

Monitoring methane seepage from Fruitland Fm. outcrop near Lake Nighthorse. Photo from Devin Hencmann. See field trip announcement, pg. 5.

FEBRUARY 2019 NEWSLETTER FOUR CORNERS GEOLOGICAL SOCIETY

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FEBRUARY DINNER MEETING

SPEAKERS: John C. Lorenz and Scott P. Cooper, Fracture Studies LLC
TITLE: *Comparing Natural Fracture Systems in Reservoirs of the San Juan, Piceance, Raton and Green River Basins*
DATE: Thursday, February 21st
TIME: 5:30pm Social, 6:00pm Dinner, 6:30pm Talk
LOCATION: Fort Lewis College, Student Union, Vallecito Room
COST: \$20/person with RSVP by deadline. 25/person post deadline and/or at the door while food lasts. \$2/person talk only. Ten students can attend for free IF they contact Dr. Gary Gianniny (gianniny_g@fortlewis.edu) by the deadline.
RSVP: By Tuesday, February 19th at 5pm. Students, members who are pre-paying and members who just want to reserve a spot and pay at the door can all register at this link (use your preferred buttons):

<https://fourcornersgeologicalsociety.org/event/comparing-natural-fracture-systems-in-reservoirs-of-the-san-juan-piceance-raton-and-green-river-basins-by-john-lorenz-scott-cooper/>



Thank you E.S.S. & Chuck Baltzer for sponsoring 6 students at the February meeting!

Inside this issue:

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Natural fractures in Cretaceous Burro Canyon Sandstone, Durango, CO. Photo by Ron Brogden



BIOGRAPHY: John C. Lorenz, Ph.D. Fracture Studies LLC

Save the Date!

March 14th @ FLC: Richard Goldfarb: *Orogenic Gold Exploration*.

April 25th @ FLC: FLC Graduating Geoscience Seniors: *Senior Theses*.

May 10th @ FLC: Kurt Blair presentation on mountain climbing. Open to guests.

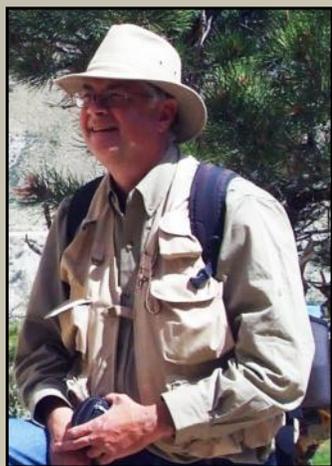
May 11th: Hydrology and Methane Seeps in the Durango Area fieldtrip.

June 1-2nd: Geology of the Ouray Area field trip.



John Lorenz earned an undergraduate BA, with a double major in geology and anthropology, from Oberlin College in 1972. After serving in the Peace Corps, Morocco, he earned his MSc, on the Moroccan Triassic, at the University of South Carolina (1975), and PhD, on Cretaceous strata in Libya and Montana, at Princeton University (1981). John has worked for the US Geological Survey in Louisiana and New Mexico, and for Sandia National Laboratories where he was the geologist for the tight-gas Multiwell Experiment in the Piceance basin. John has been a consultant, specializing in fractured reservoir characterization and effects, since 2007.

Dr. Lorenz has served as elected Editor (2001-2004) and President (2009-2010) of the American Association of Petroleum Geologists. As President he supported the advancement of the geosciences and their applications to hydrocarbon-related problems. His published papers on natural and induced fractures in reservoirs that range geographically from the Lisburne Limestone in Alaska to the Spraberry Formation in Texas. These papers and presentations have been awarded the AAPG Levorsen and Jules Braunstein awards. He has worked closely with the oil and gas industry on problems involving reservoir dimensions and in situ permeability, gaining extensive hands-on experience with core analysis and fieldwork. He has led field trips, presented core workshops, and taught short courses for the industry-oriented geological community.



BIOGRAPHY: Scott P. Cooper, M.S., Fracture Studies LLC

Scott Cooper earned a Bachelor of Science degree in geology from the South Dakota School of Mines (1997) under Dr. Alvis Lisenbee and Dr. James Fox. He received his Master of Science in geology from the New Mexico Institute of Mining and Technology (2000) working with graduate research and academic advisors Dr. Laurel Goodwin and Dr. John Lorenz. The thesis topic was fracture characterization and modeling of Teapot Dome, a basement-cored anticline in central Wyoming.

Scott was a Senior Member of the Technical Staff at Sandia National Laboratories, a Department of Energy Research Laboratory, working on projects related to outcrop and subsurface fracture studies with applications to reservoir characterization, production and CO₂ sequestration. He has been working in partnership with Dr. John Lorenz since 2008 at FractureStudies LLC on naturally fractured reservoir characterization projects around the world.

Mr. Cooper is an American Association of Petroleum Geologists, Division of Professional Affairs Certified Petroleum Geologist. He has published papers highlighting outcrop and subsurface fracture studies from Wyoming, Utah, Colorado, New Mexico, Texas and beyond. He has also led numerous field trips and taught short courses for the oil and gas industry throughout his career. Detailed descriptions of projects, published papers and links to open-file reports and papers are available at www.fracturestudies.com.





ABSTRACT: Reservoirs in the San Juan, Piceance, Raton, and Green River basins have microdarcy-scale matrix permeabilities, yet the permeability of the matrix-fracture systems, measured by well tests, is typically in the millidarcy range and highly anisotropic. The dichotomy is the result of permeability enhancement and control by natural-fracture systems. Well-developed natural fractures of several types have been documented by image logs, outcrop studies, and by cores taken from even the deeper wells, but not all fracturing creates economic reservoirs.

The most common fractures are vertical extension fractures, filled or partially filled with quartz and calcite and oriented normal to basin-margin thrust fronts. Reservoirs in the middles of basins and away from faults and folds typically contain regional fractures with spacings on the order of several feet. Single sets of extension fractures enhance permeability in only one direction, creating highly anisotropic drainage ellipses, but multiple sets of extension fractures may be superimposed over the course of geologic time.

Deformation band.

Extension fractures have been locally reactivated in shear and enhanced where they overlie faults, and such reactivated systems have been productive targets. Average fracture spacing may be less than a foot in these settings, and shear reactivation props them open. Reservoirs near overthrust basin margins locally contain conjugate strike-slip or even thrust-oriented shear fractures. Conjugate fractures offer potentially rewarding, interconnected

fracture systems.



Fractures in the lower Cutler Fm. (Halgaito). Comb Ridge, UT.
Photo by Kim Gerhardt



El Vado lake.

Stimulating and producing fractured reservoirs must be done carefully since hydraulic-fracture stimulations can damage natural-fracture permeabilities, and since production-related changes in the in situ stresses can close fracture apertures. Shear on critically-stressed fractures during stress changes can crush the fracture bridging and severely reduce fracture permeability. The three attempts to stimulate these reservoirs with nuclear explosions in the 1960s and 1970s offer a cautionary tale of natural-fracture damage.



25th Annual 3D Seismic Symposium
SEISMIC SYMPOSIUM SILVER ANNIVERSARY
Tuesday, March 19, 2019
Sponsored by the Denver Geophysical Society

For more information go to: <https://www.denvergeo.org/events/3d-seismic-symposium-call-for-papers/>



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

“PREZ SEZ” by Tim Rynott



There is a Greek proverb which reads *Society grows great when older people plant tress under whose shade they shall never sit*". Those ancient Greeks were real forward thinkers, huh? I also recently read a report indicating that when older people help younger people, they have three times the

chance of being happier. Can you appreciate the synergy? There are so many circles of life, with some being more stealth than others. Our Greek Proverb struck a nerve with me, and I hope it does with you. We are the accumulation of countless generations of wisdom, kindness, courage and empathy. Legacies don't require moving the earth and sky, a legacy can be affirmed with helping to make one person better. Here in Durango, I'm continually impressed with the impassioned trickle down from those long in tooth (an expression from my mother describing 'elders'). From the boundless altruism of the new FLC President (Tom Stritikus), to the ambassador of eternal youth Ned Overend, to Jim Corken, Chuck Baltzer, Bob Krantz, the sage Statesman Ed Heath and to the many passionate professors in the FLC geology department. And many others. All of us have the

potential, all of us benefit. But for the young people reading this – it's a two-way street. Don't let your ego cause you to think you already know everything. Don't let your timidity create barriers to guidance. Don't let ill-advised peers lead you down the wrong path. And finally, give credence to wise owls.

Wow! Jay Lebeau wowed me last month. Jay's talk concerning the Delaware was akin to a condensed mini-seminar given at a National conference! Kudo's Jay. And speaking of excellence, be sure to mark your calendars for **March 14th**. Please note that we've moved this meeting to the second Thursday of the month due to scheduling issues. Securing Dr Richard Goldfarb as our speaker is a HUGE feather in Sabina's cap. Dr Goldfarb is a true legend in gold exploration.

This month's speakers, John Lorenz & Scott Cooper with FractureStudies LLC, will provide top insights into the natural fracture systems of the San Juan Basin. I've had the fortune of knowing John through various AAPG experiences and not only is John a highly respected geoscientist, but also a true gentleman who exudes genuineness and humility; the latter being quite significant considering his immense achievements. It should be a great night.

Rock on.....Tim

An advertisement for DAPUB 2019. The top part shows a drilling rig in a snowy field with mountains in the background. The SPE International Denver Section logo is in the top right. The bottom part is a blue banner with white text: "DENVER SPE PRESENTS DAPUB 2019 DENVER ADVANCED PRACTICES IN UNCONVENTIONAL BASINS HEAR FROM THE EXPERTS DENVER, CO | APRIL 17-18 EARLY BIRD REGISTRATIONS ENDS JANUARY 31, 2019. Join us for extended sessions and panels to get an in-depth look at the challenges facing unconventional development. www.dapub.org".

DENVER SPE PRESENTS

DAPUB 2019
DENVER ADVANCED PRACTICES IN UNCONVENTIONAL BASINS

HEAR FROM THE EXPERTS DENVER, CO | APRIL 17-18

EARLY BIRD REGISTRATIONS ENDS
JANUARY 31, 2019.

Join us for extended sessions and panels to get an in-depth look at the challenges facing unconventional development.

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NEW MEXICO GEOLOGICAL SOCIETY SPRING MEETING CALL FOR ABSTRACTS DEADLINE FRIDAY MARCH 25, 2019



The New Mexico Geological Society (NMGS) is seeking presentation and poster abstracts for their 2019 Spring New Mexico Geological Society Meeting on April 12, 2019 at the Macey Center in Socorro, NM.

The special theme this year is "Recent Advances in Geophysical Research in New Mexico", with [Alex Rinehart](#) and [Shari Kelley](#) serving as conference co-chairs. [Scott Baldridge](#), emeritus geoscientist from Los Alamos National Laboratory and one of the founders of the SAGE field program, will be the keynote speaker.

The NMGS is seeking presentation and poster abstracts for sessions focusing on the geology, hydrology, geophysics, paleontology, and mineral resources of New Mexico and adjacent areas.

For more information go to: <https://nmgs.nmt.edu/meeting/>.





SAVE THE DATES, TWO FIELD TRIPS COMING THIS SPRING!!



MAY 11th: HYDROLOGY AND METHANE SEEPS IN THE DURANGO AREA



Fruitland Fm. outcrop southwest of Durango.



Methane remediation plot.



Bubbling methane seep, S. Fork Texas Creek.

Leaders: Devin Hencman (LT Environmental) and David Schiowitz (SGM)

Description: This is a day trip run out of Durango. The timing, in mid-May, coincides with spring high water tables that showcase bubbling methane seeps along the Fruitland coal outcrop that rims the northern San Juan Basin. Although the itinerary is not finalized, potential stops (from west to east) include the Cinder Buttes underground coal fire, Long Hollow Dam - hydrology, construction and maintenance issues related to geology, the Carbon Junction area methane seeps, the impact of seeps on vegetation on the Florida River, the reverse French drain remediation system on Texas Creek and BP's history at Pine River Ranches. Also, water rights of the Fruitland Fm. including litigation, flow modeling and potability.

Number of Participants: 30 total including leaders and drivers.

Transportation: Vans from a meeting location in town.

Fee: Not yet determined.

Registration: Planned to open April 1st through the Four Corners Geological Society website.

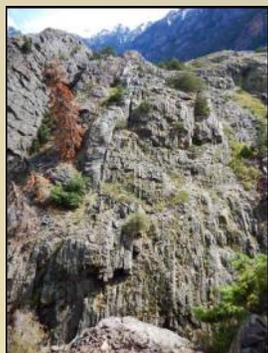


Location of Long Hollow dam abutment in Cliff House Fm. and Lewis Shale.



Long Hollow dam completed, lake half full in 2017.

JUNE 1-2nd: GEOLOGY OF OURAY AREA



Proterozoic metaquartzite.



San Juan volcanics.



Pennsylvanian - Permian section above town.
Laramide "Blowout" center. Tertiary volcanics above.

Leaders: David Gonzales, FLC, and Steve Cumella, Retired geologist.

Description: This will be a 2-day trip run out of Ouray. Transportation to Ouray and lodging in Ouray are not included in the trip fee. Geologic highlights include Proterozoic basement history, the Pennsylvanian – Permian section, late Cenozoic magmatic events (San Juan volcanic field) and mineralization in the Ouray area.

Number of Participants: 30 including trip leaders and drivers.

Transportation: Carpooling from a meeting location in Ouray.

Lodging: Participants must find their own lodging.

Fee: Not yet determined.

Registration: Planned to open May 1st through the Four Corners Geological Society website.



JANUARY MEETING



NEWS FROM THE NEVADA PETROLEUM AND GEOTHERMAL SOCIETY

NBMG, Nevada Bureau of Mines and Geology, is looking for candidates for two positions listed below.

The deadlines for applicants are February 22, 2019 (Economic Geologist) and March 2, 2019 (Assistant Professor Geosciences).

- Economic Geologist
 - https://nshe.wd1.myworkdayjobs.com/en-US/UNR-external/job/University-of-Nevada-Reno---Main-Campus/Assistant-or-Associate-Professor---Economic-Geologist_R0113408-1
- Assistant Professor Geosciences
 - https://nshe.wd1.myworkdayjobs.com/UNR-external/job/University-of-Nevada-Reno---Main-Campus/Assistant-Professor-Geosciences--Sedimentology--Structural-Geology-or-Volcanology-_R0113653



2020 RMS-AAPG MEETING CO-HOSTED BY FCGS & GJGS PLANNING UPDATE

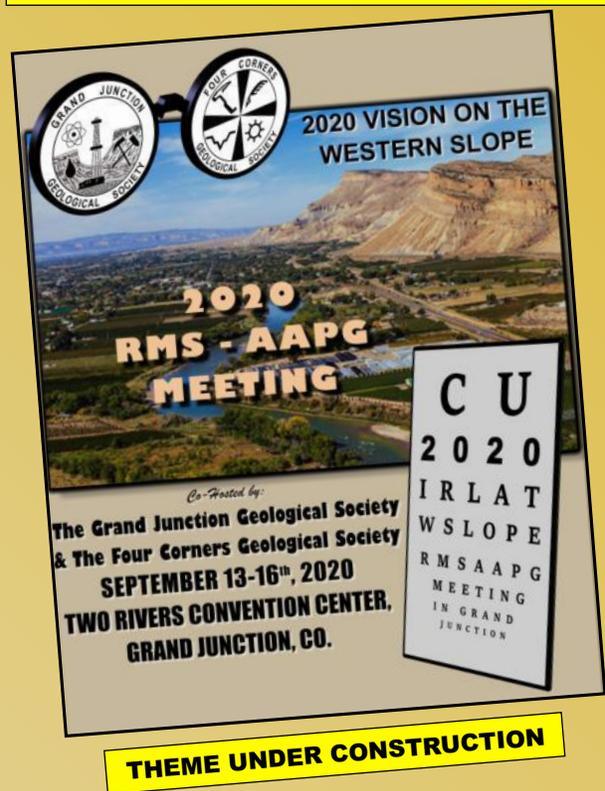
ORGANIZING: FCGS and GJGS now phone conferencing.

DOCUMENT CLOUD: Google Drive site loaded with documents and reports from past RMS meetings, especially the 2012 meeting in Grand Junction.

GEM & 2RCC CONTRACTS: Working on contract with conference planners and Two Rivers Convention Center.

GEM can do the following (if we want to pay for it):

- Registration & packet materials
- Lodging
- Guest hospitality & tours
- Publicity (part)
- Consult w/ steering committee on tasks & timing
- Consult w/ finance committee on budget
- Negotiation w/ 2RCC
- AV, catering, meeting room usage & setup, catering, security, exhibit hall management, signage
- RFP for website & abstract processing
- Meeting promotion (part)
- Website content (part)



THEME UNDER CONSTRUCTION

Need volunteers for the following tasks:

(Contact Kim Gerhardt, kim@mydurango.net)

- **SPONSORSHIP:** Solicit sponsors (using lists from past RMS meetings).
- **EXHIBITORS:** Solicit exhibitors & vendors (using lists from past RMS meetings & GEMs list).
- **FINANCE:** Budget & finance committee. Pays up front costs out of RMS meeting account. Estimates income vs expenses to determine registration fees. Collects income. Settles with RMS at end.
- **FIELDTRIPS:** Propose fieldtrips, find leaders, plan logistics, determine participant price.
- **TECHNICAL SESSIONS:** Propose technical sessions, find chairs, find subcontractor to process abstracts (AAPG contact)
- **SHORT COURSES:** Solicit short course instructors. Determine participant pricing.
- **SPEAKERS:** Recruit luncheon speakers (All Convention Luncheon, DPA).
- **AWARDS & JUDGING:**
 - Buy awards to give to last year's winners.
 - Recruit judges via registration form for this year, collect completed forms and determine winners. They will get awards at 2021 meeting.
- **WEBSITE:** Set up meeting website including links to registration & abstract submission.
- **PUBLICITY:** Publicity - use templates from other RMS meetings to make following. (Some help from GEM):
 - Meeting announcement.
 - Call for Abstracts.
 - Info flyers for Sponsors, Exhibitors & Vendors.
 - "Final Announcement" booklet - gets mailed out with opening of registration.
 - "Program with Abstracts" handout with registration material.



2020 RMS-AAPG MEETING

Technical Session and Field Trip Ideas

Need volunteers to work with GJ to revise & finalize list. Find Session Chairs & Field Trip Leaders. Steward the abstract submission process.

Rocky Mountain Cretaceous Shale Plays – Which Way Forward?

- San Juan Basin Mancos Shale play status.
- Piceance Basin Mancos Shale play status.
- Front Range Niobrara Play status.
- Wyoming PRB & BHB shale plays status.
- What affects the producibility of Cretaceous shales and how does it differ between basins?
- Shale core workshop: facies & petrophysics.

Rocky Mountain Conventional Reservoirs & Coal Bed Methane

- New moves in old plays. New information on stratigraphy, structure, petrology, etc.

Paradox Basin Enigmas

- Aneth Field AFTER the release of Resolute cores. Integration of flow unit models with geologic facies models. New insights?
- Aneth core workshop.
- Penn/Perm system – new ideas?
- Is there still life in the Gothic, Chimney Rock, Hovenweep or Cane Creek shale plays?
- Salt tectonics in the Paradox basin – comparison with Gulf Coast.

Structural and Tectonic Reinterpretations in the Rocky Mountain Region

- The creeping overprint of the Cenozoic on the Laramide.
- Fracture patterns and structural histories. Integration of small scale with large scale.

Non-Methane Gas Fields

- Why are they there? Source of the gas.
- McElmo Dome & other CO2 fields
- Red Mesa & other Helium reservoirs.
- Mississippian carbonate reservoirs for non-methane gas, outcrop and subsurface studies.

Energy Minerals of Western Colorado – A Special Session in Honor of Bill Chenoweth

- Uranium – legacy of the past or path to the future?

Mesozoic Paleoclimates and Non-Marine Depositional Environments

- Recognition of non-marine trace fossils & paleosols in outcrop and core.
- Non-marine reservoirs of the Rockies.

Green River Oil Shale

- Facies studies – Drying cycles, oil shale, Mahogany Bed, microbialites, paleo.
- GR as analog for lacustrine source & reservoirs in other regions.

Fieldtrip Ideas

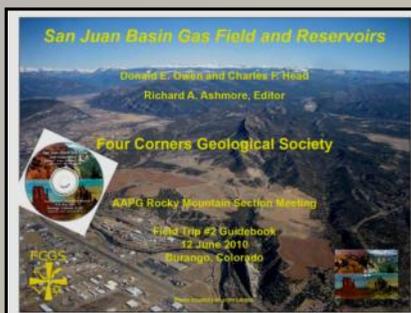
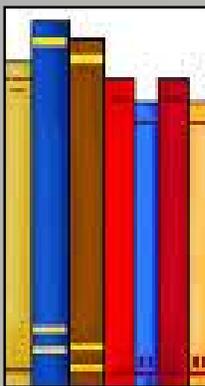
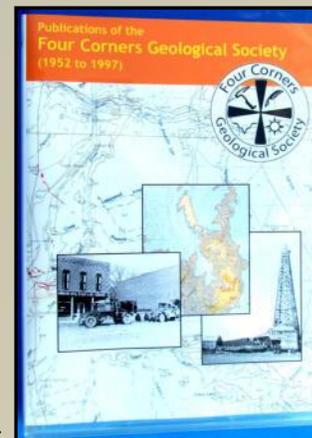
- San Juan Basin: Mancos Shale facies, conventional reservoirs, CBM, structure & fracturing.
- Piceance Basin: Mancos Shale facies, Williams Fork sands, structure & fracturing.
- Salt tectonics field trip in eastern Paradox Basin.
- Brann Johnson (GJGS) FT in eastern Canyonlands looking at sed / structure / salt movement.
- Arches Park: relay ramp fault style, salt structures, Jurassic sed/strat.
- Mississippian carbonates field trip? Tie-in to non-methane gas fields?
- Fieldtrips looking at eolian and lacustrine environments in Arches, Canyonlands, CO National Monument. Dino prints!
- Green River oil shale – lacustrine facies & analog applications.
- The Book Cliffs: Classic Sequence Stratigraphy of Cretaceous Shorelines.
- CO National Monument – The Uncompahgre Uplift & Great Unconformity.



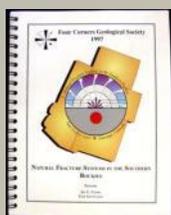
FCGS PUBLICATIONS

Order online at: <https://fourcornersgeologicalsociety.org/bookstore/>

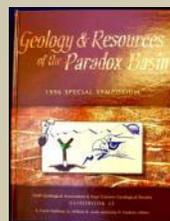
Publications of the Society: 1952-1997. This disk contains all publications of the Four Corners Geological Society (FCGS) from 1952-1997. Includes several which are out of print in hardcopy. Many contain classic papers on the geology of the Four Corners region. Much of the emphasis, but not all, is on exploration for oil and gas. Twenty publications in all. **UPDATED** - now includes Owen & Head, 2010, San Juan Basin Gas Fields and reservoirs. **\$105.**



San Juan Basin Gas Fields and Reservoirs: A Field Guide on CD. 2010, D.E. Owen and C.F. Head. A (CD) field guide of a 200 mile traverse from Durango and back into the heart of the San Juan Basin. Discussion covers Cretaceous and Tertiary reservoir outcrops, landforms, stratigraphy, history of exploration and development, and the hydrocarbon system of the basin. **\$25.**



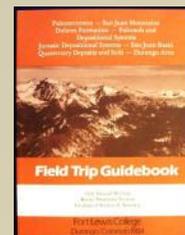
Natural Fracture Systems in the Southern Rockies. 1997. Sixteen full-length papers and 12 abstracts covering a variety of topics on natural fracture systems. Soft-spiral bound. 210p. **\$45**



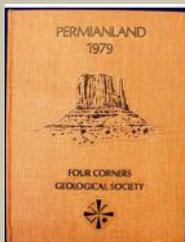
Geology & Resources of the Paradox Basin. Special Symposium with Utah Geological Association. 1996. A.C. Huffman, ed. Thirty-three technical papers and road log. Hardbound. 460p. **\$65.**



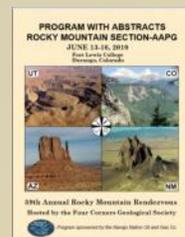
Four-Corners Oil & Gas Fields, Vols I, II, and III. Oil & gas field papers include geologic setting, discovery well drilling and completion practices, and reservoir data for each field. Vol. I&II (1978) includes 242 field papers, 726p. Vol. III (1983) has 95 field papers, 415p. Looseleaf ring binders. **\$60.**



Field Guide - Durango Vicinity. 1984, 37th Annual Meeting of Rocky Mountain Section GSA. Includes excellent road guide. Softbound. 209p. **\$22.**



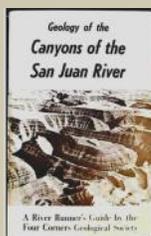
Permianland. 1979. Ninth field conference. Hardbound. 186p. **\$22**



Program with Abstracts: RMS-AAPG 2010. Programs with Abstracts Volume and CD from the 2010 Rocky Mountain Section AAPG 59th Annual Rocky Mountain Rendezvous in Durango, CO, June 13-16th 2010. **\$5.**



FOR RIVER RUNNERS!!



Geology of the Canyons of the San Juan River. 1974. The classic geologic river guide to the San Juan River from Bluff, Utah to Clay Hills Crossing. Softbound, water-resistant. 94p. **\$15.**



Cataract Canyon and Vicinity, 1987, John A. Campbell, Editor. FCGS Tenth Field Conference. Twenty eight papers, Hardbound, 199p. **\$25.**



The New Mexico Water Resources Research Institute announces a Call for Abstracts and Papers on topics related to the theme of the June 2019 conference, *Animas and San Juan Watersheds Conference: Successes and Challenges from Headwaters to Lake Powell*. The conference will address water quality issues in the Animas and San Juan Rivers watersheds, from the headwaters in the San Juan Mountains through the San Juan National Forest, past the mixed urban and agricultural valleys from Durango to Shiprock, and through desert canyons across the Navajo Nation into Lake Powell.

Relevant topics include the following:



CALL FOR ABSTRACTS

DEADLINE
April 15, 2019
at 5:00 pm

San Juan College
Farmington, NM

Animas and San Juan Watersheds Conference: Successes and Challenges from Headwaters to Lake Powell

GEOLOGY: Natural sources of heavy metal contamination in the Silverton Caldera, hard rock mining and mine drainage (including the Gold King Mine spill) and the superfund cleanup process.

FOREST: The forest connection to watershed quality, snowpack & climate change, forest fire and wetland ecosystems.

WATER USE: impact of water withdrawal, water treatment, emerging contaminants (pharmaceuticals, pesticides, per- and poly-fluoroalkyl substances (FPAS)), bacteria and nutrient pollution and agricultural water use (including soil health).

STORMWATER: water quality, ephemeral drainages, erosion.

ENERGY DEVELOPMENT: Impacts of oil and gas development, power plants, coal & uranium mining.

MONITORING: processes to monitor the aquatic food web, chemistry, sediment load & erosion.

EMERGENCY RESPONSE: Source water protection and emergency response.

Visit the NM WRRRI conference website at:

<https://animas.nmwrrri.nmsu.edu/2019/abstracts/submit-abstract/> for abstract guidelines. All abstracts must be submitted online using the provided abstract form.



Perrins Peak, Durango, CO. Photo by Ron Brogdon.

MEMBER PHOTOGRAPHY

Do you have good pics of local landmarks and geologic features of interest that you would like to share with the membership? Please send them to Kim Gerhardt using the Officer Contact link on our website.



Hidden Valley and Animas Valley, Durango, CO. Photo by Ron Brogdon.





FOUR CORNERS GEOLOGICAL SOCIETY

P.O. Box 1501, Durango, CO 81302

MEMBERSHIP RENEWAL or APPLICATION: June 1, 2018 to May 31, 2019



*Name: _____

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

*Email: _____ Phone: _____

*Employer: _____

Please Identify a Membership Category:

***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)

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. <i>*Highest Degree, Type and Year: _____</i> <i>*College / University: _____</i>
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. <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:

** 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 .