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APRIL 2025 MEETING

www.magdalenadonahue.com

<u>SPEAKER:</u>	Magdalena Sandoval Donahue
<u>TITLE:</u>	<i>The Geology of New Mexico and the Writing of the Roadside Geologic Guidebook</i>
<u>DATE:</u>	Thursday, April 17th, 2025
<u>TIMES:</u>	5:00-5:30: Happy Hour 5:30-6:30 pm: Dinner 6:30-7:30 pm: Society Business / Presentation 7:30-7:45: Raffle to raise money for students
<u>LOCATION:</u>	Sitter Family Hall Room 710 Fort Lewis College
<u>COST:</u>	\$25/person. <i>PLEASE RSVP by Monday, April 14th. WE NEED TO KNOW HOW MANY DINNERS TO ORDER. Please!</i>
<u>RESERVATIONS:</u>	Use this link (also available on website) to reserve your place. You will be given the choice to either pay now or pay at the door. You can also choose to sponsor a student. RESERVATIONS LINK STUDENTS AND FACULTY: Please RSVP to Dr. Gonzales at gonzales_d@fortlewis.edu . Most students will be sponsored. Get on the list! Faculty <u>members</u> are sponsored,
<u>ZOOM:</u>	ZOOM LINK Passcode: 787441 <u>Zoom starts at 6:30pm</u>

Date: May 8th

NEXT MTG:

*Celebration of Spring Gathering on the Rooftop!
Last Meeting of the Season and a Chance to Have Fun
Picnic is scheduled for Sunday August 17th*



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Abstract of Talk

Magdalena Sandoval Donahue will join us for a short discussion covering the writing of the new edition of the Roadside Geology of New Mexico. This casual discussion will include an overview of some of the author's favorite geologic locations in New Mexico, as well as the writing and publishing process.

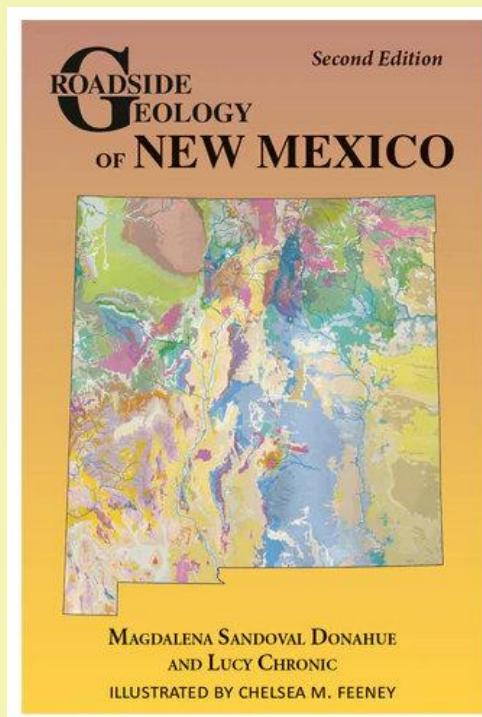
Speaker Biography



Magdalena Sandoval Donahue lives in Albuquerque with her husband and three children. She grew up in northern New Mexico and earned her BS in Geological Sciences and Fine Arts from the University of Oregon, and her MS and PhD in Earth & Planetary Sciences from the University of New Mexico. Her professional pursuits have included authorship,

building a software company, environmental remediation, flying for LiDAR data collection, and federal service. Magdalena loves to share geologic histories and the stories of landscape formation with the people around her. The Roadside Geology of New Mexico is her second book; she also authored Colorado Rocks: A Guide to Geologic Sites in the Centennial State (2021). Magdalena is an active outdoorswoman, and loves hiking with her family, running (she is a 2- time Olympic marathon qualifier), camping and backpacking all around the western US.

For more information on the author, please visit www.magdalenadonahue.com.



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Lustrous Minerals!

The creation of most mineral colors is relatively easy to understand. Wavelengths of energy from a light source (e.g., sunlight) interact with the mineral and its atomic structure. If a mineral absorbs certain ROYGBV spectra, then the mixture that comes to our eyes is the color we perceive. For example, a red mineral absorbs most wavelengths except the red end of the spectrum and white minerals absorb most of the wavelengths. But what about minerals that are opaque with metallic lusters and colors that are gray, golden, silver, and bronzy. These colors are distinctive of minerals that are sulfides, sulfosalts, oxides, and native elements. How are their colors created and why are they so different than the typical range of colors?

Let us start with a more common phenomenon that can help explain the process. When sunlight strikes many objects on the surface the radiant energy is absorbed. Some of the energy is then released, but not in the same state, rather as thermal energy that gets trapped by the atmosphere, the Greenhouse effect. But how does this apply to minerals with metallic lusters and colors?



Gold: [The mineral native Gold information and pictures \(minerals.net\)](http://minerals.net)

Atoms of elements have a core of protons and neutrons surrounded by a cloud of negatively charged electrons. Every electron occupies a certain position outside the core of the atom and each of

these positions have different energy levels. The outermost electrons (valence) are those that make mineral magic. It is these electrons that

allow atoms to combine in a process called bonding. Bonding happens so that the outer electron fields are filled and stable which in turn makes stable, solid compounds that we call minerals. The valence electrons of a given atom can combine in several ways to bring the atoms together.

Before an atom is bound to other atoms the valence electrons are in certain positions in a zone called the valence band. Higher energy levels in the atomic structure are unfilled but under certain conditions the valence electrons can move into these higher levels called the conduction band. The valence and conduction bands are often separated by a band gap. The band gap is the energy (e.g., light energy or photons) needed to promote a valence electron to the conduction band where it is free to move within the crystal lattice. This allows bonds to form, and the electrons can serve as charge carriers to conduct electric current. In many minerals the size of the band gap influences the absorption of wavelengths of light energy that create colors.

Let us consider minerals dominated by metallic bonds such as gold, copper or platinum. Because atoms in these minerals tend to have only a few valence electrons then something unique happens for the atoms to bond. The outer (valence) electrons roam to form a "cloud" of electrons shared by all the atoms. In metallic-bonded minerals the valence and conduction bands overlap with no gap between them. This allows the entire visible spectrum of light to be absorbed, and the mineral appears opaque. This process also creates distinctive electrical and thermal conductivity.

Some of the energy absorbed by minerals with



metallic bonding is released after absorption (radiated) creating distinct reflective luster and metallic colors. The photons are absorbed by electrons near the top of the conduction band and energy is released as the electrons fall back into lower energy levels. Native silver absorbs and re-emits the entire visible spectrum which gives it a high luster and light gray color. In gold, the longer wavelengths of light (red, yellow) are absorbed more. The blue and violet end of the spectrum are absorbed less and can penetrate the atomic structure to a greater depth. The blue and green wavelengths emit less visible light but create a faint blue-green color on the beautiful reflective yellowish-red color of gold.

On the other extreme end of the band gap theory are those minerals whose gap between the valence and conduction bands is greater than all wavelengths of light energy. So, none of the energy is absorbed and the mineral appears colorless such as covalent-bonded (shared electrons) diamond.

Between the two examples discussed above there are what is known as semiconductors. These are minerals in which the atoms are held together with different bond types and the thickness of the band gap varies. This allows a range of energies to be absorbed (to different degrees) and create a variety of colors. Wavelengths of light energy that are greater than a given band-gap width will be absorbed and excite valence electrons into the conduction band. In pyrite the band gap absorbs all of the visible spectrum but red and yellow are absorbed more and released to a greater degree creating the beautiful bronzy color. Where the band gap is small enough to absorb all of the light energy then the mineral appears gray like galena or black (e.g., magnetite and graphite). In some cases, the thickness of the band gap will absorb some wavelengths and allow others to pass. For example, in cinnabar the blue and violet light is absorbed but the red dominates the light that passes through to create a distinctive red color and vitreous luster.

The shiny lusters and distinct colors of some minerals is thus a magical interaction of light and atomic structure that produces fantastic creations. So, the next time you view piece of gold, silver or copper consider the beauty of this natural process.

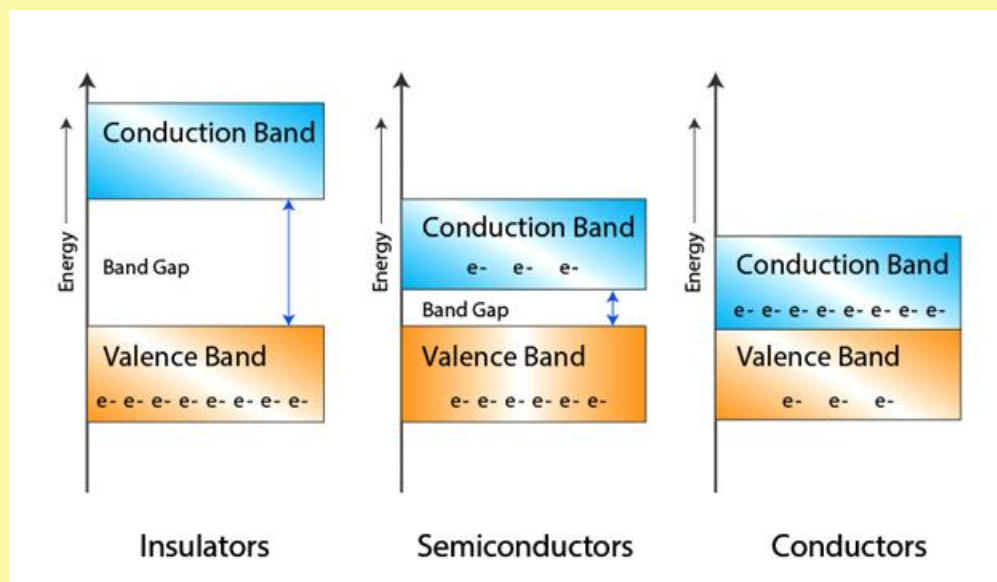
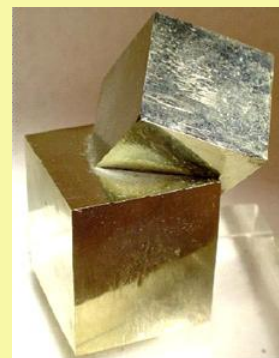


Figure showing the relationship between the valence and conduction band in different atomic structures. Metallic minerals such as gold are dominated by an overlap in the two “bands.”



[Pyrite: Mineral information, data and localities. \(mindat.org\)](https://www.mindat.org/en-us/mineral-10000/pyrite.html)

Sources of information

Nesse, W.D., 2017, Introduction to mineralogy, 3rd edition: New York, Oxford University Press, 495 p.

<https://www.britannica.com/science/color/Energy-bands>

https://en.wikipedia.org/wiki/Valence_and_conduction_bands



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Foundation News - 2025 Master of Science Thesis Grants Announcements - And More! by Cindy French

M.S. Thesis Grants are the Foundation's longest running and highest priority charitable program. This program has supported **64** Master's degree candidates since it was started by the Society in 1991. To be considered for a grant, a thesis must contribute to regional geologic knowledge in at least one of these states (CO, UT, NM, AZ) and be acceptable to the selection

In early January, the 2025 grant application announcement was emailed to 14 Geoscience Departments in the Four Corners states that offer a Master's Degree. The Foundation is pleased to announce that it has awarded a total of \$2900 in grants to four students toward their research. We received 12 applications from 8 schools in Colorado, Arizona, Kansas, New Mexico, and Utah. The resulting awards are well distributed among 4 institutions and 3 states. In general, each of the students requested < \$1000, for specific fieldwork related expenses.



And the Winners Are!!!



- Dylan Frawley, Colorado State University, for 'Timing and Kinematic Constraints of Polyphase Contractions in the Sangre De Cristo Mountains, Colorado.'
- Micah Hernandez, Utah State University, for 'Hydration of Colorado Plateau Lower Crust: Geochemical Evidence from Xenoliths in the Navajo Volcanic Field [Arizona].'



- Brice Liedtke, Northern Arizona University, for 'Investigating Magmatic Flux during the Initiation and Incubation Phases of a Continental Ignimbrite Flare-up [San Juan Volcanic Field, Colorado].'

- Polito Walters, New Mexico State University, for 'Mapping and Geochemistry of the Black Mountain – Santo Tomas Chain, Potrillo Volcanic Field, Southern New Mexico.'

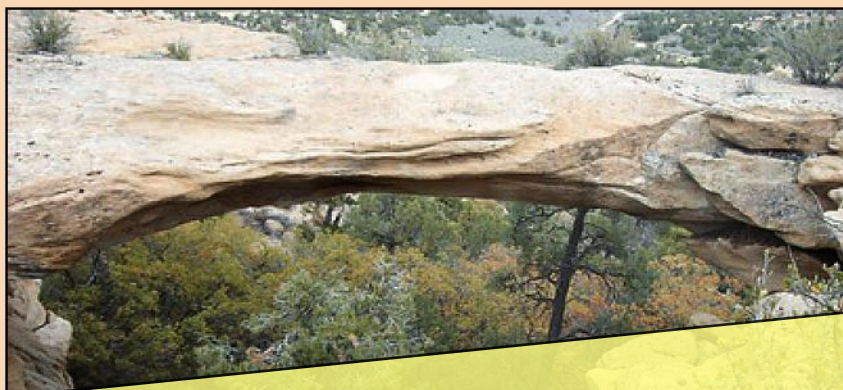


We hope that some of these theses could be appropriate for future presentations at FCGS meetings. We wish the students success in their research and careers! Also, many thanks to our generous donors who've helped us support so many MS degree students since the 1990s.

Donations Click [HERE](#)



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SPRING FIELD TRIP 1: Aztec Arches

DATE: April 12, 2025. (Daytrip)

LEADER: Dr. Jeff Geslin.

COST: \$15pp

TRANSPORTATION: Carpools from
Durango, with pick-up in Aztec, NM.

LIMIT: 25

REGISTRATION: Link to register: [HERE](#)

**TRIP HAS FILLED
There is a waitlist.**

The "Bridge of Wonder" is one of the arches we will be visiting. Photo by Larry B.

DESCRIPTION: There are four preserved natural arches preserved in the Paleocene / Eocene Nacimiento and San Jose Formations near Aztec, NM. On this fieldtrip we will discuss the local stratigraphy, processes for forming thick fluvial sandstones, and how sandstone arches are formed. We will have several stops where we will take short hikes to look at different types of arches. The hikes will not be long, but they will be over rough ground, so please wear sturdy hiking shoes. Most importantly, we will be hiking around in northern New Mexico in the springtime and it should be a beautiful day outdoors, so bring a picnic lunch and join us.

SPRING FIELD TRIP 2:

Paleo-Biology of the San Juan Basin, Ah-Shi-Sle-Pah Wilderness Area

DATE: April 27, 2025. (Daytrip)

LEADERS: Mr. John Hankla and
Mr. Tom Knopick

COST: \$15pp

TRANSPORTATION: Carpools from
Durango, with pick-up in NM.

LIMIT: 23

REGISTRATION: Opens 9am, April 14th



DESCRIPTION: The San Juan Basin has been a hotspot for paleontological discovery for over a century, with fossils from this region shaping our understanding of the dinosaurs that roamed North America just before the mass extinction. On this trip, we'll step into the role of field paleontologists, exploring how scientists reconstruct ancient ecosystems using vertebrate fossils, sedimentary structures, and plant remains. We'll also dive into the history of fossil collecting in the area, from the first museum expeditions in 1920 to the latest research shaping our knowledge today.

Our 4-mile loop hike will take us through the stunning badlands of the Ah-Shi-Sle-Pah Wilderness Study Area, where we'll see dinosaur fossils in situ, key geological contacts, and historic discovery sites. The terrain is uneven, so sturdy hiking shoes are essential. Bring plenty of water, a lunch to enjoy in the heart of the badlands, and a sense of adventure as we uncover the past in one of the most scenic and scientifically significant landscapes of the region.

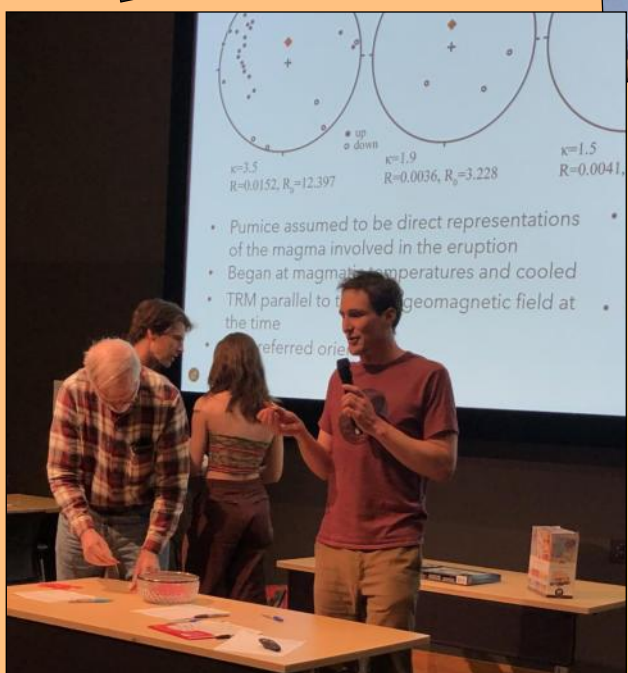
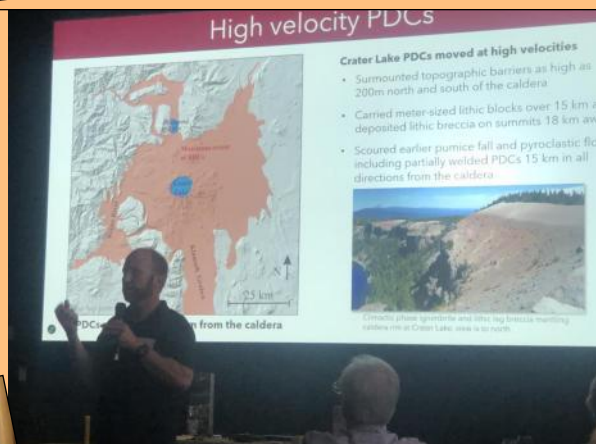
John Hankla's career spans fieldwork, curation, museum displays and media presentations. In addition, he runs field discovery programs that empower children and students to see the ancient environments around them and to respect conservation ethics.

Read John's CV [HERE](#).



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March Meeting Pics



Upcoming Meetings



Registration opening March 10th for the
N.M.G.S. SPRING MEETING,
April 25th at New Mexico Tech
in Socorro, N.M.

The theme this year is *Earth Science, Environmental Change, and Health*.

Registration fee is \$50

Special session topics include:

- Earth science and health,
- Water quality changes,
- Wildfire and post-landscape processes,
- The water/energy nexus, and
- Impacts of climate change on natural resources.

For more information click [HERE](#)

**Online registration will be available through Friday,
April 18, 2025**

NGWA Hydrogeology of States Webinar Series: Indiana
Monday, April 14; 11 am-12 pm MT

Overview:

As hydrogeology varies widely across the United States — and as primary jurisdiction over groundwater development rests with the states — each is unique. This webinar series explores the issues encountered in each of the 50 states — one at a time.

Ginger Davis, Indiana Geological and Water Survey, will discuss the unique hydrogeology of Indiana, including:

- Nationally determined Principal Aquifer is not so productive for the state, but the springs are flowing
- Coal country with its soft water hotspot
- In our “Water Rich State”, far water transfers are being proposed begging the question, “Are we truly water rich?”.
- A river runs through it, the story of the Lafayette (Teays) aquifer.

To register, go to

<https://www.ngwa.org/detail/event/2025/04/14/default-calendar/25apr14web>



Mark your calendars now for the
N.M.G.S. Annual Fall Field
Conference,
September 17-20th, 2025.

The Eastern San Juan Basin

Description: The 75th annual Fall Field conference examines eastern margin of the San Juan basin. Last visited by NMGS in 1992, this will be the second of three consecutive conferences to focus on the interconnection of the Colorado Plateau, southern Rocky Mountains, and Rio Grande rift physiographic provinces. The relationships between tectonism and landscape development are complex but writ large in the landscapes, geology, and history of the area; this conference examines them through time. A conference guidebook will include field trip roadlogs, manuscripts on recent geology research in the region, and special remembrances celebrating 75 years of NMGS Fall Field Conferences

For more information click on this link: [HERE](#)



Geological Society of America, Rocky Mountain
Section Meeting
75th Annual Meeting of the Rocky Mountain Section

Dates & Location: May 18-20th, Provo, Utah
Utah Valley Convention Center

We are excited for you to join us at the GSA 2025 Rocky Mountain Section Meeting, to be held in Provo, Utah. Provo is nestled in one of the most geologically diverse settings in America.

The meeting will be held at the Utah Valley Convention Center, less than an hour drive from the Salt Lake International Airport. Provo has been ranked by Outside Magazine as one of the best places to live in the U.S.

Registration: For more information: or to register, click on this link: [HERE](#)



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Colorado School of Mines Van Tuyl Lecture
April 14, 2025; 12-1 pm MT; In-person and Zoom
Berthoud Hall Room 205, Golden, CO

“Reducing Risk from Landslides and Debris Flows: How to Respond when Mother Earth Doesn’t Love You”
Paul Santi, CSM Geology and Geological Engineering

Abstract:

As populations continue to push into the wildland-urban interface and climate change produces more severe storms and expanded wildfire impacts, tools for managing geologic hazards are becoming crucial to our society. Our research has focused on identifying and reducing the impacts of hazards, with principal focus on landslides and debris flows. I will present a summary of some of the recent research from our group, highlighting the variety of approaches we use to understand these hazards and to generate engineering solutions. Principal problems including predicting and reducing debris flow avulsion onto new and unexpected paths, reducing growth in debris flows as they transit, identifying long runout landslides that endanger areas distant from their sources, and generating predictive methods to identify hazard locations without time-consuming field studies.

Join from PC, Mac, Linux, iOS or Android:

<https://mines.zoom.us/j/94597428285?pwd=koypxdNg1KxVBQkgmR9tyOT3PPzmFwa.1>

Meeting ID: 945 9742 8285

Password: 110544

GJGS April Meeting

Wednesday, April 16th; 6:30 pm MT; In-person & Zoom

Joint meeting with the CMU Geology Students;
Saccomanno Lecture Hall (Room 141) in the Wubben
Science Building at Colorado Mesa University

“Duration of events and cycles in Campanian age strata, Book Cliffs, Colorado and Utah”
Mark Kirschbaum, U.S.G.S. (retired) and Colorado School of Mines

Abstract:

In my almost fifty years as a geologist, there have been moments of wonder when I’ve found a sedimentary feature that records some extraordinary event: a dinosaur footprint, a trackway from a small reptile or

dinosaur, a shell accumulation, an altered volcanic ash containing leaf fossils, or cross stratification containing mud drapes, each recording seconds to weeks of time. In Roberts Dott’s 1982 paper on episodic sedimentation published in Journal of Sedimentary Petrology, he addresses such sedimentation and quotes Marshall Kay, late of Columbia University, “Could bedding planes represent more time than the preserved rocks?”. Kay is undoubtedly correct. Thicker more extensive deposits represent larger-scale cycles preserved during 10’s or 100’s of millions of years in Dott’s view.

This study considers episodic sedimentation in Campanian strata of the Wasatch Plateau in Utah, and the Book Cliffs in Colorado and Utah. I have had the great fortune of visiting most of the canyons from where I-70 passes through the Plateau south of Emery, Utah to where I-70 separates the Book Cliffs from Grand Mesa near Palisades, Colorado. I studied shoreface and deltaic rocks and coals of the Star Point Sandstone, Blackhawk Formation, Castlegate Sandstone, Sego Sandstone, Neslen Formation, and Iles Formation. Using personal knowledge and extensive literature, I have estimated about 75 transgressive/regressive cycles deposited over about 8-10 million years or about 120,000 years per cycle. Counting cycles is fraught with uncertainty and the timing is even more uncertain, but it seems worth the attempt. Smaller parts of the section, which have the best age control, yield results in the range of 30,000 to 50,000 years per cycle. Most likely the cycles range from 10,000 to 200,000 years, and it is tempting to invoke Milankovitch cyclicity to explain them, but there is no reason to infer that all cycles were deposited in the same duration of time. To better constrain the duration of cycles, more precise information is required on biostratigraphy, absolute ages, and how cycles are defined.

Join Zoom Meeting:

<https://coloradomesa.zoom.us/j/97088140347>

Meeting ID: 970 8814 0347

RMS-SEPM Grain Size Gala

Saturday, May 3rd, 2025; 4:00 pm; In-person
Bigsby’s Folly, 3563 Wazee St, Denver, CO

RMS-SEPM is excited to announce an opportunity to socialize for a good cause. The First Annual Grain Size Gala will be held this year. The Grain Size Gala is an opportunity for fun, networking, and helping fund RMS-SEPM student scholarships. Tickets to the Grain Size Gala cover entry to the event, food, 1 drink ticket and 1 raffle ticket. To register, go to <https://www.rmssepm.org/event-registration/ticket-to-the-grain-size-gala>



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Please Identify a Membership Category:

Active Member	\$30	Any person engaged in the practice or teaching of geology or who holds a Bachelor's Degree in geological science from a college of acceptable academic standards. Degree requirement may be waived if applicant has adequate professional experience. <i>*Highest Degree, Type and Year:</i> _____ <i>*College / University:</i> _____
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Emeritus Member	Free	An Active Member of 65 years old or older who has been a member for 25 years including time spent in military service. <i>*Year emeritus status was awarded:</i> _____
Honorary Member	Free	An Active Member who has contributed distinguished service to the profession of geology and to the betterment of the FCGS. Determination is made by the FCGS Executive Committee. <i>*Year honorarium was awarded:</i> _____.

Other Professional Interests or Comments and Concerns.

Are you interested in Volunteering? If so, what is your area of interest?

** Required information for new members. Current Members, please update.*

*Please check your interests:

- ☐ Sedimentology & stratigraphy
- ☐ Structure & tectonics
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- ☐ Igneous geology, volcanology
- ☐ Ore geology and hard rock mining
- ☐ Other mineral extraction
- ☐ Petroleum geology
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- ☐ Geological engineering
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- ☐ Geography / GIS
- ☐ Other interest (see box)

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or go online to fourcornersgeologicalsociety.org (preferred - much more reliable)



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