



Puu Oo, Hawaii

WELCOME TO THE FCGS

Kathy Cashman@ FLC on September 17th, 2024

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Mesozoic section near Chavez Canyon, Chama Float Trip

Picture by Jim Corken



SEPTEMBER 2024 MEETING

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SPEAKER: Dr. Kathy Cashman, University of Oregon

SUBJECT: *How Lava Flows: A Hawaiian Perspective*

DATE: Tuesday, September 17th, 2024

TIMES: 5:30-6:30 pm: Dinner and Complementary Drinks
6:30-7:30 pm: Society Business / Presentation
7:30-7:45: Raffle to raise money for students

LOCATION: Vallecito Room, Student Union Building
Fort Lewis College

COST: \$25/person. PLEASE RSVP by Friday, September 13th. WE NEED TO KNOW HOW MANY DINNERS TO ORDER.

RESERVATIONS: 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!. All faculty will be sponsored.

ZOOM link: [ZOOM LINK](#)
Password: **927354**
Zoom starts at 6:30pm



Abstract of Talk

Lava flows are an iconic manifestation of volcanic activity. They also provide a natural laboratory to study an active volcanic process. Persistent lava flow activity from 1983-2018 provided unprecedented opportunities to observe, measure and analyze lava flows. Technological innovations over the same time period provided increasingly detailed observations of lava flow behavior.

I will review some of what we have learned from these decades of observations, focusing particularly on the physical processes that modulate lava flow emplacement.



Speaker Biography



Katharine Cashman is a volcanologist who studies links between chemical and physical factors that control magma ascent, eruption, and emplacement on the Earth's surface. She has studied volcanoes on six of the seven continents that encompass a range of eruption styles and magma compositions. She is a Fellow of the American Geophysical Union (AGU), an elected member of the Academia Europaea, the American Academy of Arts and Sciences, the National Academy of Sciences, a Fellow of the Royal Society and the 2023 recipient of the GSA Distinguished Geologic Career Award.



Picnic Perseverance! Chris Heine and Dave Schiowitz fought for the horse shoe tournament title in a hailstorm at the FCGS Picnic on August 25th at Junction Creek. Forced to concede to the weather, they will meet soon to determine the winner and 2025 holder of the Steve Hayden trophy knife.



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Foundation News, by Cindi French

It's the Back to School Edition of FCG Foundation News you can use!

Quiz: What do they ask you on your first day of class?

Answer: What did you do this summer?

I can tell you that the Foundation Board Members were doing everything EXCEPT Foundation business, which is fine. That's how we roll. We live and play in this incredibly spectacular recreational and geological environment. We'll have plenty of time to get back to business now before snow season starts!

President
Mary Gillam
attended
to her
field
mapping
projects
and
Secretary
Patti
Phillips
hiked in
Europe
and
beyond.



Both Treasurer Peter Mesard and VP Cindy French took advantage of several of the AIPG annual conference geological field trips, resulting in new AIPG geo-friends...super fun!

Our last board meeting was June 26 when Peter took the helm as Treasurer and Cindy as Vice President. During the meeting at Peter's house we had an impromptu viewing of his fabulous museum quality hand-specimen collection (see photo) – a "Geology Moment"! Thanks Peter!

We will be kicking off this new business year with a board meeting on September 12. I'm thinking of proposing we add a "Geology Moment" to the agenda for each board meeting going forward so that it's not ALL business every time.

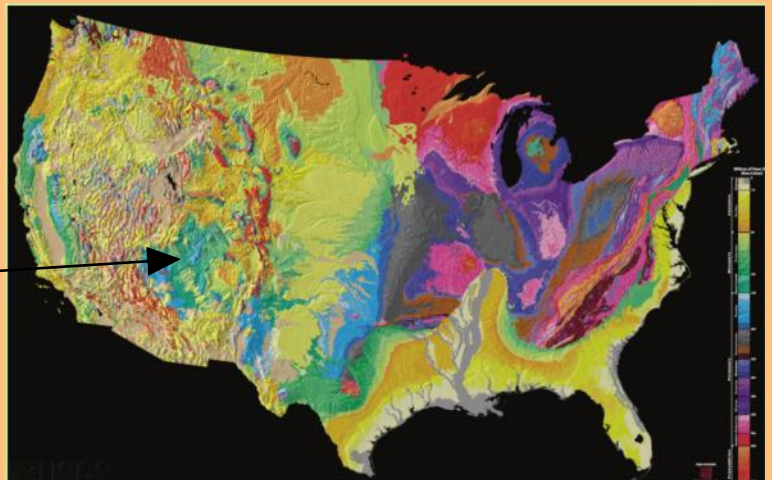
And of course, since we were so busy this summer having fun, we need to jump right back into fundraising for the Foundation. Thanks to all of you who donated already this year, I believe we had received eight donations by June 26. No dollar amount donation is too small, so please help us continue our funding of geology students and their activities – they are our future colleagues.

Upcoming Meetings

October 10th (Thursday): Dr. Peter H. Hennings, Research Professor, Bureau of Economic Geology, University of Texas.

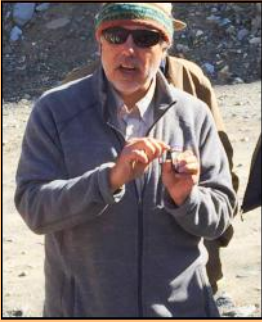
November 12th (Tuesday): Dr. Vince Matthews, retired Colorado State Geologist, speaking on the rotation of the Colorado Plateau.

USGS Geologic Investigations Series 2720, "A Tapestry of Time and Terrain", combines topographic relief with geologic age (colors).



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Pres Sez, by Dr. David Gonzales



“Nature is a mutable cloud which is always and never the same.” Ralph Waldo Emerson.

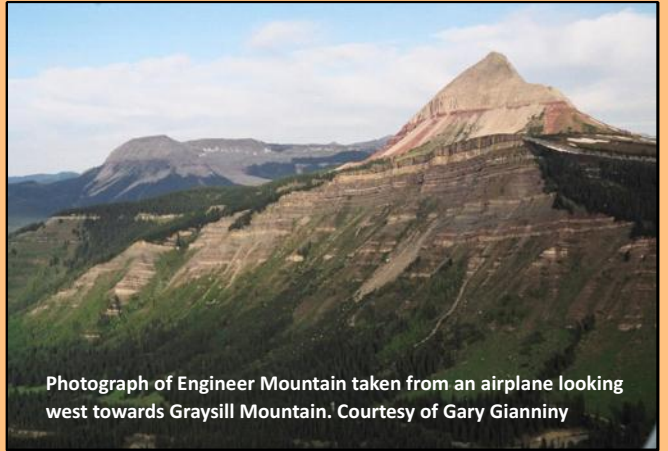
To start off the 2024-25 year, I am highlighting one of the most iconic geologic features in southwestern Colorado, Engineer Mountain. The mountain rises just under 13,000 feet and looms in our view as we drive north of Durango. A number of online sites note that the name was given to the peak in honor of the Army Corps of Engineers.

Engineer Mountain was “born” around 16 million years ago when felsic magma rose into the earth and intruded between layers of older sedimentary rock, similar to a layer of frosting in a cake. Engineer Mountain was once part of a more extensive mass of intrusive rock that is also exposed at Graysill Mountain and Barlow Creek.

Because the rock exposed at Engineer Mountain possesses a texture similar to porphyritic volcanic rocks, some people have incorrectly referred to it as rhyolite. Technically, the mineralogic and chemical composition of the rock classifies it as a granite. The texture reflects a complex crystallization history that started with the formation of large crystals of perthitic feldspar under conditions at deeper levels in the earth. The magma then rose and was emplaced within a few thousand feet of the surface. This caused a more rapid stage of cooling and the production of small crystals of quartz, feldspar, and biotite along with minor amounts of zircon and sphene. Cooling of the magma also led to the creation of 3- to 6-sided columnar joints that define the lower section of the sill.

Though geologists had explored Engineer Mountain since the late 1890's, the actual timing of this event was

not well known until about 15 years ago. That is when I trekked in knee-deep snow on a day in late May to the eastern flank of the mountain,



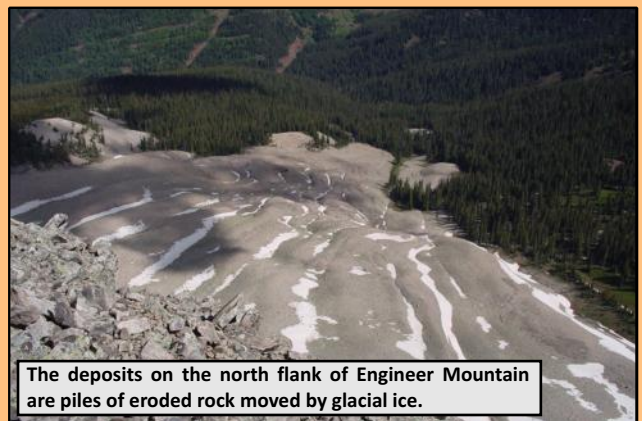
Photograph of Engineer Mountain taken from an airplane looking west towards Graysill Mountain. Courtesy of Gary Gianniny

collected samples, and then analyzed the zircons extracted from the rock to constrain the age which revealed that this is one of the youngest igneous events in the area. Other plutonic rocks of similar age have since been identified. This generation of plutons is responsible for local magmatic uplift and are often associated with zones of mineralization and thermal metamorphism.

For much of its history, Engineer Mountain was hidden by a cover of older sedimentary strata. It was not until glaciers carved away at the earth in the past ~100,000 years that the overlying rock was removed exposing the underlying sill and creating a glacial horn. The mountain is not the best example of a glacial horn in the region (i.e., Golden Horn), but it gives you an idea of how much ice once occupied the area, as the top of the mountain rose above the ice and snow. Today, if you hike to the north side of the mountain or take a flight in Google Earth you can view the piles of rock that are the vestiges of glacial activity. The debris resemble great masses of pudding with a sculptured surface. Some of these masses may still be moving as rock glaciers.



A view of Engineer Mountain from Coal Bank Pass on a snowy September day. Note the distinct columnar joints exposed between the cover of snow.



The deposits on the north flank of Engineer Mountain are piles of eroded rock moved by glacial ice.



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Jim Corken, Field Trip
Committee Chair

EXPLORING THE GEOLOGY OF THE LA PLATA MOUNTAINS



View SW from Kennebec Pass. Photo by Kim Gerhardt

- LEADER:** Dr. David Gonzales, Fort Lewis College
- COORDINATOR:** Jim Corken
- DATE:** Sunday, September 22nd.
- TIME:** Meet 8:30 a.m. in DoubleTree parking lot. Form carpools. Leave at 9am.
Return by 5:00 p.m.
- TRANSPORTATION:** 5 carpool vehicles. Drivers **MUST** have 4WD, high-clearance vehicles that can carry at least 3 riders.
- FEE:** \$15. Covers FCGS field trip insurance.
- LIMIT:** 5 drivers with 4WD vehicles, 15 non-driving participants.
- BRING:** Daypack with lunch, water, rain gear and warm layers.
- REGISTRATION:** Click on this link to register: <https://form.jotform.com/242483708385162>

DESCRIPTION: The La Plata Mountains are one of several Late Cretaceous laccolithic complexes that were developed in northwestern New Mexico and southwestern Colorado ~70 Ma during the Laramide orogeny. The La Plata Mountains straddle a major regional structural boundary between the Four Corners platform and the San Juan uplift.

These mountains were created by emplacement of 70-60 Ma subalkaline to alkaline plutons into Paleozoic to Mesozoic sedimentary rocks causing contact metamorphism and skarn formation. The intrusive rocks in the La Plata Mountains are mostly potassic calc-alkaline to alkaline monzonite and diorite with lesser syenite and gabbro. Base and precious metals mineralization were allied with magmatism and related thermal metamorphism. The rugged landscape in this mountain range was created by glaciation and fluvial erosion along with numerous mass movement events.

This tour will provide a sampling of the geology in the La Plata Mountains. We will stop at various points on this 4 x 4 trip to examine intrusive masses, contact metamorphic zones, ore deposits, and recent surficial deposits. At Kennebec Pass we will have one of the most magnificent views of the landscape and geology in southwestern Colorado. Participants should expect unpredictable weather and hikes up to 0.5 miles at elevations up to 11,600'.



WEST GOLD HILL DINOSAUR TRACK SITE, OURAY, CO



Aerial view of a fossilized dinosaur trackway known as the West Gold Hill Dinosaur Track site.

USDA Forest Service photo. Inset image by Patti Phillips.

<https://www.fs.usda.gov/detail/gmug/news-events/?cid=FSEPRD1171521>.

- LEADERS:** Steve Cumella and Rick Trujillo
COORDINATOR: Kim Gerhardt
DATE: Sunday, October 13th
TIME: 8:30am at the Silvershield trailhead in Ouray.
FEE: \$15pp. Covers FCGS field trip insurance. \$13 refunded if cancel.
LIMIT: 10 minimum for trip to go. No maximum.
BRING: Daypack with lunch, water, rain gear and warm layers. Hiking poles **strongly recommended** for the descent back to the cars.
REGISTRATION OPENS: 9 a.m. on September 23rd through the FCGS website > Events tab.

LOGISTICS: Participants must arrange their own transportation to Ouray, as well as lodging if you will be staying overnight before or after the trip. A group email will be sent to participants before the trip so people can arrange carpools. In Ouray we will meet at the Silvershield trail head at 8:30am. Location information will be sent to registrants. **The dinosaur trackway is reached by a 2.1 mile, 1,600' climb uphill to 9,300' on a rough, exposed trail with unsure footing in places. Hiking poles highly recommended for descent as surface is loose in places.**

DESCRIPTION: This is the longest recorded dinosaur trackway in the world (134 consecutive tracks, or 67 strides, extending 160 yards). The tracks were made by a single long-neck sauropod dinosaur. The animal looped in a 270-degree turn making this one of only six known sites where dinosaur tracks changed direction significantly.

The tracks are near the base of the Jurassic, Morrison Formation. Locally called the "Lower Quartzite" by miners, the sandstone has been hardened by hydrothermal alteration within the Uncompahgre Mining District.

At the top of the Lower Quartzite, researchers found two sets of symmetrical ripple marks. These are interpreted as wave ripples created by wind blowing over shallow water. Subsequently the dinosaur walked on this soft, water-saturated surface leaving deep impressions.

See the Forest Service website, the Ouray Geology Facebook page and this reference for more information: *Goodell, Z. et al., 2021, A High-Altitude Sauropod Trackway Site in the Jurassic of Colorado: The Longest Known Consecutive Footprint Sequence Reveals Evidence of Sharp Turning Behavior, in: Lucas, S.G., Hunt, A.P. and Lichtig, A.J., 2021, Fossil Record 7. New Mexico Museum of Natural History and Science Bulletin 82.*



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Summer Field Trip Pictures



Chinle Formation Field Trip, May 18th, 2024

**Chinle Formation Field
Trip with Gary Gianniny
and Jeff Geslin, May 18th,
2024**

**Chama Float Trip with
Matt Zimmerer,
NMBGMR.
July 26-28th.**



Chama Float Trip, July 26-28th, 2024



Allosaurus track, Dark Canyon.

Ducky flotilla. L-R, Gary Gianniny,
Mary Gillam, Matt Zimmerer and
Nate Rogers.



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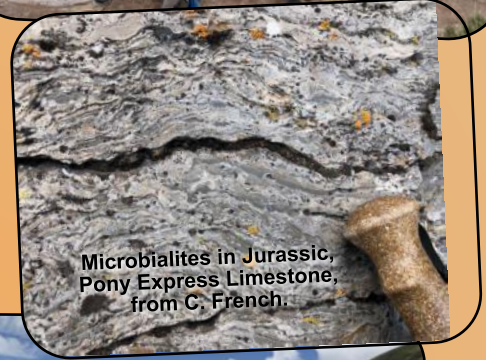
AIPG Meeting Field Trip Pictures



The AIPG, under President Doug Bartlett (left) held their annual meeting at Fort Lewis College in Durango in August. Many FLC faculty and FCGS members took part in the associated field trips.



Sand Canyon with Chris Heine and Kim Gerhardt



Microbialites in Jurassic, Pony Express Limestone, from C. French.



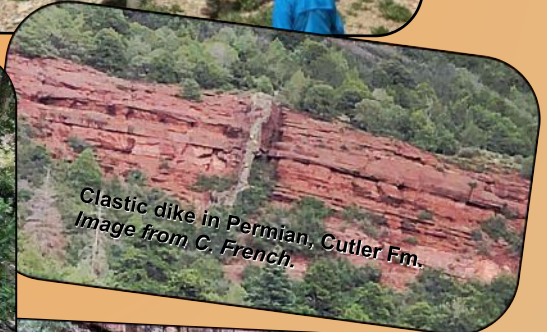
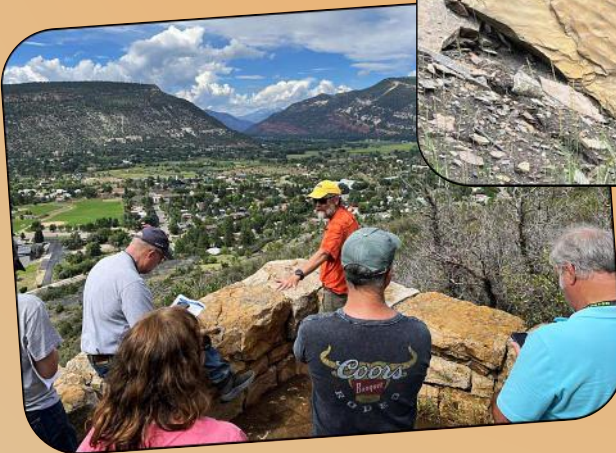
Box Canyon from C. French.

La Plata Mountains with David Gonzales and Chris Heine

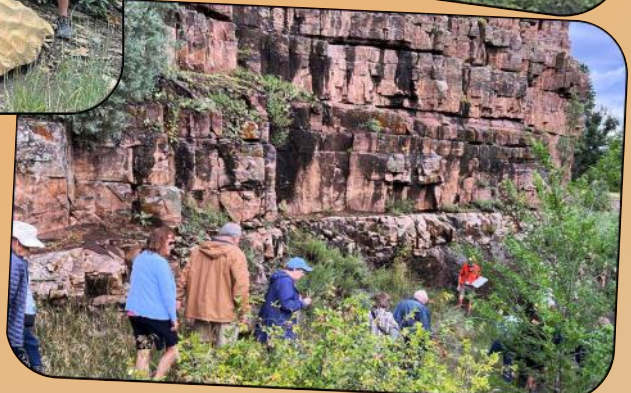


Ouray with Steve Cumella and Rick Trujillo

The Animas Valley with Gary Gianniny



Clastic dike in Permian, Cutler Fm. Image from C. French.





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FOUR CORNERS GEOLOGICAL SOCIETY

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MEMBERSHIP RENEWAL or APPLICATION: June 1, 2024 to May 31, 2025

*Name: _____

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

*Email: _____ Phone: _____

*Employer: _____



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> _____
Associate Member	\$30	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. <i>*Highest Degree, Type and Year:</i> _____ <i>*College / University:</i> _____
Student Member	Free	Any undergraduate or graduate student majoring in geology at a college of acceptable academic standards. <i>*College / University:</i> _____ <i>*Year expected to graduate:</i> _____
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
- 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 .