Museum, and lecture sessions on June 15 + half day June 16. The lecture sessions will take place in Berthoud Hall, CSM campus. All interested persons will be welcome to register to attend. For more information about the symposium as it becomes available please see the FMCC website, <https://friendsofmineralogycolorado.org/> . To sign up on an email list to receive information updates about the symposium please go to:

<https://friendsofmineralogycolorado.org/SymposiumMailingListSignUpForm>

[If you are interested in presenting at the symposium, please click here to fill out the Call for Papers form.](#)

Thurs.-Sun., July 25-28, Fairplay Gem, Mineral, and Jewelry Show; Platte Drive, ½ mile west of US-285, Fairplay, CO; free admission and parking.

Thurs.-Sun., Aug. 8-11, Buena Vista Contin-Tail Gem, Mineral, and Fossil Show, Buena Vista Rodeo Grounds; free admission and parking.

Thurs.-Sun., Aug. 15-18, Woodland Park Gem & Mineral Show; located outdoors off US-24; free admission and parking.

Thurs.-Sun., Aug. 16-18, Lake George Gem & Mineral Show; located outdoors off US-24; free admission and parking. Sponsored by the Lake George Gem & Mineral Club.

Thurs.-Sun., Sept. 12-15, Denver Gem and Mineral Show, part of the Hardrock Summit Show, and cosponsored by the nonprofit Greater Denver Area Gem and Mineral Council, an association of 7 Front Range area gem, mineral, and fossil clubs. In 2024 this will be held at the **Westin Westminster Hotel**, 10600 Westminster Blvd., Westminster CO. The show includes museum displays, club booths and demonstrations including free mineral and gem identification, and sale of grab bags for kids that goes toward a scholarship fund at Colorado School of Mines. Free admission and parking.

Several other gem, mineral, and jewelry shows will take place in Denver during the week preceding the “Denver Show”. These include:

Fri.-Mon., Sept. 5-8, Just Minerals and Crystals Event Denver, Denver Airport Marriott at Gateway Park, 16455 E. 40th Circle, Aurora CO. Free parking & admission.

Sept. 6-14, Colorado Mineral and Fossil Fall Show, Crowne Plaza DIA, 15500 E 40th Ave., Denver CO 80239. Free admission & parking.

Sept. 6-15, Denver Mineral, Fossil, Gem & Jewelry Show; Denver Expo Gem Show; and Miner’s Co-op Show; all at the National Western Complex, 4655 Humboldt St., Denver. Free parking & admission.

Nov. 1-3, New Mexico Mineral Symposium, Socorro, NM, sponsored by the New Mexico Bureau of Geology & Mineral Resources, Mineral Museum, and held at the Macey Center, New Mexico Institute of Mining & Technology. For information see <https://geoinfo.nmt.edu/museum/nmms/home.cfm> . *[Note, this is a recently announced date change to Nov. 1-3, from the earlier anticipated date of the weekend of Dec. 8-10.]*

Nov. 15-17 (anticipated date), Denver Area Mineral Dealers (D.A.M.D.) Gem and Mineral Show, at the Jefferson County Fairgrounds, Golden.

Dec. 13-15, Flatirons Gem and Mineral Show, at the Boulder County Fairgrounds, Longmont; sponsored by the Flatirons Gem & Mineral Club [Boulder].

2024 Earth Sciences Colloquium

Denver Museum of Nature & Science

All are welcome to attend!

Talks are in-person-only, from 2-3 pm in Ricketson Auditorium (not the VIP Room)

Ricketson Auditorium is on the 1st floor near the West Atrium. Museum admission not required to attend. Enter through Staff/Volunteer entrance, 50' east of main visitor entrance, and let Security know you're attending the talk, they will direct you to walk through the *Space Odyssey* exhibit until you see the park and then turn right toward Ricketson Auditorium.

Jan 22nd: *Testing evolutionary theories of predator-prey interactions in deep time.* ([Lydia Tackett](#), U. of Missouri)

Jan 30th: *How to take over the world: Climate change, development, and the origin of major vertebrate groups.* ([Chris Griffin](#), Yale)

Mar 7th, 2 pm*: *Tales told by trilobites.* ([Thomas Hegna](#), SUNY Fredonia) *(doubleheader!)

Mar 7th, 3 pm*: *The largest organisms on the Morrison Formation floodplain...and the sauropods that ate them.* ([John Foster](#), Utah Field House of Natural History State Park Museum) *(doubleheader!)

Mar 14th: *Our Earth was completely frozen? Twice?* ([Carol Dehler](#), Utah State U.)

Apr 9th: *Revisiting the mechanisms and thresholds of mass extinction.* ([Cori Myers](#), U. of New Mexico)

May 3rd: *Drainage reorganization, sediment source reconstruction, & intraplate tectonics during Ancestral Rocky Mountain deformation.* ([Tyson Smith](#), USGS)

Jun 27th: *Using 3D morphometrics to track rapid morphological changes in Late Triassic bivalves from New Zealand.* ([Annaka Clement](#), DMNS)

Aug 1st: *Origins of icehouse vegetation in southern South America.* ([Gabi Rossetto Harris](#), DMNS)

Sep 26th: *The single worst day in Earth's history - the squamate perspective.* ([Holger Petermann](#), DMNS)

Oct 24th: *Brain evolution and the origin of birds.* ([Amy Balanoff](#), Johns Hopkins)

Nov 14th: *Did the Deccan Traps volcanic province cause the end-Cretaceous mass extinction?* ([Blair Schoene](#), Princeton)

Dec 5th: *The wandering Falklands: A plate tectonic odyssey.* ([Eric Roberts](#), Mines)