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FOUR CORNERS GEOLOGICAL SOCIETY

November 2022

NOVEMBER 2022 MEETING



SPEAKER: **Dr. Carol Finn: U.S. Geological Survey**

TITLES: **Geophysical Imaging of Yellowstone's
Hydrothermal Plumbing System**

DATE: **Thursday, November 17, 2022**

TIME: 5:30 - 6:30 pm: HAPPY HOUR
Drinks and Food prior to the meeting
~ 6:30 pm - 8 pm: Speaker, Society business and Raffle

LOCATION Vallecito Room, Student Union Building
Fort Lewis College

COVID: Please be cognizant of the ever-present danger of this
nasty virus as well as flu and RSV.

COST: \$20/person. Please RSVP by Monday, November 14 if
possible. 1) PLEASE go to the website to pay and/or
register: <https://fourcornersgeologicalsociety.org/event>
Or 2) email Jeff Geslin at jkgeslin@gmail.com
Some students will be sponsored. First come, first
served.

To sign up, contact Dr.Geslin, RSVP and get on the list.

ZOOM LINK: **[Link to meeting - CLICK HERE](#)**
Starts at 6:30 PM



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***Our Speaker:* Dr. Carol Finn**

Dr. Carol Finn graduated with a BA in Geology from Wellesley College and a MS and Ph.D. in geophysics from the University of Colorado. She is a research geophysicist at the U. S. Geological Survey, a past president and past General Secretary (Treasurer) of AGU. Her research interests are quite broad, but currently focus on the application of magnetic and gravity data, along with other geophysical techniques, to identify the subsurface distribution of hydrothermal alteration, sub-volcanic intrusions as well as ground water as they relate to both landslide hazard assessment and systematics of hydrothermal systems; find crystalline basement related to global mineral resource assessments (Algeria, Mauritania, Afghanistan, South Africa, Canada, Russia, United States); and model the 3-D geometry and internal structure of layered mafic intrusions, including



the Bushveld, Stillwater and Duluth complexes, in support of assessments of platinum group element potential. She is a Fellow of the Geological Society of America, has received Department of the Interior Meritorious and Special Service Awards and fellowships from Japan and Australia. When not working, she is skiing, hiking, jogging, rafting and “moming” her 12 year old son.



[ZOOM LINK -
CLICK](#)



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ABSTRACT

The nature of Yellowstone National Park's plumbing system linking deep thermal fluids to its legendary thermal features is virtually unknown. The prevailing concepts of Yellowstone hydrology and chemistry are that fluids reside in reservoirs with unknown geometries, flow laterally from distal sources and emerge at the edges of lava flows. Here we present a high-resolution synoptic view of pathways of the Yellowstone hydrothermal system derived from electrical resistivity and magnetic susceptibility models of airborne geophysical data. Groundwater and thermal fluids containing appreciable total dissolved solids significantly reduce resistivities of porous volcanic rocks and are differentiated by their resistivity signatures. Clay sequences mapped in

thermal areas and boreholes typically form at depths of less than 1,000 metres over fault-controlled thermal fluid and/or gas conduits. We show that most thermal features are located above high-flux conduits along buried faults capped with clay that has low resistivity and low susceptibility. Shallow subhorizontal pathways feed groundwater into basins that mixes with thermal fluids from vertical conduits. These mixed fluids emerge at the surface, controlled by surficial permeability, and flow outwards along deeper brecciated layers. These outflows, continuing between the geyser basins, mix with local groundwater and thermal fluids to produce the observed geochemical signatures. Our high-fidelity images inform geochemical and groundwater models for hydrothermal systems worldwide.

JUST IN CASE YOU DON'T THINK FCGS MAKES A DIFFERENCE IN PEOPLE'S LIVES

Last month we received the following letter from Zach Cover, an FLC graduate

Dear FCGS,

I really appreciate what this community did for me when I had my back against the wall. I was in a very difficult situation at the end of my senior year at Fort Lewis when I could not afford Field Camp and was at risk of not graduating. After discussing my worries with a few professors and members, this community came together and helped me so much with such short notice. Your actions at my time of need speaks wonders of how close and important this community is to one another. Because of you, I was able to have the time of my life doing what I love at Field Camp and graduate on time. I am working as a mud logger up in Alaska now and applying to go to graduate school for sedimentary basin analysis.

Thank you for your kindness!

Zachary Cover



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“PREZ SEZ” by Jeff Geslin

Hello FCGS members! ***This month...*** Our talk this month is by Carol Finn on imaging of the hydrothermal plumbing system at Yellowstone National Park. Yellowstone is truly an icon of the American west, and is geologically fascinating. I'm really looking forward to Carol's presentation. We will start the meeting at 5:30 pm, but please note that this month we will be in a different location, *the Vallecito room in the Student Union Building at FLC*.

We will be going out for another fieldtrip this Saturday, November 12, to the Bisti Badlands in New Mexico. The badlands are a spectacular modern landscape with an interesting geologic history (and some *huge* petrified logs!). Because it is a wilderness area, we are limited in the number of people that can attend. The trip may be sold out, but if you haven't signed up and are interested in going, then you should put your name on the wait list in case someone cancels.



Out and about... My wife and I were fortunate to be able to travel to the Dalmatian Coast of Croatia this month. The human history in that part of the world is amazing, and the geologic setting is interesting as well. All of the ancient cities in that area are constructed out of limestone blocks, sourced from the Cretaceous strata in the fold-thrust belt that defines the coast and adjacent mountains. It made me think of the cliff dwellings at Mesa Verde, another ancient construction using locally sourced stone. Obviously, in both examples it is construction that was built to last...

Best regards,

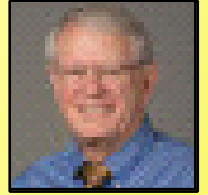
Jeff



The ancient walled city of Dubrovnik, build from local Cretaceous limestones.



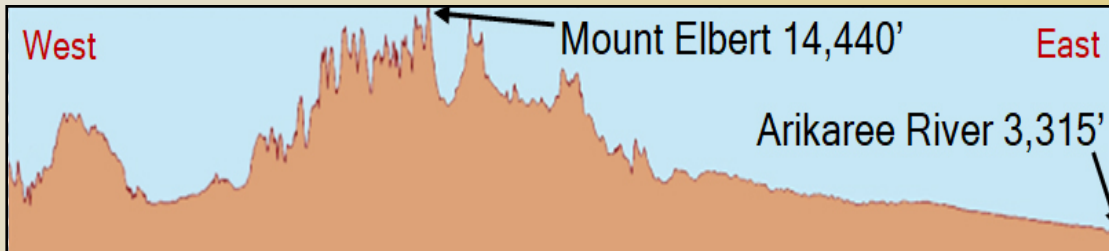
DID you KNOW?



Courtesy of Dr. Vince Matthews

Director, Colorado Geological Survey, (Retired)
Visiting Assistant Professor / Lecturer
Department of Geology and Environmental Science
University of Wisconsin - Eau Claire

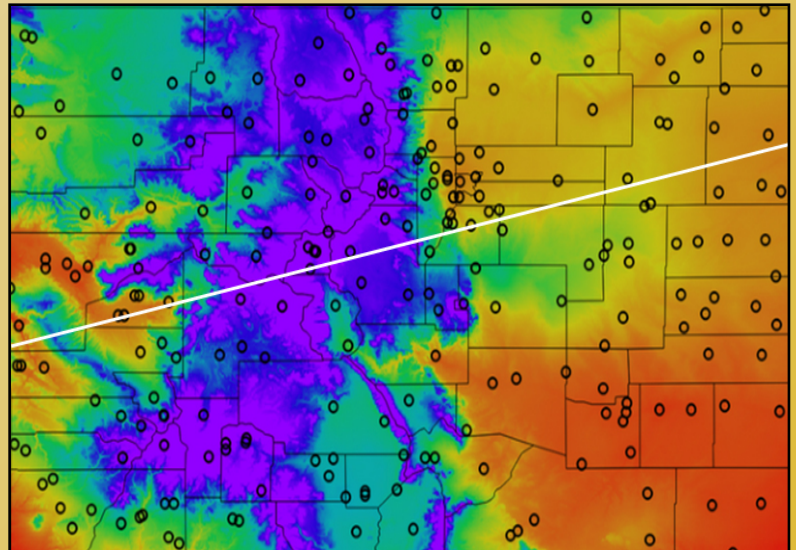
Colorado has the highest average elevation of all 50 states at 6,800 feet above sea level. More than two vertical miles (11,125') separate its highest and lowest points.



A topographic profile through Colorado's lowest and highest points. Colors represent average annual temperatures.



Mount Elbert is the highest point in Colorado at 14,440 feet above mean sea level.



The Arikaree River enters Kansas at the lowest point in Colorado at 3,315 feet above mean sea level.



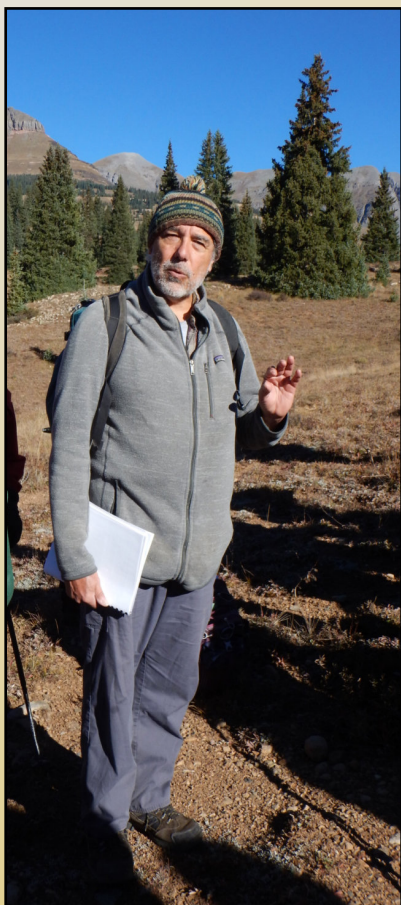
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FCGS October Field Trip



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FCGS in the Field



This month: Bisti

SAVE THE DATES!

December 8, 2022:

TBD + Student Posters

April 20, 2023

FLC Student Presentations

January 19, 2023:

TBD

May 2023:

Possible Spring Party

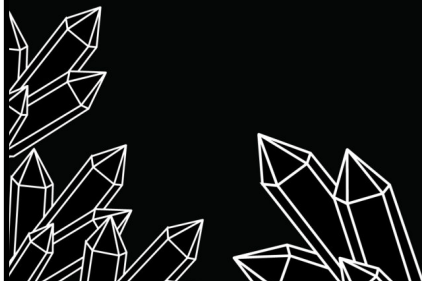
February 16: Nathan Rodgers/Lauren Broes

March 23: John Singleton, Colorado State University



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WANT AN INTERN



GEOLOGY SMALL BUSINESS INTERNSHIP FUND

Geology/geoscience organizations can help students to excel in their field by gaining skills and knowledge that will be useful for their future.



Funding provided by
Fort Lewis College.



Interns earn academic credit
at Fort Lewis College.



Targeting micro businesses
that have career geology/
geoscience experiences
available.

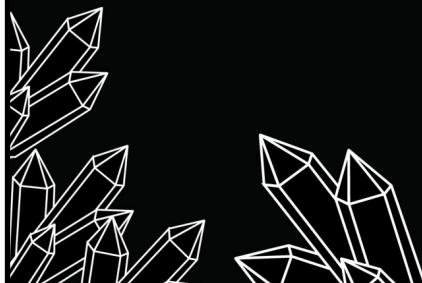


Be a mentor not the employer.



More Information:
Dave Kerns (970)-247-7427
kerns_d@fortlewis.edu

WANT TO DONATE



GEOLOGY SMALL BUSINESS INTERNSHIP FUND

Give geology/geoscience majors a chance to experience a paid internship and earn academic credits towards their degree.



Pooled tax-deductible
donations.



Interns paid as employees of
Fort Lewis College.



Interns earn academic credits
while learning relevant
geoscience work place skills.



Organizations with the best
internships are selected for
funding.



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Water Week

EVENTS

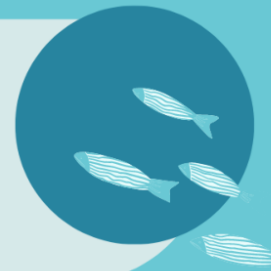


Monday 11/14 4:00 P.M.-5 :00 P.M.

Panel on "Environmental Issues on the Colorado River." CSWS Lyceum.

Tuesday 11/15 6:00 P.M.- 7:00 P.M.

Jonathan Thompson, author of "River of the Lost Souls," book discussion.
Student Union.

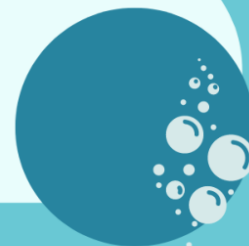


Wednesday 11/16 5:30 P.M. -8:00 P.M.

Showing of documentary film "Thirst for Justice." Vallecito Room. Includes a panel of guest speakers and free food.

Thursday 11/17

Make your own trailmix and learn how you can get involved in water projects. In front of the Reed Library all afternoon.



Fort Lewis College



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THIRST FOR JUSTICE

**A documentary telling the
story of residents' struggle
for clean water in Flint,
Michigan and the
Navajo Nation**



November 16

5:30 P.M. to 8:00 P.M

**Vallecito Room on
FLC Campus**



**Free entry and
food provided**

**Featuring a panel
of guest speakers**



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NEWS FROM AROUND THE REGION

AAPG Petroleum Systems Webinar Series

Nov 16, 2022; 8:00 AM CST

Join the Petroleum Systems Technical Interest Group (TIG) for the next session of the AAPG Petroleum Systems Webinar Series, "Fluid rock Interaction – What We Think We Know."

This webinar will provide a summary of the current understanding of fluid rock interaction as it pertains to fluid property prediction. The talk will be separated into three sections: tight rocks, conventional plays, and EOR production. Each section will highlight challenged assumptions from over the years and where practitioners can apply good modeling and sampling programs to address these issues in their own organizations.

To register, go to https://aapg.zoom.us/webinar/register/WN_MZkCTItCQO-6CVgHWkwYbw#/registration

November GJGS Talks

Wednesday, November 16, 2022; 7:30 PM Mountain Time; In-person only

Saccomanno Lecture Hall (Room 141 in the Wubben-Science Building), Colorado Mesa University, Grand Junction, CO

The Meeting will Be GSA Poster Presentations. The posters were Presented at the National GSA meeting by Colorado Mesa University students. Because these are posters, there will NOT be a Zoom component of the meeting.

"WeCSIP: analyzing stable isotopes in precipitation to create a preliminary local meteoric water line for Grand Junction, Colorado" by Myah Baker and Abigail Winkler, supervised by Dr. Cassie Fenton.

"Evaluation of petrophysical heterogeneity within fluvial architectural elements of the Cretaceous Burro Canyon Formation, Colorado" by Liam Posovich, supervised by Dr. Javier Tellez.

"Fluvio-glacial terraces of the upper Green River Basin spanning the past ~2 Ma: new detrital-sanidine, cosmogenic-burial, and luminescence age constraints" by Leyna Weller, supervised by Dr. Andres Aslan.

"Late Eocene to Miocene landscape evolution of western Colorado: new age constraints using detrital sanidine $^{40}\text{Ar}/^{39}\text{Ar}$ Geochronology" by Aaron Orelup, MJ Winey, and Cole Wood, supervised by Dr. Andres Aslan.

"Use of paleocurrents to evaluate origins of the enigmatic Late Cretaceous(?) Ohio Creek interval" by Cole Wood, supervised by Dr. Andres Aslan



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MEMBERSHIP RENEWAL or APPLICATION: June 1, 2022 to May 31, 2023



*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 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.

Please donate to the Foundation to support student research. Make out your check to: "Four Corners Geological Foundation" and include it in the envelope with your dues.

*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)