

FEBRUARY 2020 NEWSLETTER

FOUR CORNERS GEOLOGICAL SOCIETY

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<https://fourcornersgeologicalsociety.org/about/>

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FEBRUARY DINNER MEETING

SPEAKER: Laura Hartman, Bureau of Land Management

TITLE: Investigations Into the Advancement of Cryptotephra
Geochemical Fingerprinting and Tephrochronology

DATE: Thursday, February 20th, 2020

LOCATION: Vallecito Room, Student Union Building, Fort Lewis College

TIME: 5:30 Social, 6:00 Dinner, 6:45 Announcements, 7:00 Talk

COST: \$20 per person with RSVP by deadline, \$25 per person
post-deadline and while food lasts. \$2 per person talk only.

STUDENTS: 10 Students can attend for free. Please contact Dr. David
Gonzales, GONZALES_D@fortlewis.edu to sign up.

RSVP: By Tuesday, February 18th at 5pm online
(<https://fourcornersgeologicalsociety.org/events/> or to Kim
Gerhardt (kd@mydurango.net, 970-375-2700).



**Thank you E.S.S. & Chuck Baltzer
for sponsoring 10 students for
the February meeting!**



SPEAKER ABSTRACT

Two of the on-going challenges in ice core based tephrochronological work is the extraction and measurement of the geochemical composition of ultra-fine tephra particles ($<10\text{ }\mu\text{m}$). When a volcanic source can be accurately identified using volcanic glass particle geochemistry, it may provide a robust time reference for the ice core's timescale. In addition, the presence of an identifiable tephra layer may also suggest atmospheric pathways at the time of deposition, or assist in reconstructing volcanic forcing of climactic state for a specific event. Although traditional geochemical measurements are taken using EMPA-WDS, the grain size can be a limiting factor. Therefore, this work attempts to further improve SEM-EDS based tephra measurements to unveil their fullest potential.

The first section of this work explores the use of recent particle mounting methodological advancements to examine the volcanic sources of tephra horizons in ice cores from Antarctica and the Swiss-Italian Alps. The second section of this work evaluates the results of testing a fully quantitative SEM-EDS geochemical measurement protocol developed at the National Institute of Standards and Technology (NIST) called DTSA-II.

BIOGRAPHY: Laura Hartman, BLM



Laura Hartman received her BSc in Geoscience from Pennsylvania State University. Her senior thesis focused on paired xenoliths and basalts from Western Turkey in order to constrain melting regimes. She then went on to gain her MSc in Quaternary and Climate Science at the University of Maine. Her MSc thesis focused on tephrochronology and attempting to develop new techniques for cryptotephra geochemical fingerprinting. During and after school, she shifted her focus to working with public lands. In the beginning, this was through a series of internships

with the Bureau of Land Management (BLM), Forest Service (USFS), and National Park Service (NPS). With these agencies, she worked as a Cave Technician in Shoshone, ID (BLM), Geologist in Winnemucca, NV (BLM), Geomorphic Technician in Umpqua National Forest, OR (USFS), Environmental Educator at Oregon Caves National Monument and Preserve, OR (NPS), and Education Technician at Colorado National Monument, CO (NPS). Laura now works with the Bureau of Land Management in Dolores, CO as an Environmental Protection Specialist. She's new to southwestern Colorado, and is looking forward to new challenges and experiences!



“PREZ SEZ” by Sabina Kraushaar



Thanks to our own Durango local, **Steve Cossey**, whose talk about the Gulf of Mexico was well attended last month. We have a few more exciting talks coming up this spring - including **Laura Hartman** on Feb 20th, then Fort Lewis graduating seniors in April.

I recently attended NAPE in Houston, Texas - this is a huge oil and gas

expo with over 12,000 attendees. I made some observations that I thought may be worth sharing.

First of all, there were a notable amount of conventional prospects for sale. These are usually small, vertical, affordable and easy-to-drill conventional oil prospects. It seems as though the crazy growth in unconventional (horizontal drilling that targets the source of the petroleum accumulation) is starting to slow. The Permian Basin is the exception. Perhaps this slow down is due to faster-than-predicted decline curves and production performances that turned out lower than expected.

Second, folks seemed keen on buying assets that are already producing, cash-flow positive and have in-field development opportunities. This basically means investors are taking a more conservative approach because the wells have already been drilled (eliminating engineering and geologic risk) and now they have a predicted production decline curve.

Third, there was some excitement about non oil and gas assets and ESG investing (Environmental, Social and Governance) - which measures the sustainability and societal impact of an investment. Multiple people talked to me about helium exploration in the Four Corners area. Many of the large companies are diversifying to include renewable energy as part of their energy portfolio, and are in support of the Paris Agreement's goal of limiting warming of the planet by less than 2 degrees Celsius (Shell, BP, Equinor, to name a few).

Hopefully I didn't bore all the non-petroleum readers out there!

This month we have a newcomer to the Four Corners area Laura Hartman giving a talk about her Master's thesis work dating ash layers in ice core. It should be very interesting and I hope you can help us welcome Laura to our geological community! Once again, we couldn't do this without our amazing board: **Jonathan Harvey, Tom Staatz, Tim Rynott, Jolin Cordalis, Rachel Medina, Kim Gerhardt, and Tom Ann Casey**. We are searching for a President-Elect candidate for next year, so please let me know if you are interested in planning our speaker series! It's very rewarding and great networking.

All the best,

Sabina

MARK YOUR CALENDARS! SPRING FIELD TRIPS

April 11th & 12th: Field trip to Harding Pegmatite Mine near Taos, NM. The Harding pegmatite is located in the western part of the Picuris Range about 15 miles southwest of Taos.

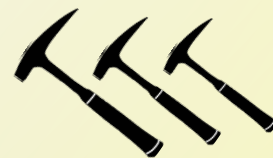
nmgs.nmt.edu/publications/guidebooks/downloads/30/30_p0127_p0133.pdf

[Link to Harding Pegmatite](#)

May 7th Talk @ FLC: Chris Heine on the Eolian Cedar Mesa Fm. of SE Utah.

May 9th or 10th: Field trip to look at Cedar Mesa Fm. at Moqui Dugway, near Bluff, UT.

Please contact our field trip chair, Jim Corken, at rjcork@aol.com or 970-759-2567



News from the Four Corners Water Center at Fort Lewis College

For upcoming events visit: www.fortlewis.edu/water and sign up for our e-newsletter

Next Durango Water Professionals Happy hour **Wed Feb 19, 5pm,**
Animas Brewing Company

Wed, Feb 26, 6pm: The Four Corners Water Center at Fort Lewis College and Rocky Mountain PBS co-host a pre-screening of a **new RMPBS episode of Colorado Experience: Western Water -- and Power.** For more information and to register: <https://www.fortlewis.edu/about-flc/initiatives/four-corners-water-center/events/event-details/western-water-and-power>

6:00 PM - 7:00 PM Reception and exhibits. Enjoy snacks and drinks while learning more about water projects and water history

7:00 PM - 8:00 PM Pre-Screening of Western Water -- and Power

8:00 PM - 8:30 PM Panel Discussion and Q&A

Contact:

Gigi A. Richard, Ph.D.

Four Corners Water Center

Fort Lewis College | Durango, CO 81301

office 970.247.6561 | Reed Library, Room 73

www.fortlewis.edu/water | Facebook: @waterFLC | Twitter: @FLCwater



Save the Date!

March 12th @ FLC: Speaker
TBA.

April 16th @ FLC:
Graduating Seniors present
Senior Theses.

April 11th & 12th: Fieldtrip to
Harding Pegmatite Mine
near Taos, NM.

May 7th @ FLC: Chris Heine
on the Eolian Cedar Mesa
Fm. of SE Utah.

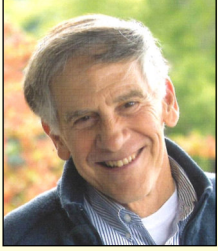
May 9th or 10th: Fieldtrip
to the Cedar Mesa Fm. at
Moqui Dugway, near Bluff,
UT. with Chris Heine and
Gary Gianni.

DAVE GONZALES WINS RMAG PAPER AWARD

Dr. David Gonzales of Fort Lewis College has won RMAG's 2019 Best Paper Award for his paper titled, *New Constraints on the Timing and History of Breccia Dikes in the Western San Juan Mountains, Southwestern Colorado*, which was published in *The Mountain Geologist*, October 2019. Participants on the Ouray field trip viewed several of these features with Dave last June.



FCGS MEMBER REDGE GREENBERG OBITUARY



Redge Larry Greenberg passed away at age 70 on December 8, 2019. Redge leaves his two children - Tiffany Purcell (Hap) and Aaron (Sarah), and his three grandchildren - Jack and Skyler Purcell and Arthur Greenberg. He

was a devoted husband to his wife of forty years - Linda Greenberg, who died in 2013. Redge and his late wife moved from Austin, Tex. to Durango in 1999. For the past six years, he had been the beloved second-life partner of Mary Nowotny.

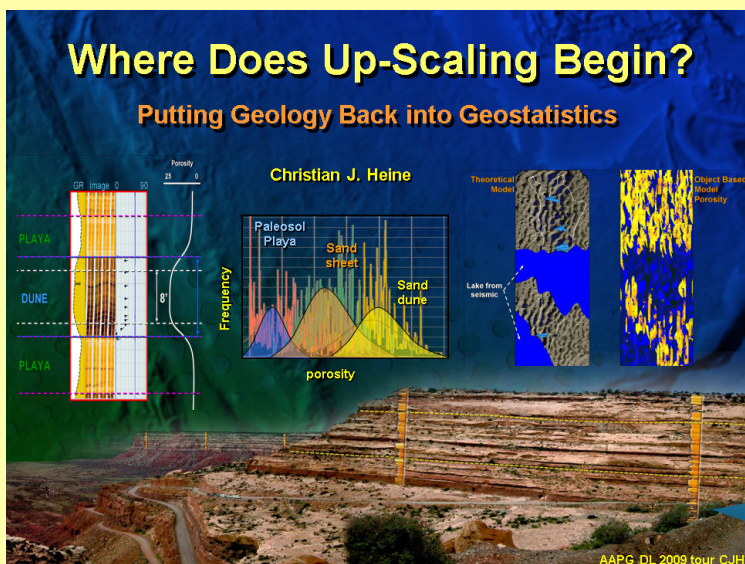
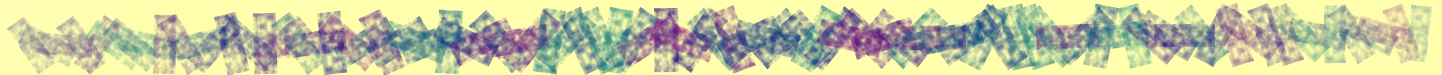
Redge's life was full of family, learning, and adventure. He grew up in Reading, PA, and reached the rank of Eagle Scout. Shortly after moving to Los Angeles at age 16, he saved up money from his job at a local gas station, and earned his pilot's license. He received his undergraduate degree from the University of Arizona, and then went on to earn two master's degrees and completed course work for a PhD in geology and geophysics at the [University of Texas](https://www.utexas.edu/) in Austin. For many years he worked with Hupecol, an energy exploration and production company, developing 3D seismic interpretive maps identifying potential sites for development in Colombia, Mexico, Italy and New Zealand. He always loved the learning process, which lead him to become a part-time professor of mathematics for ten years at Austin Community College.

Redge absolutely loved the outdoors. He was a certified SCUBA diver, a BA hiker, traveler of the world, a bare boat sailing captain, and had ninety-nine parachute jumps (ninety-eight without mishap). An avid aviator, Redge bought his first airplane at age 18 and flew private planes for nearly ten-thousand hours for pleasure as well as service to local search and rescue efforts.

Assembled in his garage, he was one of the first owners of a kit-built SubSonex jet, which he flew from Durango-LaPlata airport. He enjoyed performing many aerobatic maneuvers, at a safe height, of course! He was an active member of EAA (Experimental Aircraft Association) based at Animas Air Park, and flew for many years at the local glider port.

Redge was born to Ruth and Robert Greenberg on September 9, 1949, in Houston. In addition to his children and grandchildren, he is survived by his younger brother, Gary Greenberg, of, Reno, Nevada, and his younger sister, Laurie Greenberg, of Queens, New York. Redge can be best remembered as a wonderful father, grandfather, and friend to those that survive him.

***"Oh! I have slipped the surly bonds of earth, ...
put out my hand, and touched the face of God."* -
John McGee.**



Mark Your GEO Calendar!!

May 7th @ FLC: Chris Heine on the Eolian Cedar Mesa Fm. of SE Utah.

May 9th or 10th: Fieldtrip to look at Cedar Mesa Fm. at Moqui Dugway, near Bluff, UT.



SCHOLARSHIP OPPORTUNITIES



The **FOUR CORNERS GEOLOGICAL FOUNDATION** is pleased to announce its Masters Thesis Research Grant Program for 2020. Since 1991, FCGS and later its Foundation have given financial aid to 35 master's degree candidates working on geologic theses in the states of Colorado, New Mexico, Utah and Arizona. This year we plan to give at least two grants in the \$500 to \$1,000 range. In order to be considered, a thesis must contribute to regional geologic knowledge in at least one of these states. Selection will be based on financial need, scientific merit, and student qualifications (US citizenship is required). Applications are due April 1 and selections will be made by April 15 (see <https://fourcornersgeologicalsociety.org/scholarships/>). Please share this information with potentially interested students and their faculty advisors.

Donations to the Foundation will help us increase grant support. For now, donation checks payable to Four Corners Geological Foundation may be mailed to Mary Gillam (President) at 115 Meadow Road East, Durango, CO 81301.



The RMS SEPM gives out 3 scholarships annually.

They are:

- 1) Fluvial Sedimentology Award in the amount of \$2,000.00, is offered to support Masters or Doctoral level student research in modern or ancient fluvial sedimentology.
- 2) Edwin D. McKee Grant is offered as a tribute to the late Edwin McKee who worked for the U.S. Geological Survey for over 30 years (see AAPG Bulletin, v. 69, p. 491-493). This grant offers a \$2,000.00 award to Undergraduate or Master's degree candidates. The award is to be used for thesis-related research in sedimentology and/or the application of sedimentology to a better understanding of the geology of the Rocky Mountain region.
- 3) Donald L. Smith Research Grant which is offered as a tribute to the late Professor Donald Smith of Montana State University (see AAPG Bulletin, v. 69, p. 1830-1832). This grant offers a \$2,000.00 award to a Ph.D. degree candidate. The award is to be used for research that is directly applicable to better understanding the geology of the Rocky Mountain region.

If you have students, or know of students working in these areas, please contact me or have them contact me or go to our website at <https://www.rmssepm.org/scholarships> for information on applying.

Thank you in advance for your help in spreading the word.

Sincerely,

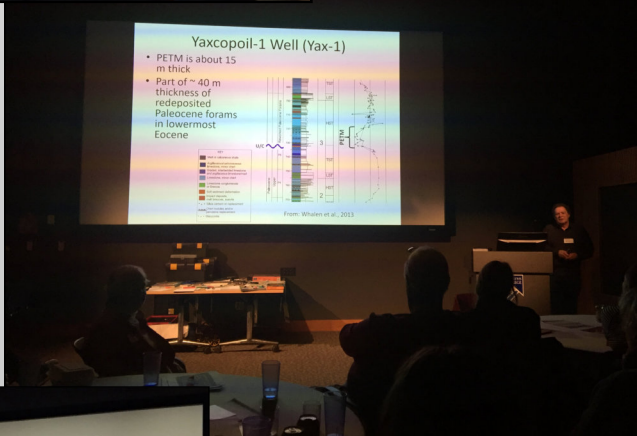
Robin Swank,
Treasurer, RMS-SEPM
robin.swank@gmail.com



FCGS January Meeting With Dr. Steve Cossey



2



20/20 VISION

TURN HINDSIGHT / TO FORESIGHT



Mitch Bowers Photography, www.imagewerx.us

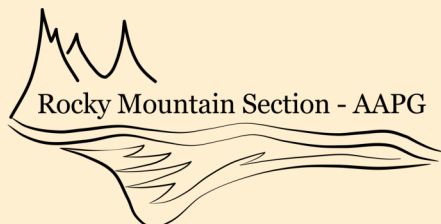
ROCKY MOUNTAIN SECTION AAPG MEETING

SEPTEMBER 13-16, 2020

TWO RIVERS CONVENTION CENTER, GRAND JUNCTION, CO

CO-HOSTED BY:

THE GRAND JUNCTION GEOLOGICAL SOCIETY
THE FOUR CORNERS GEOLOGICAL SOCIETY



CALL FOR PAPERS

MEETING WEBSITE: rmsaapg2020.com

The RMS-AAPG together with the Grand Junction and Four Corners Geological Societies invite abstract submissions for the 2020 meeting. All petroleum geology related topics are welcome, with special emphasis on these themes:

- Hindsight to Foresight: Lessons from the History of Exploration and Production
- The Mancos Shale / Western Niobrara Equivalent: Sedimentology, Geochemistry and Physical Properties
- The Powder River Basin Shale Play, A Rockies Powerhouse
- The San Juan Basin: from Conventional Reservoirs to Resource Plays
- Clastic Reservoirs of the Rockies: Sequence Stratigraphy, Reservoir Quality and Producibility
- Geochemistry and Basin Modeling of Rocky Mountain Petroleum Systems
- Lacustrine Basins: Sedimentology, Stratigraphy, Geochemistry and Petroleum Systems
- The Pennsylvanian System of the Rockies
- Structure, Tectonics, and Geomechanics of the Rocky Mountain Region
- Advances in Seismic Imaging in the Rocky Mountain Region
- Non-Methane Gas Fields of the Rockies
- Energy Minerals of the Rockies - A Special Session in Honor of Bill Chenoweth
- Applications of Machine Learning and Data Mining to Petroleum Geology and Energy Minerals
- Sustainable Development 1: New Technology and Models for Reservoir Revitalization
- Sustainable Development 2: Carbon Capture Use OR Storage - Turning CO₂ from a Liability to an Asset

SUBMIT ABSTRACTS ON MEETING WEBSITE BY MARCH 31, 2020

PLEASE CONTACT THE TECHNICAL PROGRAM CHAIRS WITH YOUR QUESTIONS.

Larry Anna
LA Resources,
Grand Junction, CO
LA_Resources@msn.com

Elizabeth Petrie,
Moncrief Chair in Petroleum Geology,
Western Colorado University
epetrie@western.edu

Brad Burton,
Rady Chair in Petroleum Geology,
Western Colorado University
bburton@western.edu

VISIT OUR WEBSITE FOR SPONSORSHIP AND EXHIBITOR OPPORTUNITIES

SPONSORSHIP CHAIRS: John Youle and Tom Ann Casey: SponsorsRMS2020@gmail.com

EXHIBITS CHAIR: Dave Abrahamson: rmsaapg2020ex@gmail.com

GENERAL INFORMATION

GENERAL MEETING CO-CHAIRS: FCGS, KIM GERHARDT & GJGS, HEIDI SCHOENSTEIN
aapgms2020@gmail.com



Four Corners Geological Society, P.O. Box 1501, Durango, CO 81302
www.fourcornersgeologicalsociety.org



ROCKY MOUNTAIN ASSOCIATION OF GEOLOGISTS

DENVER ATHLETIC CLUB

1325 Glenarm Place
Denver, CO 80204

Data Science SYMPOSIUM

KEYNOTE
SPEAKER:

Rod Heard
CEO SmartBe
Wealth





The Rocky Mountain Association of Geologists presents
"Digital Workflows in Oil & Gas"

Data analytics is leading companies to new ways of thinking and faster insights. Come learn about software development and incorporating analytics into your workflow and network with other geologists, geoscientists, and data science professionals.

Price: Member \$225; Non-member \$250; Student: \$100 (limited number).
Register at www.rmag.org.

email: staff@rmag.org | phone: 800.970.7624
1999 Broadway, Suite 730, Denver CO 80202



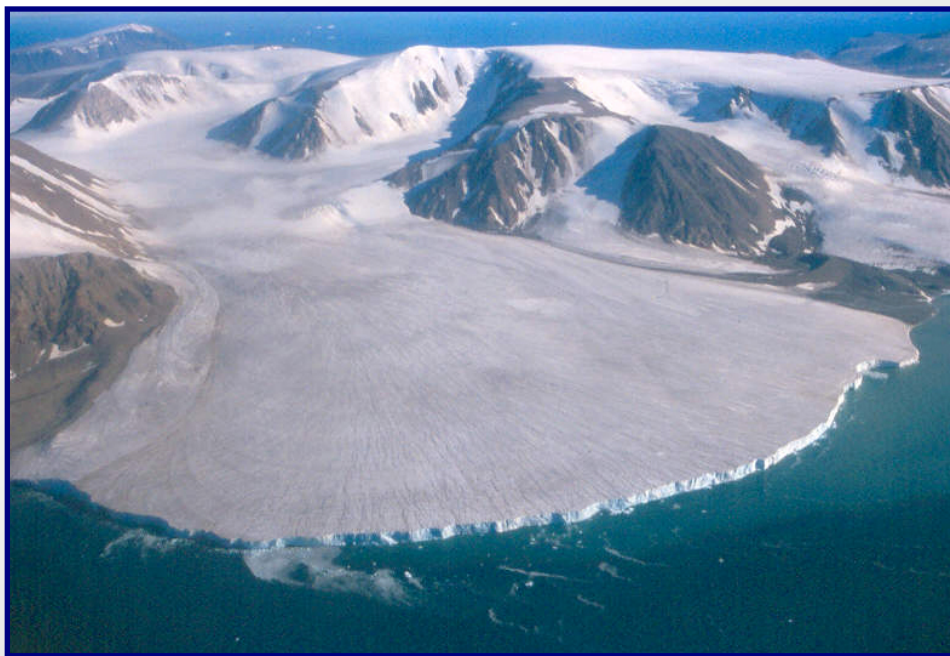
fax: 323.352.0046 | web: www.rmag.org
follow: @rmagdenver    



Four Corners Geological Society, P.O. Box 1501, Durango, CO 81302
www.fourcornersgeologicalsociety.org

FCGS Member PHOTO Contest - WOW!

1 AND the First Round Winners Are:



1st Place

Unnamed glacier,
Nunavut Canada

Charlie Burnham



**2nd
Place**

**Dr. Gary Gianninny's Trip to Geo
Mecca**

Gary at Sicar Point May 2019



**3rd
Place**

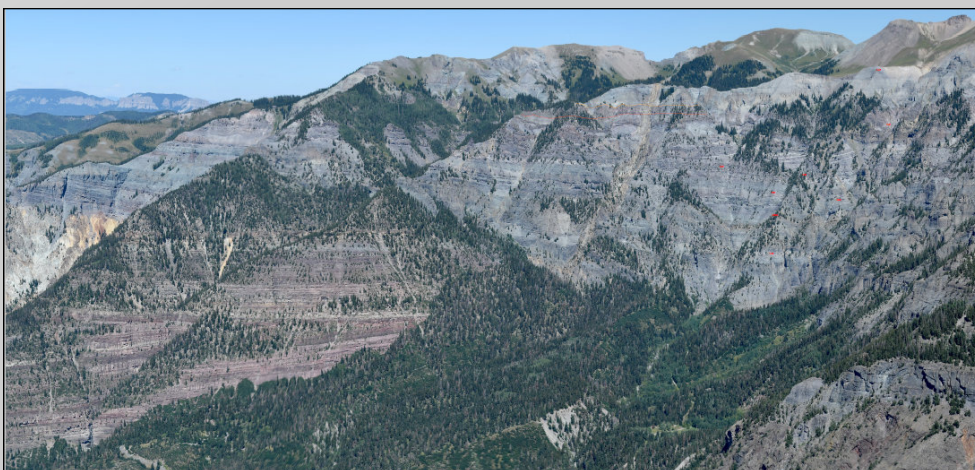
Tie For 3rd Place!

Kallea Cohen

Sea of Clouds
Silver Peak, Santa Catalina Island

Steve Cumella

Panorama of the Triassic Unconformity
looking toward the Ouray Amphitheater
from Hayden Mountain



FCGS Member Photo Contest - WOW!

Second Round Entries



Dr. Jon Harvey

- 1) Perrins Peak from FLC December, 2019
- 2) The full moon from Jon's house. That is an outcrop of Junction Ck sandstone on Missionary Ridge.

Chip Head

Crater Lake in Cradle Mountain National Park in the central highlands of Tasmania, Australia ➡



Bob Krantz

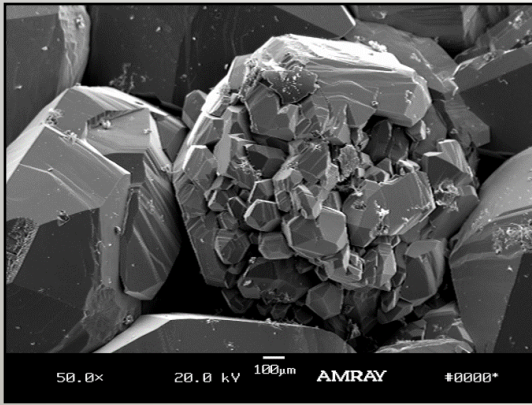
Entrada Fault Surface:
A normal fault cutting through the Entrada Sandstone near Goblin Valley, Utah. Displacement is about 5 m.

Sabina Kraushaar

- 1) Sabina's Bike
- 2) Hovenweep



FCGS Member PHOTO CONTEST!



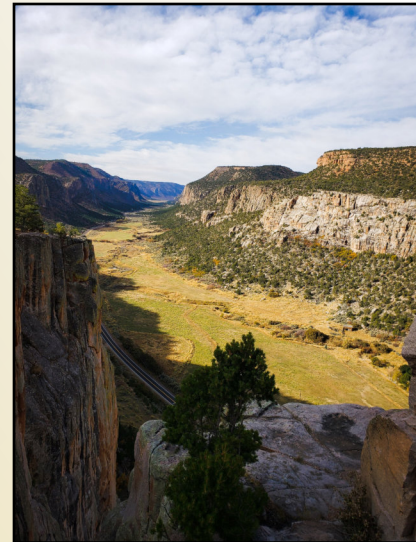
Dr. Rob Lander

- 1) An SEM secondary electron image taken by Dick Larese showing quartz overgrowths that he grew experimentally for us here in Durango. The grain with all of the small crystal overgrowths has a polycrystalline quartz substrate
- 2) Fracture in the Cedar Mesa Sandstone, Needles area of Canyonlands National Park.
- 3) Claron Formation at Bryce Canyon.



Brandi Maher

- 1) Colorado National Monument near the Redlands Overlook
- 2) The view of Stagecoach Trail by Palisade, CO with the Grand Mesa is the background
- 3) Unaweep Canyon near Grand Junction, CO

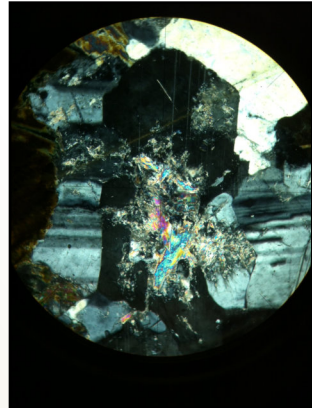


FCGS Member Photo Contest - WOW!



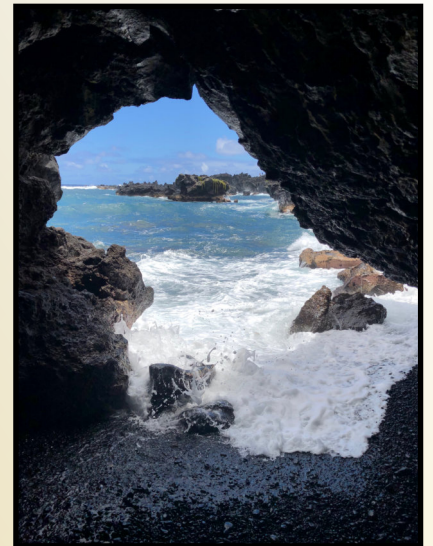
Rachel Medina

- 1) Engineer Mountain; a view of the rock glacier and mountains beyond.
- 2) Canyon de Chelly National Monument from Spider Rock Overlook, Dec 2019
- 3) Vermilion Cliffs from Marble Canyon along the Colorado River just southwest of Page, AZ
- 4) A thin section photo taken while I was in Dr. Gonzales' Optical Mineralogy class in Spring 2012. It's a sericite mica consuming a feldspar.



Jack Rosenthal

- 1) San Juan Outcrop - Outcrops of Gallup Sandstone on western flank of San Juan Basin, NM
- 2) Dakota and Fountain Snow - Taken at Red Rocks Park of Dakota Fm. (left) and Fountain Fm. (right) - outcrops in Denver Basin.
- 3) Maui black sand - Tunnel through lava on black sand beach on Wai'anapanapa State Park Maui, Hawaii'i



FCGS Member Photo Contest - WOW!



Tim Rynott

Perrins Peak

Paul Oldaker

Elephant Rock near Buk Moron (city),
Bayan Oligy Sum (state or province),
Mongolia
Paul for scale (he's a Big guy!)



Lori Schell

- 1) Taiwan - The Road Less Traveled
- 2) Taiwan - Technology vs. Nature



FCGS Member Photo Contest - WOW!



Steve Thibodeaux

- 1) Desert buzzard & Navajo Sandstone
- 2) Stateline Arch
- 3) Desert rainbow
- 4) John's Canyon UT
- 5) Cha Canyon Hike & wildlife





FOUR CORNERS GEOLOGICAL SOCIETY

P.O. Box 1501, Durango, CO 81302

MEMBERSHIP RENEWAL or APPLICATION: June 1, 2019 to May 31, 2020



*Name: _____

*Address: _____ City: _____ State: _____ Zip: _____

*Email: _____ Phone: _____

*Employer: _____

Please Identify a Membership Category:

Active Member	\$25	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. *Highest Degree, Type and Year: _____ *College / University: _____
Associate Member	\$25	Any person who is a graduate of a college of acceptable academic standards with major studies related to, or associated with, geology. Degree requirement may be waived if applicant has adequate professional experience. *Highest Degree, Type and Year: _____ *College / University: _____
Student Member	Free	Any undergraduate or graduate student majoring in geology at a college of acceptable academic standards. *College / University: _____ *Year expected to graduate: _____
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. *Year emeritus status was awarded: _____
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. *Year honorarium was awarded: _____

Other Professional Interests:

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

*Please check your interests:

- ☐ Sedimentology & stratigraphy
- ☐ Structure & tectonics
- ☐ Mineralogy, petrology, geochemistry
- ☐ Igneous geology, volcanology
- ☐ Ore geology and hard rock mining
- ☐ Other mineral extraction
- ☐ Petroleum geology
- ☐ Geophysics
- ☐ Geological engineering
- ☐ Geomorphology
- ☐ Quaternary geology
- ☐ Hydrology & water resources
- ☐ Environmental geology
- ☐ Geography / GIS
- ☐ Other interest (see box)

Please either print, complete and return this form with your check for dues made payable to: "Four Corners Geological Society" and mail to the address above or go online to fourcornersgeologicalsociety.org .