Dear CSS members, please come to our February meeting, Thursday, Feb. 16, 2023, 7 p.m., at Golden Calvary Episcopal Church:

Mars Geology;
Stratigraphy, Sedimentology, and Diagenesis of a Martian Lacustrine Deposit, Murray Formation, Gale Crater, Mars

Thursday, February 16, 2023 Dr. John P. Grotzinger, Division of Geological and Planetary Sciences, California Institute of Technology

All are welcome
6:30 pm – Social time begins at Golden Calvary Episcopal Church
6:45 pm – Join Zoom meeting, if attending remotely
7:00 PM – Meeting starts. Church doors are locked after 7:00 pm.

Mars

Abstract: The Mars Science Laboratory Mission's Curiosity rover landed at Gale crater, Mars, on August 6, 2012. For the past ~9 years Curiosity has been exploring a lacustrine deposit exposed in dissected terrain of crater-interior central mountain. The lacustrine deposit (Murray fm., ~400m thick, early Hesperian age) overlies and is laterally equivalent to fluvial-deltaic deposits of the Bradbury group that Curiosity explored earlier in the mission. These rocks are unconformably overlain by the Stimson formation, an eolian sandstone that was deposited above a surface representing significant denudation of crater-filling strata. The Murray contains one major depositional facies – laminated mudstone – deposited in a lake; and minor additional facies – ripple cross laminated and trough cross bedded sandstones – representing subaqueous delta foreslope, fluvial, or eolian environments. The persistence of fine lamination, locally with scour and drape truncation surfaces, and general absence of desiccation cracks, prism cracks, intraclasts, displacive evaporite crystals and nodules, or bedded evaporites, all suggest a perennial lake with depths great enough to avoid seasonal desiccation. Intercalated thin sandstones, of potentially eolian or fluvial origin, might indicate base-level lowering during longer-term lake level oscillations or a

period of normal regression. The mineralogy and chemistry of the lower Murray formation are explained by variations in the composition of fine clastic detritus delivered to the lake via marginal sediment plumes, coupled with redox oscillations in the composition of authigenic minerals precipitated from the lake. Stratigraphically higher members of the Murray, including those leading up to and comprising Vera Rubin Ridge and Glen Torridon regions, record elemental mobility during later diagenesis due to chemical weathering in an increasingly temperate paleoclimate as shown by feldspar alteration and phyllosilicate mineralogies. The early Hesperian environment at Gale crater is inferred to have recorded a persistently aqueous environment characterized by mild salinity and acidity. In that regard, Mars increasingly seems similar to Earth, where spatial variability in regional/global environments is as important to understand as temporal variability.

Dr. John P. Grotzinger is the Harold Brown Professor of Geology, Division of Geological and Planetary Sciences, California Institute of Technology. He was named chair of the Division of Geological and Planetary Scienes in June 2015. He served as chief scientist for NASA's Mars Rover Curiosity mission and is currently a science Co-Investigator on the Perseverence Rover mission. Dr. Grotzinger's research involves the comparative evolution of Earth and Mars in characterizing the origin and early evolution of life on Earth, and the search for biosignatures on Mars. He is a member of the US National Academy of Science, the American Academy of Arts and Sciences, and a recipient of NASA's Outstanding Public Service Medal, and the Halbouty Award of the American Association of Petroleum Geologists. Dr. Grotzinger is a graduate of Hobart College (BS), the University of Montana (MS) and Virginia Polytechnic Institute (PhD). He served as a professor at MIT for 18 years, moving to Caltech in 2005.

Meeting at Golden Calvary Episcopal Church

Golden Calvary Episcopal Church

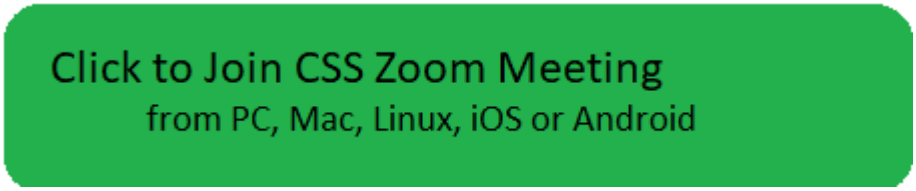
[1320 Arapahoe St, Golden, CO 80401]
Click on link to open a Google map.

Enter off 14th St., going in via the main glass doors.
Go through building following the CSS signs to the Community Rooms 1 and 2, where we meet.
The church doors must stay locked, and we will have a person to let you in.
They want to see the presentation too, so please be there by 7:00 pm.

Parking
On street parking is available close by, west of Washington Ave in downtown Golden.
The AirGarage parking structure, which can be entered from either Arapahoe St. or 14th St., is $3.00 for three hours.

Link to Join CSS February Zoom Meeting:
Mars Geology;
Stratigraphy, Sedimentology, and Diagenesis of a Martian Lacustrine Deposit, Murray Formation, Gale Crater, Mars

CSS is inviting you to our meeting on Thursday February 16th at 7:00 pm.



Join Zoom Meeting
https://us06web.zoom.us/j/85793363843?pwd=Vlk4aU5Jc3c3a1BXWlNYYlFLd0pnZz09

Meeting ID: 857 9336 3843
Passcode: 227404

We normally hold monthly meetings from September through May.
Our meetings are normally now both in-person and virtual.

Meetings are normally on the third Thursday of the month.

All are welcome – no admission charge
6:30 pm – Social time starts at in-person meetings
6:45 pm – Join Zoom meetings
7:00 pm – Meeting and Program begin. Church doors are locked after 7:00 pm.

Please pay your CSS dues for 2023!

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 our online membership payment form and the CSS Membership printable PDF.
Regular Membership is $20, through January, 2023; then $25;
Student Membership (any level) $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!

See Zoom Recordings of Recent CSS Meetings

Recent CSS presentations are recorded on Zoom. Follow the links in the titles for each presentation to see abstracts, biographies of the speakers and video recordings of our meetings.
Note: Ignore the "Transcript". It is wrong too often. Just listen to the video.

Structural Geology and Geological Exploration in the Indo-Burmese Ranges of NE India; Deformation along a collisional/transform plate margin
May 19, 2022

Daniel Schelling, Structural Geology International, LLC

Sandstone cliffs in Mizoram, India

This talk focuses on the structural geology of the Northeast India collisional plate boundary with Burma, and the northern sector of the 1200 km long Indo-Burmese ranges.

Meetings are normally on the third Thursday of the month.

All are welcome – no admission charge
Join Zoom meetings at 6:45
Meeting and Program begin at 7:00

See Archives of CSS Talks – Indexed (under Events) for previous Colorado Scientific Society Talks, or just follow the link.

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Calvary Episcopal Church in Golden – Details and Map

1320 Arapahoe St, Golden, CO 80401
Click on link to open a Google map.

Golden Calvary Episcopal Church

Parking Options:

- There is on-street parking in the neighborhood.
- The parking structure, which can be entered from either Arapahoe St. or 14th St. is $3.00 for three hours.

Map of the **Calvary Episcopal Church in Golden, paid parking lot**.
The Church is southwest of their parking lot. It is easiest to enter the church complex from 14th St.

Enter off 14th St., going in via the main glass doors.
Go through building following the CSS signs to the Community Rooms 1 and 2, where we meet.

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Other Options to Join the CSS Meeting Presentation via Zoom

The Colorado Scientific Society is inviting you to a scheduled Zoom meeting.

Topic: CSS 2023 Monthly Lecture Series – February, 16, 2023 Meeting
Time: Feb 16, 2023 06:45 PM Mountain Time (US and Canada)
Topic: **Stratigraphy, Sedimentology, and Diagenesis of a Martian Lacustrine Deposit, Murray Formation, Gale Crater, Mars**
Presenter: **Dr. John P. Grotzinger**, Division of Geological and Planetary Sciences, California Institute of Technology

Time: The lecture will start at 7:00 PM