

GSA TODAY

VOL. 14, No. 6

A PUBLICATION OF THE GEOLOGICAL SOCIETY OF AMERICA

JUNE 2004

GEOSCIENCE in a Changing World

GSA Annual Meeting & Exposition

SUBARU 

Title Sponsor of the 2004 GSA Annual Meeting.

Inside:

GSA Bookstore Update,
A Special Insert, p. 33

Limnogeology Division Award, p. 59

GeoMart Geoscience Directory, p. 62

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GSA TODAY publishes news and information for more than 18,000 GSA members and subscribing libraries. GSA Today lead science articles should present the results of exciting new research or summarize and synthesize important problems or issues, and they must be understandable to all in the earth science community. Submit manuscripts to science editors Keith A. Howard, khoward@usgs.gov, or Gerald M. Ross, gross@NRCan.gc.ca.

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Cover Images: Upper left: "The Big Blue Marble," courtesy of NASA. Lower left: Larson B Ice Shelf collapse. Image courtesy of NASA/GSFC/LaRC/JPL, MISR Team. View of the Soyuz TMA-2 spacecraft docked to the cargo block on the International Space Station. Image courtesy of the crew of ISS Expedition 7, NASA.



Geoscience in a Changing World: Denver 2004 GSA Annual Meeting & Exposition

- 5 Greetings from the Technical Program Chair
- 6 Special Events
- 7 Graduate School Information Forum
- 7 Student Volunteer Program
- 7 GSA Employment Interview Service
- 8 2004 Exhibitors
- 9 GSA Mentor Programs
- 10 Guest Program
- 11 Field Trips
- 16 Short Courses and Workshops
- 19 K-16 Education Workshops
- 22 Registration
- 24 Preregistration Form
- 26 Map of Denver Hotels
- 27 Hotel Reservation Form
- 28 Travel & Transportation
- 30 Pardee Keynote Symposia
- 32 Topical and Discipline Sessions
- 55 How to Submit Your Abstract

33 Bookstore Update 2004: Special Insert

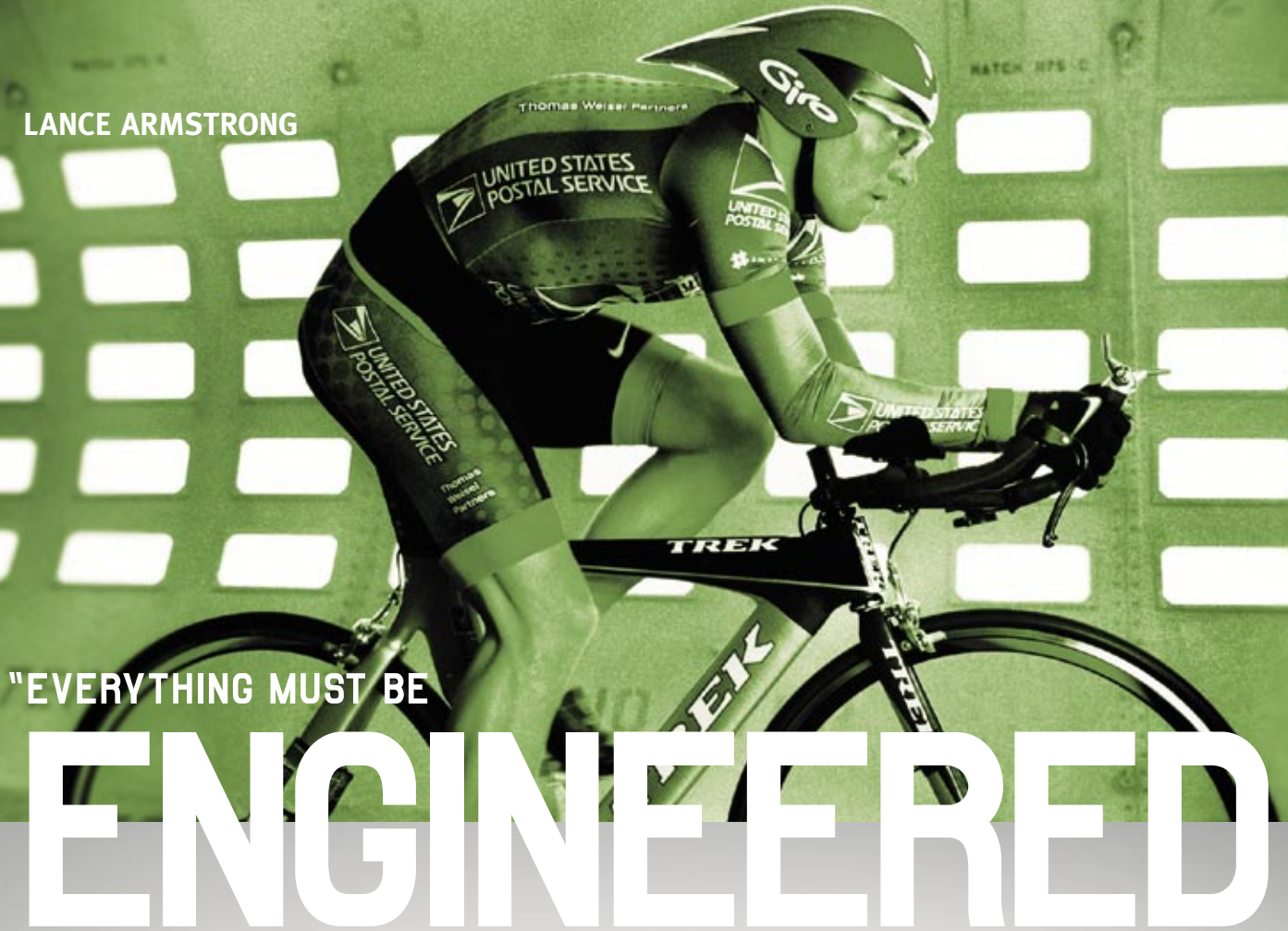
56, 59 Announcements

60 Classified Advertising

61 Journal Highlights

62 GeoMart Geoscience Directory

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GEOSCIENCE in a Changing World

GSA Annual Meeting & Exposition

November 7–10, 2004, Colorado Convention Center, Denver, Colorado

MEETING HIGHLIGHTS

PARDEE SYMPOSIA

- Medical Geology (P4)
- Geoscientific Aspects of Human and Ecosystem Vulnerability (P3)
- Seeing Mars with New Eyes (P7)

TECHNICAL SESSIONS

- Upcoming Revolutions in Observing Systems: Implications for Hydrogeology (T2)
- Groundwater Depletion and Overexploitation in the Denver Basin Bedrock Aquifers (T5)
- Lacustrine Records of Landscape Evolution (T44)
- Ocean Chemistry through the Precambrian and Phanerozoic (T47)
- The Evolution and Expansion of C4 Plants (T54)
- Nano-Geochemistry and Nano-Structures in Earth Systems (T68)
- 1500–2500 Ma: A Period of Changing Mantle Regimes in Earth History? (T74)
- A Xenolith Perspective on the Physical and Chemical Evolution of Continental Lithosphere (T75)
- Pre-EarthScope Synthesis of the Rocky Mountains (T76–T80)
- Differentiating Climatic from Tectonic Controls on Landscape Evolution (T95)
- Geology, Decisionmakers, and the Public: Challenges in Communication (T109)

The 2004 Annual Meeting in Denver is shaping up to be an outstanding overview of hot research in both new and traditional areas of the earth sciences. With eight Pardee Symposia, more than 140 Topical Sessions, and a wide range of open discipline sessions, the meeting will have something for every interest in the earth sciences. The special sessions listed to the left will give you some idea of the diversity of the program.

In addition, the Annual Meeting is the principal forum for presentation and discussion of the latest ideas in geoscience education, and this year will feature more than 25 sessions on education-related topics. There will also be an evening session focusing on a subject near and dear to the hearts of many geoscientists: Geology and Beer!

Downtown Denver is a vibrant location for a meeting, with plenty of good restaurants and brew pubs within walking distance of the convention center. And of course, the Rocky Mountains beckon with many field trip and recreational opportunities.

I would like to issue a challenge to every professional geoscientist reading this: to encourage at least one student or junior colleague to attend the meeting. The Annual Meeting continues to be one of the preeminent venues for presenting and hearing about new directions in our science, and for interacting with a wide spectrum of geoscientists and educators. As you make your own plans for November, urge your colleagues to do likewise.

See you in Denver!

Jane Selverstone, 2004 Technical Program Chair

IMPORTANT DATES, EVENTS, and DEADLINES

Registration Opens:	June
Abstracts Deadline:	July 13
Early Bird Registration Deadline:	July 13
Standard Registration Deadline:	September 30
Cancellation Deadline:	October 7
Premeeting Field Trips:	Tues.–Sat., Nov. 2–6
Short Courses & Workshops:	Fri. and Sat., Nov. 5–6
Presidential Address & Awards Ceremony:	NEW DAY—Sat., Nov. 6, 7–9 p.m.
Welcoming Party & Exhibits Opening:	Sun., Nov. 7, 5:30–7:30 p.m.
Technical Program:	Sun.–Wed., Nov. 7–10 8 a.m.–noon; 1:30–5:30 p.m.
Pardee Keynote Symposia:	Sun.–Wed., Nov. 7–10, 8 a.m.–noon; 1:30–5:30 p.m.
Private Alumni Receptions:	Mon., Nov. 8, 5:30 p.m.–1 a.m.
Group Alumni Reception:	Mon., Nov. 8, 7–9:30 p.m.
Exhibit Hall Hours:	Sun., Nov. 7, 5:30–7:30 p.m. Mon. and Tues., Nov. 8–9, 9 a.m.–5:30 p.m. Wed., Nov. 10, 9 a.m.–2 p.m.
Hot Topics:	Sun.–Wed., Nov. 7–10, 12:15–1:15 p.m.
Postmeeting Field Trips:	Wed.–Sat., Nov. 10–13

Annual Meeting Sponsor

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Title Sponsor of the 2004 GSA Annual Meeting.

Photo image "The Big Blue Marble," courtesy of NASA.

≈ SPECIAL EVENTS ≈

GSA Presidential Address & Awards Ceremony

SAT., NOV. 6, 7–9 P.M.

HYATT REGENCY, GRAND BALLROOM

Join us Saturday when President Rob Van der Voo gives his Presidential Address and distributes the 2004 Awards and Medals. Recipients of the Penrose Medal, the Arthur L. Day Medal, the Young Scientist Award (Donath Medal), the GSA Public Service Award, the Doris M. Curtis Women in Science Award, and the GSA Distinguished Service Award, as well as the newly elected GSA Fellows, and Honorary Fellows, will be announced in an upcoming issue of *GSA Today*.

Come honor your fellow geoscientists, the award recipients, the GSA Fellows, and the Honorary Fellows at the Presidential Address and Awards Ceremony, which will be followed by a cash bar reception.

Exhibits Opening & Welcoming Party

SUN., NOV. 7, 5:30–7:30 P.M.

EXHIBIT HALLS A and B

COLORADO CONVENTION CENTER

Come and kick off the Grand Opening of the 2004 GSA Annual Meeting and Exposition in the Exhibit Hall Sunday night. The Welcoming Party proves to be a great networking time with colleagues and friends and a good opportunity to view the exhibits and enjoy a beverage.

Award Luncheons and Other Ticketed Group Functions

GSA Associated and Allied Societies and GSA Divisions invite their members and other interested guests to join them for their annual meal functions, special addresses, and awards ceremonies. Only a few tickets will be available on-site, so please register early for ticketed functions using the preregistration form. Location and time of events will appear on your ticket and in the 2004 Annual Meeting Program.

Group Alumni Party

MON., NOV. 8, 7–9:30 P.M.

MARRIOTT CITY CENTER HOTEL

Come join your former classmates and colleagues at this year's Group Alumni Party at the Marriott.

To include your school in the Group Alumni Party, complete the Space Request Form at www.geosociety.org/meetings/2004/events, or contact Melissa Cummiskey, mcummiskey@geosociety.org, (303) 357-1058, for details.

Private Alumni Receptions

MON., NOV. 8, 5 P.M.–1 A.M.

See Annual Meeting Program for locations.

Plan to join your fellow alumni for an evening of memories and renewed connections.

Please see the 2004 Annual Meeting Program for a listing of schools holding individual alumni receptions and locations. If you would like to hold an alumni reception, check with your department head, who may have already arranged this with GSA, or send an e-mail to mcummiskey@geosociety.org.

Planetary and Space Art Exhibit [201]

TUES., NOV. 9, 12:30–6 P.M.

COLORADO CONVENTION CENTER

This year's Annual Meeting will have a number of out-of-this-world events sponsored by the Planetary Geology Division. Perhaps one of the more visually appealing activities will be the Planetary and Space Art Exhibit. Works by scientists and artists who specialize in heavenly works will display their original creations. These will include paintings, textural art, photography, and electronic art. Works by Bill Hartmann, Dan Durda, Leonard Wikburg, Ulrike Arnold, and others will be on display. The cost of the event is a very reasonable \$2.00 per person, which will be donated to the Planetary Geology Division. For more information, contact Mike Kelley, mkelley@georgiasouthern.edu, or Mary Chapman, mchapman@npgcable.com.

The Colorado Symphony Orchestra

FRI., NOV. 5, AND SAT., NOV. 6, 7:30 P.M.

BOETTCHER CONCERT HALL, DENVER PERFORMING ARTS COMPLEX

The annual GSA Symphony and Dinner will change format this year due to a change in the GSA Presidential Address and Awards Ceremony. Join us to hear the Colorado Symphony Orchestra present "Symphonic Sousa." Sam and Nancy Adams will attend Friday night. Nancy can arrange tickets in the \$40 range for anyone who is interested in Friday evening. If you are interested in organizing a group for dinner and the concert, please contact Nancy directly at (603) 783-8950 or nancyadams@together.net.

Things to Do in Denver

Please see our meeting Web site—www.geosociety.org—for additional things to do while in Denver.





Graduate School Information Forum

EXHIBIT HALL

SUN., NOV. 7, 8 A.M.–8:30 P.M.
MON.–WED., NOV. 8–10, 8 A.M.–5:30 P.M.

Meet face-to-face with prospective students in a relaxed, informal setting by participating in the Graduate School Information Forum (GSIF) during the GSA Annual Meeting. Take advantage of this excellent opportunity to promote your school to more than 1,500 students.

The GSIF will be located immediately as you enter the Exhibit Hall, next to the poster sessions. The booths are in a highly visible area and will be open during the Sunday night Welcoming Reception in the Exhibit Hall.

You may choose to participate for one day to all four days. Space is limited, and Sunday and Monday will be the first to sell out. Those schools reserving multiple days will be assigned first and to the most visible booths.

Participating schools will be promoted in the October GSA Today (pending submittal date of reservation form), the 2004 Annual Meeting Program, and e-mail links on the GSA Web site so prospective students may schedule appointments prior to the Annual Meeting.

Go online to reserve your space at
https://rock.geosociety.org/forms/xGSIF_form.asp.

For more information, contact Kevin Ricker,
(303) 357-1090, kricker@geosociety.org.

DON'T DELAY: RESERVE YOUR SPACE NOW!

Students: Sign Up to Volunteer and Reap the Rewards

Do you ever feel the only way you can afford to go to a meeting is to panhandle? Now you don't have to! Become a student volunteer and offset your meeting costs. No upfront meeting registration fee required!

Free registration if you volunteer
just 10 hours of your time.

Free Abstracts with Programs volume
by volunteering 15 hours.

Additionally, volunteers receive a stipend of \$25 for each half-day (5 hours) volunteered at the meeting. (Stipends can only be issued to students who have a U.S. government-issued Social Security Number, Green Card, or Student Work Visa.) New this year: optional partial food stipend available.

For more information, contact Kevin Ricker,
kricker@geosociety.org, or visit www.geosociety.org/meetings/2004/students.htm.

Work fewer hours this year to earn a FREE registration!

EMPLOYMENT INTERVIEW SERVICE

BALLROOM 1,
COLORADO CONVENTION CENTER

SAT., NOV. 6, NOON–5 P.M.
SUN.–TUES., NOV. 7–9, 8 A.M.–5 P.M.

Do you need qualified scientists to fill staff needs?

Are you looking for employment in the earth sciences?

If so, you are invited to participate in the GSA Employment Interview Service. All organizations seeking qualified earth scientists at any level are urged to submit notices of their vacancies and requests for access to applicant profiles in advance of the meeting. Interview booths at the meeting may be reserved in half-day increments for a nominal fee, and GSA staff will handle all interview scheduling. Many job seekers have found the Employment Interview Service critical to their successful search for positions.

The registration fee for applicants is \$35 for GSA members and associates, and \$65 for nonmembers (includes GSA membership) and includes year-round service as well as interviewing at the annual meeting. To register, applicants post their own résumé-style profile online. Be sure to set up your profile early to receive maximum exposure prior to the meeting! It's never too late, though: applicants and employers may also register at the meeting.

Profile posting for applicants and forms for employers are available in the Employment Opportunities section of GSA's Web site at <http://www.geosociety.org>. For additional information, contact Pat Kilner in Membership, membership@geosociety.org or (303) 357-1017.

More networking opportunities: See page 9 for information of GSA's Careers Roundtable Discussions.

L@@K STUDENTS!

President's Student Breakfast Reception

SUN., NOV. 7, 7–8:30 A.M.
MARRIOTT CITY CENTER HOTEL

SPONSORED BY: **ExxonMobil**
Exploration

HOSTED BY:  THE GEOLOGICAL SOCIETY OF AMERICA

GSA President Rob Van der Voo invites all students registered for the meeting to attend a free breakfast buffet sponsored by ExxonMobil Corporation. Rob and members of the GSA Leadership, as well as ExxonMobil staff members, will be on hand to answer questions and address student issues. Each student registered for the meeting will receive a complimentary ticket for the breakfast buffet. This is one of the most popular events at the meeting for students, and with good reason! Take this opportunity to network with fellow students and meet the officers of GSA.

2004 EXHIBITORS

Attention Annual Meeting attendees! Come see the exhibits and support our GSA exhibitors! Join a community of over 6,000 geoscientists mingling with exhibitors at the Colorado Convention Center. We have a lot of new and exciting exhibitors this year, so stop by to visit, purchase, inquire, sign up, and catch up!

(by category—as of 3/31/04)

Computer Hardware

Panasonic Computer Solutions Company

Computer Software

Beicip—Inc
Golden Software, Inc.
iGage Mapping
Rockware, Inc.

Gems/Minerals Dealers, Jewelry/Gifts

Gems & Crystals Unlimited
Geographics
IKON Mining & Cal Graeber
Komodo Dragon
Nature's Own
Roxy Gemstone Jewelry

Geographic Supplies and Related Equipment

Ben Meadows Company
Rite in the Rain

Geological Society of America

GSA Bookstore
GSA Coming Attractions
GSA Education and Outreach
GSA Foundation
GSA Member Services

Government, Agencies (Federal, State, Local, International)

Central Great Lakes Geologic Mapping Coalition
Consejo de Recursos Minerales
Micropaleontology Project
NASA's Global Change Master Directory
NASA/EOSDIS
National Park Service
National Science Foundation
Office of Surface Mining
Oklahoma Geological Survey
University Corporation for Atmospheric Research
U.S. Bureau of Land Management
U.S. Dept of Energy, Yucca Mountain Project
U.S. Geological Survey
USDA Forest Service

Instrumentation, Cameras, Scopes

Advanced Geosciences, Inc.
ASC Scientific
Bruker AXS Inc.
Brunton

Cameca Instruments, Inc.
Campbell Scientific, Inc.
CETAC Technologies
Forestry Suppliers, Inc.
Gatan, Inc.
Leica Microsystems
Meiji Techno America
New Wave Research
Panalytical
Rigaku MSC
SPEX CertiPrep, Inc.
Terraplus USA, Inc.
Thermo Electron

Other—Commercial

Armfield
Subaru of America, Inc.*

Other—Educational

Chronos
ESRI
GEON
IRIS Consortium
National Research Council of the National Academies
Paleontological Research Institution

Professional Societies and Associations

AAPG Bookstore
American Geological Institute
American Geophysical Union
American Institute of Professional Geologists
American Quaternary Association
Association for Women Geoscientists
Association of American State Geologists
Association of Earth Science Editors
Association of Engineering Geologists
Council on Undergraduate Research
Cushman Foundation
The Geochemical Society
Geoscience Information Society
History of the Earth Sciences Society (HESS)
Mineralogical Association of Canada
Mineralogical Society of America
National Association of Geoscience Teachers
National Earth Science Teachers Association
National Ground Water Association
The Paleontological Society
Sigma Gamma Epsilon
Society of Economic Geologists
Society for Mining, Metallurgy & Exploration (SME)
Society for Sedimentary Geology

Publications, Maps, Films, and Teaching Aids

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Elsevier
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Kendall/Hunt Publishing Co.
Kluwer Academic Publishers
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Mountain Press Publishing Co.
Oxford University Press
Prentice Hall
Springer-Verlag New York, Inc.
University of Chicago Press
W.H. Freeman & Company
W.W. Norton & Co.
Ward's Natural Science

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Beta Analytic Inc.
DOSECC, Inc.
Environmental Isotope Lab
Geochron Laboratories
Geoscience Laboratories
SGS Minerals Services

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Colorado Geological Survey
Illinois State Geological Survey

Universities/Schools

Auburn University—Geology
Baylor University, Dept. of Geology
Colorado School of Mines
Desert Research Institute
Mississippi State University
Montana State University
Ohio State University—Dept. of Geological Sciences
University College of the University of Denver
University of Memphis—Dept. of Earth Sciences
University of Nevada—Las Vegas
University of Nevada—Reno
University of Texas at Austin
University of Utah—Department of Geology & Geophysics

*Title sponsor

Exhibits Opening & Welcoming Party

Sun., Nov. 7 5:30–7:30 p.m.

Exhibit Hall Hours

Mon.–Tues.

Nov. 8–9 9 a.m.–5:30 p.m.

Wed., Nov. 10 9 a.m.–2 p.m.

≈ GSA MENTOR PROGRAMS ≈

at the 2004 Denver Annual Meeting

GSA MENTOR PROGRAMS AT THE 2004 DENVER ANNUAL MEETING

CAREERS ROUNDTABLE DISCUSSIONS

SAT., NOV. 6, 1–3 P.M.

EMPLOYMENT SERVICE AREA, BALLROOM 1
COLORADO CONVENTION CENTER

Seeking Employment?

PLAN TO ATTEND THE CAREERS ROUNDTABLE
DISCUSSIONS.

A new name marks this mentored event (formerly called Employment Services Roundtables). Mentors—all offering one-on-one career advice—hail from a broad range of geoscience-related career choices representing academics, industry, and government agencies. If you are seeking employment, or will be in the future, join this group for networking opportunities and job-market perspectives. This FREE come-and-go event is open to everyone; registration is not required.

For additional information, contact Karlon Blythe, Education and Outreach, kblythe@geosociety.org.

Students: Check out the Geology in Government Mentor Program!

MON., NOV. 8, 11:30 A.M.–1 P.M.

LOCATION TBA

Plan to arrive early for this FREE lunch for undergraduate and graduate students to be held at GSA's Denver Meeting. This popular annual event will feature a select panel of mentors representing various government agencies. Mentors will invite questions from students, offer advice about preparing for a career, and comment on the prospects for current and future job opportunities with their agencies. Registration not required; every student registered for the Annual Meeting will receive a ticket to this event along with their badge. Attendance is limited—arrive early!

For more information, contact Karlon Blythe, kblythe@geosociety.org.



THE
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OF AMERICA

ATTENTION Students Pursuing a Hydrogeology Career Path!

The new Mann Mentors in Applied Hydrogeology Program makes it possible for up to 25 students to attend the distinguished Hydrogeology Division Luncheon and Awards Presentation without cost to the students. Eligible students will have the chance to meet some of the nation's top hydrogeologists and observe the presentations of the coveted O.E. Meinzer Award, the Student Research Grants Awards, and the Distinguished Service Award from the membership of the GSA Hydrogeology Division. Eligible students are those who have checked the box on their membership application indicating their professional interest in hydrology/hydrogeology and have registered for the Annual Meeting by September 30, 2004. FREE tickets will be awarded to the first 25 students who respond to an e-mail invitation, based on the eligibility criteria above. Registration is required. Time and location TBA.

For more information, contact
Karlon Blythe,
kblythe@geosociety.org.

Find us on the Web at www.geosociety.org.

~ GUEST PROGRAM ~

We extend a warm welcome to all guests at the 2004 GSA Annual Meeting & Exposition in Denver, Colorado!

The guest registration fee of \$80 per person is for nongeologist spouses, family members, or friends of a professional or student registrant. The guest registration fee is required for those attending any of the guest activities, tours, or seminars, for access to the Exhibit Hall, and for refreshments in the Guest Hospitality Suite. The guest registration fee will not provide technical session access; however, guests can sign in with the hostess or host in the Guest Hospitality Suite to get a visitor badge, allowing entrance to specific presentations. Formal guest tours, listed in the following section, are at an additional cost and include professional tour guides, round-trip transportation, admission fees, and gratuities.

Tours

All GSA Annual Meeting attendees and registered guests are welcome to participate in the following guest program tours. Reservations for all tours will be accepted on a first-come, first-served basis. The tour operator requires a final guarantee weeks in advance. Most tours have attendance minimums as well as maximums. Tours may be canceled if minimum attendance is not met. Please register early to guarantee your spot.

Plan to arrive at the departure location 15 minutes before the scheduled departure time to make sure you don't miss the bus. Guests should check in at the Guest Hospitality Suite and will then be directed to departure location at the Marriott City Center.

The Denver area has a great deal to offer and the formal tours can only cover a small portion of what is available for you to see and do. You may enjoy visiting other area attractions with fellow guests or go it alone on a self-guided tour. The Guest Hospitality Suite staff can provide you with more information and activity suggestions.

Beautiful Breckenridge [101]

Sun., Nov. 7, 9 a.m.–4 p.m.

The glitter of the gold rush that brought thousands of fortune seekers to Colorado soil more than one hundred years ago still glimmers in one of the Rockies' wealthiest areas—Breckenridge. Your scenic drive up to Breckenridge will be a sight to remember as will the interesting historical commentary from your tour guide. The Victorian, tree-lined streets of this National Historic District are accented with period gas lamps and colorful, 130-year-old buildings that house more than 200 unique restaurants, bars, shops, and boutiques. Although the ski industry was Breckenridge's economic salvation, the well-preserved storefront facades reveal its second most popular activity—shopping! You'll take a historic walking tour with your guide and enjoy lunch on your own at one of the many fine eating establishments. Cost: \$40. Minimum: 30 people. Lunch not included.

Highlights of Boulder [102]

Sun., Nov. 7, 12:30 p.m.–5:30 p.m.

This tour of nearby Boulder includes time for art: Boulder boasts over 30 galleries, representing contemporary fine arts, western, and Native American arts, cooperative galleries, collectibles and fine gifts as well as public galleries. A true cultural treasure, the Boulder Dushanbe Teahouse was a gift from Boulder's Tajikistan sister city, Dushanbe, as a sign of friendship. You might want to have lunch or

tea at this beautiful teahouse. A little farther north, we'll see how the beauty and romance of the West comes alive at the Leanin' Tree Museum of Western Art, housed in the corporate headquarters of Leanin' Tree. It has one of the nation's largest private collections displaying over 200 paintings. We then invite you to a Celestial Tea Experience. You can tour the factory and see how the beautiful little boxes are made. Cost: \$26. Minimum: 25 people. Lunch not included.

Rocky Mountain High Tour [103A]; Rocky Mountain High Tour with optional box lunch purchase [103B]

Mon., Nov. 8, 9 a.m.–5 p.m.

Rocky Mountain National Park is one of the most accessible National Parks in the West. Your trip up to Trail Ridge Road along the Continental Divide is breathtaking. It is known for its spectacular high mountain beauty and provides some of the best watch-able wildlife in Colorado, with Bighorn Sheep, Elk, and Mule Deer leading the list. While in Estes Park, you'll tour the famous Stanley Hotel, which overlooks the town. The Stanley Hotel was built in 1906 of wood and rock obtained from the nearby mountains. It has a very special connection to Stephen King and his book, *The Shining*. Mr. King wrote about half his novel in room 217. He most recently returned to make the ABC mini-series, "The Shining." Estes Park, which was founded in 1870 and is set in the valley of Rocky Mountain National Park, is famous for its many jewelry and curio stores. Cost: \$48 for tour only, \$58 with box lunch. Minimum: 30 people.

Castle in the Sky [104]

Mon., Nov. 8, 9 a.m.–1 p.m.

A scenic drive leads your guests to Cherokee Ranch, an exquisite Scottish Castle built high on a bluff just south of Denver in 1924. This exquisite castle boasts breathtaking views of the Rocky Mountains, from Pikes Peak in the south to Longs Peak in the north. The ranch was owned by Tweet Kimble, a beautiful woman driven to make it big in a man's world by breeding the highly acclaimed Santa Gertrudis cattle. You will enjoy the exquisite art collection, antique furniture, and colorful, eccentric history of the life of Ms. Kimble and her ranch. A knowledgeable tour guide will accompany you on the motor coach to and from the ranch to provide Colorado history highlights. Cost: \$40. Minimum: 25 people. Maximum: 40 people. Lunch not included.

Western Grandeur [105]

Tues., Nov. 9, 9 a.m.–5 p.m.

Old Colorado City, Manitou Springs, Glen Eyrie Castle, and The Broadmoor

Old Colorado City, an original gold supply town, has a shady history, according to General Palmer, because of its many saloons, banks and boomtown life style. This restored town is a fun place to browse in the many upscale antique stores, gift shops, a chocolate factory, the Michael Garman Gallery, and Simpich Doll Factory. Just a few minutes away is Manitou Springs, nestled between Garden of the Gods and Pikes Peak. This quaint village offers boutique shopping, mineral springs, and the Cliff House, one of the beautiful historic Inns in Manitou. Then it's on to a tour of the Glen Eyrie Castle that was built by General Palmer, who founded the Denver & Rio Grande Railroad and established the city of

Colorado Springs. You will step back in time to the turn of the century and enjoy the elegance of royalty by participating in an English Cream Tea with finger sandwiches. Our last stop will be an exquisite tour of the world-famous Broadmoor Resort built in 1917 by Spencer Penrose, a Philadelphia entrepreneur who made his fortune in gold and copper mining. You will tour this beautiful resort and grounds, which has been the destination of hundreds of presidents, statesmen, foreign dignitaries, and celebrities. Cost: \$67. Minimum: 30 people. Lunch not included.

Pure Gold [106]

Tues., Nov. 9, 8 a.m.–1 p.m.

A 30-minute drive from Denver will take you back over 100 years to the flourishing hub of Colorado's gold country in the National Historic District of Idaho Springs. Made rich by gold and still rich with history, Idaho Springs is a "must see." The Mountain Ute and Arapahoe (Plains) Indians called the place "Eduhoe" meaning "Gem of the Mountains". The Phoenix Gold Mine was discovered in 1872 and is still a working mine today. You can pan for gold and get a history of geology as well. The Argo Gold Mine and Mill is a fascinating museum and National Historic Site with the world's largest haulage tunnel. After your mine tour, browse about the quaint town and have lunch on your own. Then you will travel on to Mount Evans. At 12,000 feet, you'll hit timberline. Here, intense solar radiation, high winds, and freezing temperatures prevent the growth of vegetation larger than a bush. Above timberline is the alpine zone, where you will see alpine tundra—wild flowers and other small plants specially adapted to the short growing season at this high elevation. The rocky alpine zone is a hospitable area for the ptarmigan, the sure-footed bighorn and white mountain goat. *Please note: Weather is a major factor when driving to Mount Evans.* Cost: \$37. Minimum: 30 people. Lunch not included.

Butterfly Pavilion [107]

Wed., Nov. 10, 9 a.m.–1 p.m.

The Butterfly Pavilion was created to foster an appreciation of butterflies and other invertebrates and emphasize the need for conservation of threatened habitats in the tropics and around the world. The Butterfly Pavilion and Insect Center is the only stand-alone, nonprofit insect zoo in the nation. Many years of research helped create the crucial conservatory climate control required for the approximately 1,200 individual butterflies from over 50 different species that fly, feed, and bask in the Pavilion's tropical atmosphere. Here you will learn how long butterflies live, how they live, the difference between moths and butterflies, where they sleep, which part of their bodies they use for tasting, what they eat, and much, much more. Although you are asked not to touch the butterflies (the soaps, oils, and lotions from your hands are not good for them), they may land on you for closer observation. This fascinating center is fun for all ages. Cost: \$35. Minimum: 25 people. Lunch is not included.

Seminars

Payment of the guest registration fee entitles you to attend the guest seminars at no extra charge. Seminar names, descriptions and locations will be listed in the October issue of *GSA Today* and in the Annual Meeting Program.

Guest Hospitality Suite Hours

Sun.–Wed., Nov. 7–10, 8 a.m.–5:30 p.m.

Denver Marriott City Center, Molly Brown Room

Beginning Sunday, November 7, guests are invited to visit the Guest Hospitality Suite in the Molly Brown Room at the Denver Marriott City Center. A hostess or host will provide a resource center with abundant information about Denver and its various attractions and sightseeing opportunities, and light refreshments will be served throughout the day. Please remember to wear your GSA badge; it will be required for admission to the Hospitality Suite and Exhibit Hall.

≈ FIELD TRIPS ≈

Student, spouses, and interested guests are cordially encouraged to attend these field trips. Trips are technical in nature, and some can be physically rigorous. Participants should be prepared for cold, wet weather. Trips are one to five days in duration and led by active field researchers. The minimum number of registrations for field trips is 12 unless otherwise stated.

If you register for *only* a field trip, you must pay a \$40 nonregistrant fee in addition to the field trip fee. This fee may be applied toward meeting registration if you decide to attend the meeting. Trip fees include transportation during the trip and a guidebook. Other services, such as meals and lodging, are noted by the following symbols: B—breakfast, L—lunch, R—refreshments, D—dinner, ON—overnight lodging.

All trips begin and end in Denver at the Colorado Convention Center, *unless otherwise indicated*. Upon return, some postmeeting trips can stop at the Denver International Airport to discharge participants who have evening flights or would prefer to spend the night in a hotel closer to the airport. Participants are cautioned against scheduling any tight travel connections with field trip return times, as those times are estimates and delays in the field can occur. For a list of hotels near the airport, contact Edna Collis, Program Officer, GSA Headquarters, (303) 357-1034, ecollis@geosociety.org.

CANCELLATION DEADLINE: OCTOBER 7, 2004

No refunds will be given after this date. If GSA must cancel a field trip because of logistics or if minimum registration requirements are not met, a full refund will be issued to you after the meeting. Be aware of flight change penalties imposed by the airlines. Plan alternatives in advance should the trip you are registered for be cancelled.

FOR MORE INFORMATION


Contact the trip leader or the 2004 field trip co-chairs: Eric Erslev, Dept. of Earth Resources, Colorado State University, Fort Collins, CO 80523-1482, (970) 491-6375, fax 970-491-6307, erslev@cnr.colostate.edu, and Eric Nelson, Dept. of Geology and Geological Engineering, Colorado School of Mines, Golden, CO 80401-1887, (303) 273-3811, fax 303-273-3859, enelson@mines.edu.

PREMEETING

1. Navajo Sand Sea of Near-Equatorial Pangea: Tropical Westerlies, Slumps, and Giant Stromatolites [401]

Tues.–Sat., Nov. 2–6. Cosponsored by *GSA Sedimentary Geology Division*. David Loope, Dept. of Geosciences, University of Nebraska, Lincoln, NE 68508, (402) 472-2647, fax 402-472-4917,

**Montana Bureau of Mines and Geology
Special Publication 115**



**Applied Gold Placer
Exploration and Evaluation
Techniques**

by
**Robin McCulloch, Bob Lewis,
Don Keill, and Matthew Shumaker**
2003

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Attention Students

The *GSA Coal Geology Division* offers a \$50 scholarship to the first Division-affiliated student member who registers for a division-sponsored field trip. Student must pay the full field trip fee when registering, but will be reimbursed \$50 after the GSA meeting by the Coal Geology Division.

The *GSA Hydrogeology Division* will subsidize the first student registrant who is a valid division member. The student must pay the full field trip fee when registering, but will be reimbursed \$50 after the GSA meeting by the Hydrogeology Division.

The *GSA Sedimentary Geology Division* is cosponsoring several field trips and will subsidize all students who are valid Division members. (See individual trip descriptions for sponsorship information.) Students must pay the full field trip fee when registering, but will be reimbursed \$100 after the GSA meeting by the Sedimentary Geology Division. To be reimbursed, students must apply by e-mail, before the Annual Meeting, to Paul K. Link, Secretary of the Sedimentary Geology Division, at linkpaul@isu.edu. For reimbursement, students must provide their GSA member number, certify that they are members of the Sedimentary Geology Division, and provide their social security number and address.

GSA Structural Geology and Tectonics Division offers up to five \$100 scholarships to Division-affiliated student members for division-sponsored field trips. Apply in writing, giving name, institution, class, specialty, poster or talk title, field trip title, and a one-paragraph rationale to Martha Oliver Withjack, by e-mail only at drmeow3@yahoo.com. The deadline to apply is September 1. See the Structural Geology and Tectonics newsletter for more information.

dloope1@unl.edu; Len Eisenberg; Erik Waiss. Max.: 15; min.: 10. Cost: \$475 (5L, R, 4ON, vans).

Up-close and personal, full-day inspections of two spectacular Navajo Sandstone outcrops form the core of this trip. One outcrop lies on the Utah/Arizona border along the west edge of the Paria Plateau, and the other is near the crest of the Waterpocket Fold in Capitol Reef National Park. Emphasis will be on cyclic crossbedding, trace fossils, giant stromatolites, mass flows, and paleowind reconstructions.

2. Strike-Slip Tectonics and Thermochronology of Northern New Mexico [402]

Thurs.–Sat., Nov. 4–6. Eric Erslev, Dept. of Geosciences, Colorado State University, Fort Collins, CO 80523, (970) 491-5661, fax 970-491-6307, erslev@cnr.colostate.edu; Steven Cather; Seth Fankhauser; Matt Heizler; Rob Sanders. Max.: 40; min.: 12. Cost: \$255 (2L, R, 2ON, vans). *Begins and ends in Denver or Santa Fe, New Mexico.*

Participants will meet in Denver or join us in historic Santa Fe for a review of dextral faults in New Mexico and the active controversy over their age—are they Laramide, Pennsylvanian, or Precambrian? Friday will be spent viewing spectacular granitic breccias and folds of the Picuris-Pecos fault, the largest strike-slip fault in the southern Rockies. On Saturday, we will explore the thermochronologic contrasts and metasomatic alterations in the Sangre de Cristo Mountains and view new seismic data across their frontal faults.

3. Geology of the Silver Cliff–Rosita Hills Mining District and Spanish Peaks Area [403]

Fri.–Sat., Nov. 5–6. Cosponsored by *GSA Sedimentary Geology Division*. Paul R. Krutak, P. Krutak Geoservices International, P.O.

Box 369, 2118 Main Street, Rye, CO 81069-0369, (719) 489-2282 (phone and fax), pkrutakgeos@hotmail.com; John R. Barwin; Marty Horn. Max.: 36; min.: 12. Cost: \$185 (2L, 1D, R, 1ON, vans).

The first day of this two-day field excursion covers the mining geology of the Silver Cliff–Rosita Hills mining district on the west flank of the Wet Mountains, Colorado. We plan visits to the sites of the old Geyser, Bull Domingo, and Bassick mines as well as to the BP (British Petroleum) CO₂ facility at Sheep Mountain. Second-day activities include study of the Spanish Peaks intrusives in the Raton Basin, where we will examine the following plutons: Black Hills, Silver (Dike) Mountain, and at least two of the radial dikes (Profile Rock and Devil's Stairway) associated with the West Spanish Peak. We will also visit synorogenic conglomerates at Cordova (Apishapa) Pass and Laramide structures associated with the Culebra Thrust.

4. Hyperpycnal Wave-Modified Turbidites of the Pennsylvanian Minturn Formation, North-Central Colorado [404]

Fri.–Sat., Nov. 5–6. Cosponsored by *GSA Sedimentary Geology Division*. Paul M. Myrow, Dept. of Geology, Colorado College, Colorado Springs, CO 80903, (719) 389-6789, fax 719-389-6910, pmyrow@coloradocollege.edu; Karen Houck; Charles Kluth; Michael Lamb; Claire Lukens; Jeff Parsons. Max.: 36; min.: 12. Cost: \$155 (1L, R, 1ON, vans).

We will examine the spatial and stratigraphic distribution of turbidites in the Pennsylvanian Minturn Formation, north-central Colorado and particle hydrodynamic interpretations. The beds contain evidence for both density-induced flow and storm-generated

waves. Successions of sedimentary structures and beds with reverse-to-normal grading indicate deposition from hyperpycnal flows and a direct link to the hydrograph of floods that produced these flows.

5. Structural Implications of Underground Coal Mining in the Mesaverde Group, Somerset Coal Field, Delta and Gunnison Counties, Colorado [405]

Fri.–Sat., Nov. 5–6. Cosponsored by *GSA Coal Geology Division*. Christopher J. Carroll, Colorado Geological Survey, 1313 Sherman St., Room 715, Denver, CO 80203, (303) 866-3501, fax 303-866-2461, chris.carroll@state.co.us; Greg Hunt; Wendell Kooztz; Eric Robeck. Max.: 20; min.: 7. Cost: \$240 (2L, 1D, R, 1ON, vans).

This trip will visit two underground coal mines: Bowie #2 and West Elk Mines. Coal cleat development and open-mode fractures will be observed on the surface and compared to underground seams there. A reverse-reactivated, penecontemporaneous fault exposed underground, with soft-sediment deformation and shale diapirism in the fault plane, will be observed. We will show how early faults can rotate coal cleat, providing a tool for locating hidden faults in advance of mining.

6. A New K-T Boundary in the Denver Basin [406]

Sat., Nov. 6. Cosponsored by *GSA Sedimentary Geology Division*. Kirk Johnson, Denver Museum of Nature & Science, 2001 Colorado Blvd., Denver, CO 80205-5732, (303) 370-6448, fax 303-331-6492, kjohnson@dmns.org; Richard Barclay. Max.: 45; min.: 12. Cost: \$105 (1L, R, bus).

This trip to the plains east of Denver will visit a recently discovered exposure of the Cretaceous-Tertiary boundary. This is the only known surface section in the Denver Basin that preserves the K-T iridium and shocked mineral anomalies. Located on the west side of the Bijou Creek valley on property owned by the Plains Conservation Center, this site has also produced Cretaceous dinosaurs, other vertebrates and plants, and Paleocene mammals, crocodiles, turtles, and plants.

7. Buried Paleo-Indian Landscapes and Sites in the High Plains of Northwestern Kansas and Eastern Colorado [407]

Sat., Nov. 6. Cosponsored by the *GSA Archaeological Geology Division*. Rolfe D. Mandel, Kansas Geological Survey, 1930 Constant Avenue, Lawrence, KS 66047-3726, (785) 864-2171, fax 785-864-5317, mandel@kgs.ku.edu; Jack Hofman; Steve Holen. Max.: 36; min.: 12. Cost: \$85 (1L, R, vans).

This field trip will focus on buried Paleo-Indian landscapes and sites in the High Plains along the Kansas-Colorado border. Recent geoarchaeological surveys in this area have recorded thick sections of alluvium with buried soils dating to ~9,000–11,000 ¹⁴C yr B.P. along small streams (draws) high in drainage networks. In addition to examining some of these sections, stops will be made at several buried Paleo-Indian sites, including Kanorado (Clovis and possible pre-Clovis), Powell (Clovis), and Laird (Late Paleo-Indian). Emphasis will be placed on the geomorphic and stratigraphic context of buried Paleo-Indian landscapes and sites, and late-Quaternary paleoenvironmental conditions will be addressed.

8. Colorado Front Range—Anatomy of a Laramide Uplift [408]

Sat., Nov. 6. Cosponsored by *Colorado Scientific Society*. Karl Kellogg, U.S. Geological Survey, MS 980, P.O. Box 25046, Denver Federal Center, Denver, CO 80225, (303) 236-1305, fax 303-236-0214, kkellogg@usgs.gov; Bruce Bryant; Jack Reed. Max.: 36; min.: 12. Cost: \$100 (1L, R, vans).

The trip will explore the geologic framework and uplift history of the Front Range by examining (1) the sedimentary and structural record along the eastern margin near Denver, (2) the Proterozoic basement of the range and the significance of northeast-trending shear zones, (3) the geologic setting of the Colorado mineral belt, and (4) the western structural margin of the range, which contrasts significantly with the eastern margin.

9. Continental Accretion, Colorado Style: Proterozoic Island Arcs and Back Arcs of the Central Front Range [409]

Sat., Nov. 6. Lisa R. Lytle, Dept. of Geology and Geological Engineering, Colorado School of Mines, Golden, CO 80401-1887, (303) 478-9427, fax 303-273-3859, lfiniol@mines.edu; Thomas R. Fisher. Max.: 36; min.: 12. Cost: \$90 (1L, R, vans).

A trip through the Central Front Range of Colorado to examine the ca. 1.7 Ga metamorphosed volcanic and sedimentary sequences formed during the accretion of Colorado onto the North American craton. Island arc, back-arc, and sedimentary basin-fill sequences that comprise the so-called “Idaho Springs Formation” will be examined. The possible origins and significance of the Coal Creek Quartzite, an amphibolite-grade meta-sandstone and meta-conglomerate, will be presented and discussed.

10. Eco-Geo-Hike along the Dakota Hogback North of Boulder, Colorado [410]

Sat., Nov. 6. Peter Birkeland, Dept. of Geological Sciences (retired), University of Colorado, Boulder, CO 80309, birkelap@colorado.edu; Ven Barclay; Edwin Larson; Ralph Shroba. Max.: 20; min.: 7. Cost: \$45 (1L). *Begins and ends in Boulder. Instructions for public transportation from Denver to Boulder will be available upon registration for this trip.*

Retired and active geologists will lead an eco-geo-hike (6 mi/1200 ft vertical) to discuss work mainly mapped by others or used in classes. We will traverse the Dakota hogback and discuss (1) sedimentary rocks (Fountain Formation to Pierre Shale), (2) paleomagnetic dating of Laramide uplift, (3) various kinds of landslides on the hogback, (4) the erosional history and formation of Quaternary fluvial terraces, and (5) the Boulder Creek floodplain.

11. Geological Reconnaissance of Dinosaur Ridge, Red Rocks, and the Front Range of the Rocky Mountains near Morrison, Colorado [411]

Sat., Nov. 6. Cosponsored by *GSA Geoscience Education Division*; *GSA Sedimentary Geology Division*. Norbert E. Cygan, Friends of Dinosaur Ridge, 16831 W. Alameda Parkway, Morrison, CO 80456, (303) 697-3466, fax 303-697-8911, necygan@aol.com; T. Caneer; Harald Drewes and other volunteers from Dinosaur Ridge, www.dinoridge.org. Max.: 45; min.: 12. Cost: \$90 (1L, bus). *Also offered as a postmeeting trip.*

This trip will visit classic dinosaur bones and footprints at Dinosaur Ridge in the vicinity of Morrison, Colorado. Participants will investigate the stratigraphy and depositional systems of the sedimentary rocks in the foothills. A stop will be made to examine the four lava flows at North Table Mountain with discussion of the vent area for the flows. Regional geology will be reviewed from overlooks in the area. Other sites will include the geologic display at the new Red Rocks visitor center as well as the Precambrian unconformity located nearby, selected Precambrian outcrops, an oil seep in the Dakota group, and a textbook example of a uranium roll front.

12. Glenwood Springs, Colorado Coal Fire—Observations, Discussion, and Field Data Collection Techniques [412]

Sat., Nov. 6. Glenn B. Stracher, Dept. of Science and Mathematics, East Georgia College, Swainsboro, GA 30401, (478) 289-2073, fax 478-289-2080, stracher@ega.edu; Gary Colaizzi; Steve Renner; Janet L. Stracher; Tammy P. Taylor. Max.: 45; min.: 12. Cost: \$105 (1L, R, bus, pool).

Gas vents, ground fissures, and subsidence associated with the Glenwood Springs, Colorado, underground coal fire will be examined and discussed. Techniques for collecting mineral condensates and microarthropods adjacent to gas vents, coal gas using a LaMotte hand-operated sampler and Tedlar bags, and CO plus CO₂ data by Drager tube analysis will be demonstrated. We will end the day with a dip in the Glenwood Springs hot springs pool.

13. Overview of Laramide Structures along the Northeastern Flank of the Front Range [413]

Sat., Nov. 6. Vince Matthews, Colorado Geological Survey, 1313 Sherman St., Room 715, Denver, CO 80203, (303) 866-3028, fax 303-866-2461, vince.matthews@state.co.us. Max.: 38; min.: 12. Cost: \$120 (1L, R, bus).

Laramide fold structures in the sedimentary rocks along the northeastern flank of the Front Range uplift are quite varied, including both symmetrical and asymmetrical anticlines and synclines, as well as domes, basins, and monoclines. These structures are a microcosm of the Wyoming Province of the Rocky Mountain Foreland. Exceptional exposures along the flank of the Front Range make it possible to observe the contrasting deformation of the Proterozoic basement rocks and the overlying Phanerozoic rocks. This well-illustrated field trip will be a roadside overview of the variety of structures found in the area and how they relate to regional lineaments and the structure of the adjacent Denver Basin. A short, easy walk will occur at the last stop.

14. Paleoclimate, Paleohydrology, and Paleocology of the Morrison Formation in the Front Range of Colorado [414]

Sat., Nov. 6. Cosponsored by *GSA Sedimentary Geology Division*. Stan Dunagan, Dept. of Geology, Geography & Physics, University of Tennessee, Martin, TN 38238, (731) 587-7959, fax 731-587-1044, sdunagan@utm.edu; Christine Turner; Fred Peterson; Tim Demko. Max.: 30; min.: 10. Cost: \$105 (1L, R, vans).

New interpretations of isotopic, sedimentologic, and paleoecologic data from the Morrison Formation suggest that the Front Range foothills area of Colorado was the site of Late Jurassic wetland/lacustrine deposition. Visit Denver–Fort Collins area outcrops; see spectacular lacustrine stromatolite heads, charophyte-bearing mudstone and limestone, and paleosols. A regional paleoclimatic/paleohydrologic framework provides context for the reinterpretation of these distal Morrison deposits.

15. Paleontology and Volcanic Setting of the Florissant Fossil Beds [415]

Sat., Nov. 6. Cosponsored by *GSA Sedimentary Geology Division; Paleontological Society*. Herb Meyer, National Park Service, Florissant Fossil Beds National Monument, P.O. Box 185, Florissant, CO 80816, (719) 748-3253, fax 719-748-3253, herb_meyer@nps.gov; Steven Veatch; Amanda Cook. Max.: 36; min.: 12. Cost: \$125 (1L, R, bus).

The world-renowned site at Florissant preserves late Eocene plants and insects in lake sediments and lahars that formed in close association with nearby volcanism. This trip will include visits to an outcrop and overlook of the Thirtynine Mile volcanic field, to the

petrified forest and visitor center at Florissant Fossil Beds National Monument, and to a site where fossil leaves and insects can be collected.

16. Stratigraphy and Paleobiology of Mammoth Sites in the Denver Area [416]

Sat., Nov. 6. Cosponsored by *GSA Sedimentary Geology Division*. Russ Graham, Director, Earth & Mineral Sciences Museum, Pennsylvania State University, University Park, PA 16802, (814) 865-6427, fax 814-863-7708; Bart Weis; Jim Dixon. Max.: 36; min.: 12. Cost: \$95 (1L, R, vans).

This field trip will examine sites in the Denver area where mammoths have been found. The implications of the taxonomy and stratigraphic positions of the finds and how they relate to our understanding of mammoth evolution will be discussed. In addition, associated taxa provide a framework for interpreting the environments these mammoths inhabited.

HALF DAY—DURING THE MEETING

17. Tour of U.S. Geological Survey National Earthquake Information Center, Golden, Colorado [417]

Wed., Nov. 10, 12:30–5 p.m. Peter J. Modreski, U.S. Geological Survey, MS 150, Box 25046, Denver Federal Center, Denver, CO 80225-0046, (303) 202-4766, fax 303-202-4767, pmodreski@usgs.gov; Lynn M. Highland; Lisa Ann Wald; Pamela J. Benfield; Waverly J. Person; Jill McCarthy. Max.: 45; min.: 24. Cost: \$25 (bus).

The National Earthquake Information Center is located on the Colorado School of Mines campus. Its mission is to rapidly determine the location and size of all destructive earthquakes worldwide and to immediately disseminate this information to national and international agencies, scientists, and the public. The tour will also visit the U.S. Geological Survey's National Landslide Information Center and the new Colorado School of Mines Geology Museum.

POSTMEETING

18. Upper Cambrian and Lower Ordovician Stratigraphy of West Texas and Southern New Mexico [418]

Wed.–Sat., Nov. 10–13. Cosponsored by *GSA Sedimentary Geology Division*. John F. Taylor, Geoscience Dept., Indiana University of Pennsylvania, Indiana, PA 15705, (724) 357-4469, fax 724-357-5700, jftaylor@iup.edu; Raymond L. Ethington; James D. Loch; Paul R. Myrow; Robert L. Ripperdan. Max.: 20; min.: 12. Cost: \$325 (2L, R, 3ON, vans). *Begins and ends in El Paso, Texas.*

This trip transects southern New Mexico and westernmost Texas to examine variable lithofacies and faunas in the Bliss Formation and El Paso Group. Improved time control from new biostratigraphic (trilobite and conodont) and carbon isotope data improves correlations between ranges and allows evaluation of hypotheses that link faunal changes at uppermost Cambrian and Lower Ordovician stadal boundaries with paleoceanographic events.

19. Ancient Depositional Environments Control Modern Aquifer Quality: Stratigraphy of Groundwater Resources in the Denver Area [419]

Thurs., Nov. 11. Cosponsored by *GSA Sedimentary Geology Division*. Robert G.H. Reynolds, Denver Museum of Nature & Science, 2001 Colorado Blvd., Denver, CO 80205, (303) 370-6047, fax 303-331-6492, denverbasin@dmns.org. Max.: 22; min.: 10. Cost: \$110 (1L, R, vans).

On this trip we will travel south of Denver to Daniels Park, Castle Rock, and Wildcat Mountain, where we will see the rock record portraying the evolution of the Denver Basin. We'll take two half-mile hikes up Castle Rock and Wildcat Mountain to admire the view, see the local rock layers, and discuss aquifer stratigraphy.

20. Cenozoic Geology and Fossils of the Pawnee Buttes Area, Northeast Colorado [420]

Thurs., Nov. 11. Cosponsored by *GSA Sedimentary Geology Division* and *Colorado Scientific Society*. Emmett Evanoff, Dept. of Geological Sciences, Campus Box 399, University of Colorado, Boulder, CO 80309-0399, (303) 444-2644 (phone and fax), emmettevanoff@earthlink.net. Max.: 36; min.: 12. Cost: \$85 (1L, R, vans).

Northeast Colorado has been the focus of Cenozoic vertebrate paleontologists and stratigraphers since the days of Marsh and Cope. This trip will examine the geology of the Cenozoic record in the vicinity of the Pawnee Buttes, including the Eocene-Oligocene White River Formation and the Miocene Ogallala Group. Ancient valley fills, wind and river deposits, floods of gravel from the Front Range, and the vertebrates associated with these deposits will all be seen and discussed on this trip.

21. Consequences of Living with Geology: A Model Field Trip for the General Public [421]

Thurs., Nov. 11. Cosponsored by *GSA Engineering Geology Division*; *GSA Geoscience Education Division*; *American Institute of Professional Geologists*. David M. Abbott Jr., Consulting Geologist, 2266 Forest St., Denver, CO 80207, (303) 394-0321, fax 303-394-0543, dmageol@msn.com; David C. Noe. Max.: 40; min.: 12. Cost: \$100 (1L, R, mini-bus).

This is an example of a trip that can be run anywhere for non-geologists and local decision-makers. We'll examine sites along the Front Range affecting everyday life in Colorado, including mine subsidence, flooding, underground gas storage, swelling soils, and natural-resource deposits, to discuss how such features affect us. Geologists can contribute to local decision making by leading similar trips.

22. Geological Reconnaissance of Dinosaur Ridge, Red Rocks, and the Front Range of the Rocky Mountains near Morrison, Colorado [422]

Thurs., Nov. 11. Cosponsored by *GSA Geoscience Education Division*; *GSA Sedimentary Geology Division*. Norbert E. Cygan, Friends of Dinosaur Ridge, 16831 W. Alameda Parkway, Morrison, CO 80456, (303) 697-3466, fax 303-697-8911, necygan@aol.com; T. Caneer; Harald Drewes and other volunteers from Dinosaur Ridge, www.dinoridge.org. Max.: 45; min.: 12. Cost: \$90 (1L, bus). Also offered as a premeeting trip.

This trip will visit classic dinosaur bones and footprints at Dinosaur Ridge in the vicinity of Morrison, Colorado. Participants will investigate the stratigraphy and depositional systems of the sedimentary rocks in the foothills. A stop will be made to examine the four lava flows at North Table Mountain with discussion of the vent area for the flows. Regional geology will be reviewed from overlooks in the area. Other sites will include the geologic display at the new Red Rocks visitor center as well as the Precambrian unconformity located nearby, selected Precambrian outcrops, an oil seep in the Dakota group, and a textbook example of a uranium roll front.

Q. What is the term used to describe the luster of diamonds?

Like Trivia? Get a team together and battle it out during GSA's first Geoscience Trivia Night at the GSA Annual Meeting in Denver!

GEOSCIENCE TRIVIA NIGHT

TUES., NOV. 9, 8–10 P.M.

LOCATION TBA

Come along and test your knowledge of Geoscience Trivia at this evening of fun. You'll rack your brain and test your skills over more than 100 questions! Register a team or join a mixed team. Winning teams will be awarded fabulous prizes and the prestige of being the first GSA Trivia Night winners!

To participate, register your team (or as an individual) with Gary Lewis, glewis@geosociety.org, by October 22.

A cash bar will operate at the event.

Answer Adamantine

23. Laramide Horizontal Shortening in the Rockies: Faulting and Folding in Oblique Backlimb-Tightening Structures of the Northeastern Flank of the Front Range, Colorado [423]

Thurs., Nov. 11. Eric Erslev, Dept. of Geosciences, Colorado State University, Fort Collins, CO 80523, (970) 491-6375, fax 970-491-6307, erslev@cnr.colostate.edu. Max.: 24; min.: 10. Cost: \$100 (1L, R, vans).

The northeastern flank of the Front Range exposes oblique backlimb-tightening (BLT) structures that develop in basement-involved arches during horizontal compression. Moderate hikes to multiple structural levels within these Laramide fault-propagation folds will reveal the complications provided by the obliquity between the N-S-trending basin margin and the SSE-plunging folds.

24. Underground Tour of Henderson Molybdenum Mine [424]

Thurs., Nov. 11. Cosponsored by *Colorado Scientific Society*. Eric Nelson, Dept. of Geology and Geological Engineering, Colorado School of Mines, Golden, CO 80401-1887, (303) 273-3811, fax 303-273-3859, enelson@mines.edu; Robert Golden; Jim Shannon. Max.: 15; min.: 5. Cost: \$140 (1L, R, vans).

This trip will view the underground and surface geology related to the world-class Henderson molybdenum porphyry deposit. Morning: presentation of detailed geology of the deposit and underground tour of mine operations and porphyry and vein types. Afternoon: surface tour to place the deposit in the context of regional geology and structure, including alteration and peripheral aspects of the deposit.

25. Walking with Dinosaurs along Colorado's Front Range [425]

Thurs., Nov. 11. Joanna Wright, Dept. of Geography and Environmental Sciences, University of Colorado, Denver, CO 80217-3363, (303) 556-6007, fax 303-556-6157, jwright@carbon.cudenver.edu. Max.: 36; min.: 12. Cost: \$85 (1L, R, vans).

Late Paleozoic to Mesozoic terrestrial paleoenvironments of the Front Range west of Denver. Outcrops will include a paleo land surface and associated weathered zone beneath the Fountain, fluvial sediments of the Morrison, the marginal marine and coastal deposits of the Dakota Sandstone, and the fluvial deposits of the latest Cretaceous Laramie Formation. Participants will visit some classic fossil bone and footprint localities, including the only known ceratopsian trackways.

SHORT COURSES & WORKSHOPS

GSA-Sponsored Professional Development Courses

GSA short courses will be held immediately before the Annual Meeting and are open to members and nonmembers. If you register for *only* a short course, you must pay a \$40 nonregistrant fee in addition to the course fee. This fee may be applied toward the meeting registration fee if you decide to attend the meeting. Preregistration is recommended; on-site registration is an additional \$30.

Continuing Education Unit (CEU) Service

All courses sponsored by GSA offer CEUs. A CEU is defined as 10 contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction, and qualified instruction. A contact hour is defined as a typical 60-minute classroom instructional session or its equivalent. Ten instructional hours are required for one CEU.

CANCELLATION DEADLINE: OCTOBER 7, 2004.

1. Evaporites: A Practical Approach [501]

Fri. and Sat., Nov. 5–6, 8 a.m.–5 p.m. Hyatt Regency Hotel. Cosponsored by *GSA Sedimentary Geology Division*.

Evaporites are responsible for trapping or creating hydrocarbon reservoirs worldwide and are associated with numerous base and precious metal accumulations. Yet the role of evaporites in many studies of these systems is largely ignored. This is no longer the case. John Warren brings more than 20 years of experience in the

applied petroleum and mineral sciences into detailed discussion of the role of evaporites as he traces and explains the evaporite-hydrocarbon-metal association from deposition through diagenesis to halokinesis and metamorphism. Throughout, the emphasis is on recognizing and predicting the importance of subsurface dynamics when working in evaporitic terrains. Designed for practicing geologists and geophysicists or anyone holding a bachelor's degree with a specialization in the earth sciences and an interest in evaporates, participants will be shown how techniques of applied sedimentology can be successfully applied to the search and production of hydrocarbons and metals in evaporitic terrains. Participants encouraged to bring a laptop computer to this course.

Faculty: John Warren, University of Brunei Darussalam, Ph.D., Flinders University of South Australia. Limit: 30. Fee: \$365; includes course manual and lunch. CEU: 1.6.

2. Introduction to Geographic Information Systems (GIS), Using ArcGIS9 for Geological Applications [502]

Fri. and Sat., Nov. 5–6, 8 a.m.–5 p.m. Emily Griffith Opportunity School, Denver. Cosponsored by *GSA Geoscience Education Division and Environmental Systems Research Institute*.

This course will introduce the use of GIS in geology-related applications using ArcGIS, ArcMap, ArcCatalog, and Spatial and 3D Analyst extensions. Experience with ArcGIS is not necessary, but familiarity with Windows OS would be beneficial. Focus will be hands-on use of ArcGIS including ModelBuilder, data access and analysis, Geoprocessing with ArcTools, and the Geodatabase. The Geodatabase GeoModel schema will be discussed.

Faculty: Ann B. Johnson, Higher Education Manager, Environmental Systems Research Institute, Redlands, California, M.S., University of California, Riverside; Dave Fosdek, Federal Account Manager, Environmental Systems Research Institute, Redlands, California, B.S., University of Idaho. Limit: 18. Fee: \$240; includes course manual and lunch. CEU: 1.6.

3. Multi-Temporal Stereo Aerial Photography [503]

Fri. and Sat., Nov. 5–6, 8 a.m.–5 p.m. Hyatt Regency Hotel. Cosponsored by *GSA Engineering Geology Division and U.S. Army Corps of Engineers*.

This is a hands-on course using stereo aerial photographs and includes a field trip to the study example. This course teaches a simple but highly effective method to document the various terrain elements used to develop the information from analysis to interpretation in all environmental and geologic investigations. Applications to GIS will be discussed. The prerequisite is a curious mind. Stereoscopic vision is a plus.

Faculty: John C. Jens, U.S. Army Corps of Engineers, Alexandria, Virginia, Ph.D., George Mason University; Thomas E. Eastler, University of Maine at Farmington, Ph.D., Columbia University. Limit: 30. Fee: \$420; includes course manual and lunch. CEU: 1.6.

4. Calibrated Peer Review Training for Faculty and Teaching Assistants: Writing Exercises for Large and Small Classes without the Pile of Papers to Grade [504]

Sat., Nov. 6, 8 a.m.–5 p.m. Hyatt Regency Hotel. Cosponsored by *GSA Geoscience Education Division and National Association of Geoscience Teachers*.

Attention Students: Subsidies Available

The *GSA Geoscience Education Division* will subsidize the first five student registrants who are valid division members. The student *must pay the full course fee* when registering, but will be reimbursed \$50 after the GSA meeting by the Geoscience Education Division.

The *GSA Hydrogeology Division* will subsidize the first student registrant who is a valid division member. The student *must pay the full course fee* when registering, but will be reimbursed \$50 after the GSA meeting by the Hydrogeology Division.

The *GSA Sedimentary Geology Division* will subsidize all students who are valid Division Members. Students *must pay the full course fee* when registering but will be reimbursed \$100 after the GSA meeting by the Sedimentary Geology Division. To be reimbursed, students must apply by e-mail, before the Annual Meeting, to Paul K. Link, Secretary of the Sedimentary Geology Division, at linkpaul@isu.edu. They must provide their GSA member number, certify that they are members of the Sedimentary Geology Division, and provide their Social Security number and address in order for GSA to send reimbursement.

For more information, contact Edna Collis, GSA Program Officer for Professional Development, (303) 357-1034, ecollis@geosociety.org. For a more detailed course description, please visit www.geosociety.org/meetings/2004/cwGSA.htm.

This course is intended for earth science instructors interested in implementing Calibrated Peer Review (CPR) assignments in their classes. CPR is a web-based technical writing tool that facilitates learning by having students writing and reviewing essays. CPR is suited for both large and small enrollment classes. Participants will learn the mechanics of CPR and will develop a new CPR assignment for use in their class. Note: Registrants must provide their own laptop computers (equipped with network card) in order to participate in this course.

Faculty: Elizabeth Heise, University of Texas at Brownsville, Brownsville, Texas, Ph.D., Texas A&M University; Cinzia Cervato, Iowa State University, Ames, Iowa, Ph.D., ETH–Swiss Federal Institute of Technology, Zurich; Amanda Palmer-Julson, Blinn College, Bryan, Texas, Ph.D., Princeton University. Limit: 20. Fee: \$340; includes course manual and lunch. CEU: 0.8.

5. Characterization and Toxicity Assessment of Mine-Waste Sites [505]

Sat., Nov. 6, 8 a.m.–5 p.m. Hyatt Regency Hotel. Cosponsored by *Geochemical Society of America*.

Abandoned mine-waste sites cover thousands of acres in the western United States. This course will provide simple and practical methods for characterizing and assessing the toxicity potential of mine-waste piles. These methods include quick, inexpensive field leaching tests that offer an evaluation of acid and trace-metal release from mine-waste material, field techniques to determine bioaccessibility and bioavailability of metals to aquatic organisms, and a simple decision tree to assess adverse effects from mine wastes. An afternoon field trip is included. This course is intended for professionals and students involved in the environmental sciences, federal and state personnel concerned with mining wastes, waste-site managers and personnel, and/or researchers in hydrological contamination studies.

Faculty: Sharon Diehl, U.S. Geological Survey, Denver, Ph.D., Colorado School of Mines; LaDonna Choate, U.S. Geological Survey, Denver; Ph.D., Colorado School of Mines; David Fey, U.S. Geological Survey, Denver, B.S., University of Colorado; Philip L. Hageman, U.S. Geological Survey, Denver, B.S., University of Colorado; Bruce Smith, U.S. Geological Survey, Denver, Ph.D., University of Utah; Kathleen S. Smith, U.S. Geological Survey, Denver, Ph.D., Colorado School of Mines; James Ranville, Colorado School of Mines, Ph.D., Colorado School of Mines; Thomas Wildeman, Colorado School of Mines, Ph.D., University of Wisconsin; James T. Herron, Colorado Division of Minerals and Geology, Denver, M.S., Colorado State University. Limit: 30. Fee: \$300; includes course manual and lunch. CEU: 0.8.

6. Estimating Rates of Groundwater Recharge [506]

Sat., Nov. 6, 8 a.m.–5 p.m. Hyatt Regency Hotel. Cosponsored by *GSA Hydrogeology Division*.

Good estimates of groundwater recharge are required to accurately assess water resources and evaluate aquifer vulnerability to contamination. This course will review theory, assumptions, uncertainties, advantages, and limitations of different approaches for estimating recharge rates. We will discuss physical, tracer, and numerical modeling techniques based on surface water, unsaturated zone, and saturated zone data. The course content is aimed at practicing hydrologists and advanced hydrology students.

Faculty: Richard W. Healy, U.S. Geological Survey, Denver, B.S., University of Illinois; Bridget R. Scanlon, Bureau of Economic Geology, University of Texas, Austin, Ph.D., University of Kentucky. Limit: 30. Fee: \$270; includes course manual and lunch. CEU: 0.8.

7. Hydrogeologic Field Methods [507]

Sat., Nov. 6, 8 a.m.–5 p.m. Hyatt Regency Hotel. Cosponsored by *GSA Hydrogeology Division*.

This course will present standard methods used by the U.S. Geological Survey, U.S. Environmental Protection Agency, and the American Society for Testing and Materials for planning and undertaking hydrogeologic field investigations. Conceptual models, water level measurements, well inventory, well drilling, aquifer testing, sample collection, monitor wells, project planning, and report preparation will be presented. This course is designed for engineers, geologists, entry level hydrogeologists, and environmental scientists.

Faculty: John E. Moore, Consultant, Denver, Ph.D., University of Illinois. Limit: 40. Fee: \$245; includes course manual and lunch. CEU: 0.8.

8. Management and Leadership Skills for Academic Administrators in the Geosciences [508]

Sat., Nov. 6, 8 a.m.–5 p.m. Hyatt Regency Hotel. Cosponsored by *GSA Geoscience Education Division and National Association of Geoscience Teachers*.

This course will provide an introduction to the interpersonal tools and skills needed to effectively and efficiently manage and lead in an academic setting. It is designed for faculty and research scientists who are either new to academic administration or wish to prepare themselves for a transition to administration. Even experienced department chairs and institute directors wanting to improve their administrative skills and to network with peers sharing similar responsibilities and challenges will benefit.

Faculty: Lee J. Suttner, Indiana University, Bloomington, Ph.D., University of Wisconsin; Sheila M. Moore, Training Concepts, Chattanooga, Tennessee, A.B., St. Olaf College. Limit: 25. Fee: \$265; includes course manual and lunch. CEU: 0.8.

9. Practical Geoscience Ethics: Elements and Examples [509]

Sat., Nov. 6, 8 a.m.–5 p.m. Hyatt Regency Hotel. Cosponsored by *GSA Engineering Geology Division and American Institute of Professional Geologists*.

The elements of professional geoscience ethics are examined using case histories illustrating a variety of issues including the significant distinction between ethical rules and ethical ideals. Review of the fundamental principles of professional ethics provides a foundation for case history discussion. Teachers can use the case histories and other information to incorporate professional ethics discussions in their classes.

Faculty: David M. Abbott Jr., Consulting Geologist, Denver, M.S., Colorado School of Mines. Limit: 40. Fee: \$250; includes course manual and lunch. CEU: 0.8.

Other Courses

Registration and information can be obtained from the contact person listed.

Sequence Stratigraphy for Graduate Students

Fri. and Sat., Nov. 5–6, 8 a.m.–5 p.m. Free short course for graduate students. Cosponsored by *British Petroleum* and *ExxonMobil Exploration Company*.

This free, two-day short course is designed to teach graduate students the principles, concepts, and methods of sequence stratigraphy. Sequence stratigraphy is an informal chronostratigraphic methodology that uses stratal surfaces to subdivide the

stratigraphic record. This methodology allows the identification of coeval facies, documents the time-transgressive nature of classic lithostratigraphic units, and provides geoscientists with an additional way to analyze and subdivide the stratigraphic record. Using exercises that utilize outcrop, core, well-log and seismic data, the course provides a hands-on experience to learning sequence stratigraphy. The exercises include classic case studies from which many sequence stratigraphic concepts were originally developed.

Instructors: Art Donovan, BP; Kirt Campion, ExxonMobil.
Limit: 40. No fee. Preregistration required. Information and registration: Art Donovan, donovan@bp.com.

Biological Revolutions in the Neoproterozoic and Cambrian

Sat., Nov. 6, 8 a.m.–5 p.m. Sponsored by *Paleontological Society*.

This free short course is designed to update paleontologists on current research on the evolution of the late Proterozoic and

Cambrian biosphere. Research in this area routinely crosses traditional disciplinary boundaries: the course will cover topics such as stromatolites and microbialites, Precambrian eukaryotes, the Ediacara biota, isotope stratigraphy, genetics and developmental biology of metazoans, biogeography of the Cambrian radiation, the skeletonization of the Cambrian biota, and the Cambrian history of reefs. It is intended as a review for college and university instructors and interested geoscientists. A short course book will be available for purchase.

Faculty: Ben Waggoner and Jere Lipps. No fee or registration required. Information: Ben Waggoner, Dept. of Biology, University of Central Arkansas, Conway, AR 72035–5003, (501) 450-5037, fax 501-450-5914, benw@mail.uca.edu; Jere Lipps, Museum of Paleontology, University of California, Berkeley, CA 94720–4780, (510) 642-9006, fax 510-642-1822, jlipps@uclink4.berkeley.edu.

COMMUNICATING GEOSCIENCE

Sharpen Your Skills for Communicating with Media, Colleagues,
Funding Agencies, and the General Public

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Media Relations Workshop

WITH SARAH SIMPSON, *SCIENTIFIC AMERICAN*

SAT., NOV. 6, 8 A.M.–NOON

Registration Required

Cost: \$40.00 professionals [650A]; \$15.00 students [650B]

Learn how to:

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For more information contact Ann Cairns, acairns@geosociety.org.

Give Effective Presentations

SAT., NOV. 6, 2–5 P.M.

Registration Required

Cost: \$40.00 professionals [651A]; \$15.00 students [651B]

Learn how to:

- ☞ Prepare and present a talk and presentation
- ☞ Prepare supporting visual aids
- ☞ Best utilize your presentation time

For more information contact Gary Lewis, glewis@geosociety.org.

Sign up for both and save!

Cost: \$65.00 professionals [652A]; \$20.00 students [652B]

Fund Your Science

BARBARA RANSOM, PROGRAM DIRECTOR, NATIONAL
SCIENCE FOUNDATION

WED., NOV. 10, 8 A.M.–NOON

Registration Required

Cost: \$40 professionals [653A]; \$15 students [653B]

Get the insider scoop on the proposal process, how it works, and how to make it work for you!

Learn how to:

- ☞ Develop strategies for funding success
- ☞ Write competitive science research proposals

For more information contact Ann Cairns, acairns@geosociety.org.

≈ K–16 EDUCATION WORKSHOPS ≈

College and University Faculty, K–12 Teachers, Undergraduate and Graduate Students, Informal Educators: Please join us for an exciting and diverse series of workshops and events for education at all levels. Annual Meeting registration and payment of the workshop fee are required in order to participate in the K–16 workshops. GSA K–12 Teacher Members who are only attending the workshops do not have to pay the meeting registration fee (\$40). Annual Meeting registration is \$40 for nonmember K–12 teachers or for others who will participate only in the weekend workshops. A special Subaru of America grant is available to Colorado graduate students and two-year college faculty that will cover half of your registration fee. Please visit www.geosociety.org/meetings/2004/rSubaru.htm for information. Preregister to ensure your spot.

Saturday Workshops

1. Earthquakes—A One-Day Workshop for College and University Faculty [601]

Sat., Nov. 6, 8 a.m.–5 p.m. Cosponsored by the *IRIS Consortium*, *U.S. Geological Survey*, *National Science Foundation*, and *Purdue University*.

Intended audience: Faculty at two-year and four-year colleges and universities teaching Earth science courses and wishing to learn more about earthquakes, seismology and plate tectonics for their instruction. Fee: \$20.

This workshop will cover the following topics: causes of earthquakes, plate tectonics, propagation of seismic waves, seismographs, statistics and data, Earth's structure, and earthquake hazards. Learning activities emphasizing hands-on and inquiry-based learning will be used to deliver content to participants. Participants are encouraged to reflect on how these activities could be used in their classrooms. **Materials (hands-on activities, maps, earthquake book, posters, software and other teaching aids) will be provided to participants** as part of the workshop. **Information:** Michael Hubenthal, hubenth@iris.edu; Larry Braile; John Lahr, jlahr@usgs.gov; John Taber, taber@iris.edu; Lisa Wald, lwald@usgs.gov.

2. Earth Science Inquiry-Based Student-Centered Curriculum Developed by the American Geological Institute with support from the NSF: EarthComm, IES, CUES, and HSES [602]

Sat., Nov. 6, 9 a.m.–5 p.m. Cosponsored by *American Geological Institute* and *National Science Foundation*.

Intended audience: Middle and high school teachers, college and university faculty. Fee: \$10.

The American Geological Institute will showcase four major NSF-funded curriculum programs for middle school and high school students that target key earth science and inquiry standards of the National Science Education Standards. Workshop attendees will **receive sample curriculum materials** and work through investigations that use a student-centered, collaborative-learning approach and apply earth systems science principles to development of earth, space, and environmental science concepts. The workshop will also demonstrate how to integrate Web-based resources and GIS applications into classroom teaching of earth and environmental science. **Information:** Roderic Brame, rib@agiweb.org; Michael Smith, mjs@agiweb.org.

3. Using the Internet in the Earth Science Classroom to Develop Data Driven Lessons, Activities, and Lab [603]

Sat., Nov. 6, 8 a.m.–noon. Cosponsored by *National Association of Geology Teachers* and *GSA Geoscience Education Division*.

Intended audience: Middle and high school teachers, college and university faculty, graduate students in education. Fee: \$60.

This workshop is designed to introduce participants to uses of the Internet in the earth science classroom. Participants will be led through interactive examples of the Internet as a file cabinet, as a source of on-line information and activities, and a source of real time data used in the design of data driven lessons, activities, and labs. The workshop will culminate with each participant creating an electronically based activity, leaving the workshop with a lesson ready to use with a class, supporting resources, and access to lessons created by other workshop members via a Web site hosted by the workshop leaders. **Information:** Steve Kluge, skluge@bedford.k12.ny.us; Andrew Patrick, apatrik@bedford.k12.ny.us.

4. Geoscience Classroom to Workforce: Skills and Partnerships for the Real World [604]

Sat., Nov. 6, 8 a.m.–noon. Cosponsored by the *Council on Undergraduate Research*.

Intended audience: College and university faculty. Fee: \$60.

In this workshop, attendees will review current data on geoscience enrollment and degree trends, as well as trends in employment (AGI, NSF, Dept. of Education, Dept. of Labor); faculty who have developed active partnerships with industry/employers will discuss their programs and the outcomes; and representatives from employment sectors will discuss hiring and downsizing trends and the workplace skills desirable in today's market. Breakout discussion groups will allow participants to explore their institutional scenarios with presenters to begin to formulate strategies for departmental improvement. **Information:** Marilyn Suiter, msuiter@nsf.gov; Richard M. Taber, rtaber@nsf.gov.

5. How to Establish and Sustain an Undergraduate Research Program [605]

Sat., Nov. 6, 1–5 p.m. Cosponsored by the *Council on Undergraduate Research*.

Intended audience: College and university faculty, graduate students. Fee: \$30.

This workshop will present strategies for developing and sustaining research programs at the undergraduate level. It is open to all, but is designed for new geosciences faculty, graduate students applying for academic positions, and faculty interested in expanding their research programs to include undergraduates. Presentations will cover strategies for obtaining a job at a predominantly undergraduate institution, funding opportunities to support undergraduate research, project selection and mentoring of undergraduates, and models of successful undergraduate research programs. Breakout sessions will be used to develop individual plans and share ideas and strategies for getting started, finding money and time, and selecting projects. **Information:** Lydia K. Fox, lkfox@pacific.edu; Lori Bettison-Varga, lbettison@wooster.edu; Jill Singer; Jeff Ryan.

6. Using Conceptests to Improve Teaching and Learning in Large Classes [606]

Sat., Nov. 6, 1–5 p.m. Cosponsored by *GSA Geoscience Education Division, National Association of Geology Teachers, and National Science Foundation.*

Intended audience: College and university faculty. Fee: \$10.

Workshop participants will learn proven techniques to create and use *conceptests*—short conceptual multiple-choice questions that generally require qualitative rather than quantitative answers. Conceptests have been successfully adopted by science faculty at a range of institutions and have been shown to improve student achievement, raise attendance, reduce student attrition, and produce a more active, student-centered learning environment. We will share at least 100 sample questions and associated assessment data with participants. **Information:** David McConnell, dam6@uakron.edu; David Steer, steer@uakron.edu; Katharine Owens.

7. Toward a Sustainable Future: Connecting the Dots [607]

Sat., Nov. 6, 1–5 p.m.

Intended audience: Middle and high school educators. Fee: \$25.

An important concept to emerge from the 20th century was the recognition that the successful continuation of human society is threatened. Earth scientists have special knowledge of some of the significant threats to sustainability, and they recognize the need to help educate the public on the key ideas of sustainability and their interconnectedness. This workshop will discuss the serious challenges facing educators of today's students because of their unawareness of these connected issues, and it will develop ways to effectively communicate them at appropriate middle and high school grade levels. **CD-ROM included. Information:** A.R. (Pete) Palmer, allison.palmer@comcast.net; Christine McLelland, cmcllland@geosociety.org.

8. Using the “Our Dynamic Planet” and “Global Ocean Data Viewer” to Implement Effective Science Writing Activities [608]

Sat., Nov. 6, 1–5 p.m.

Intended audience: Middle and high school teachers, college and university faculty, and informal educators. Fee: \$25.

This workshop will focus on the use of earth data to support learning about the Earth.

Topics to be covered are (1) using “Our Dynamic Planet” to learn about and support the theory of plate tectonics, (2) using the “Global Ocean Data Viewer” to learn about ocean structure and circulation, (3) familiarization with a collection of Web-available data sources used in University of California at Santa Barbara Oceanography, (4) implementing effective activities that support student learning using data, and (5) writing to learn about the Earth using earth data. For more information please visit: <http://oceanography.geol.ucsb.edu/>. **Attendees will receive a CD-ROM and materials. Information:** William A. Prothero Jr., prothero@geol.ucsb.edu.

9. Online Geoscience Education: How to Create Meaningful Distance Learning Opportunities [609]

Sat., Nov. 6, 1–5 p.m., Front Range Community College.

Intended audience: College and university faculty, undergraduate students, graduate students, and informal educators. Fee: \$40.

How do online geoscience educators provide meaningful distance learning opportunities to students who never meet in a class-

room? Online instructors are invited to share techniques, strategies and successes regarding field experiences, lab exercises and analysis of critical earth science issues in computer-based college-level courses. Hands-on exploration of course sites provided by workshop participants is strongly encouraged. Attendees should bring their own laptop computers to the workshop to demonstrate their online course sites and sample other sites. **Information:** Suzanne Traub-Metlay, Suzanne.tm@frontrange.edu.

Sunday Workshops

10. Inquiry-Based Digital Laboratory Materials for Introductory Geology Courses [610]

Sun., Nov. 7, 9 a.m.–5 p.m. Cosponsored by *National Science Foundation, GSA Geoscience Education Division, and National Association of Geology Teachers.*

Intended audience: College and university faculty, graduate students. Fee: \$25.

This workshop introduces integrating inquiry-based instruction into introductory level geology courses. Participants develop inquiry-based activities, assess their effectiveness, and identify innovative evaluations for student performance. Presenters will share best practices identified during development of software modules that use an inquiry-based problem-solving approach to help students learn basic geologic concepts. The modules—based on a field course taught in eastern Utah—bring field experiences into the classroom and train students to use the scientific method to solve real problems. The modules are easily scored and can be used to supplement or replace portions of traditional laboratory instruction in introductory courses. **Information:** Anne Frances Wysocki, awysocki@mtu.edu; Jacqueline E. Huntoon, Leonard C. Mankowski.

11. Creating an Online Learning Environment with Visionlearning [611]

Sun., Nov. 7, 9 a.m.–1 p.m.

Intended audience: Middle and high school teachers, college and university faculty, graduate students, informal educators. Fee: \$25.

Web-based teaching materials can avoid the weaknesses of traditional textbooks by offering low-cost resources that integrate concise content, interactive exercises, news, biographies, and other materials. Finding and using these resources effectively can be a challenge, however. In this workshop, participants will learn about the advantages of using Web-based materials, especially in an interdisciplinary classroom where no appropriate textbook exists. Participants will have the opportunity to fully explore the content and classroom management resources available at the Visionlearning, an NSF-funded undergraduate education Web site, and use the site to set up their own MyClassroom. **Information:** Anne Egger, aegger@visionlearning.com; Anthony Carpi, acarpi@jjay.cuny.edu.

Annual Meeting Sponsor



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| ◆ Clark R. Chapman | ◆ Todd A. Haney | ◆ Karl J. Niklas | ◆ S.A. Thorpe |
| ◆ Brian G. Clement | ◆ Stephen T. Jackson | ◆ Thomas H. Painter | ◆ Rebecca Verity |
| ◆ George D. Cody | ◆ David K. Jacobs | ◆ Dorothy Parker | ◆ Samuel M. Webb |
| ◆ Gregory J. Dick | ◆ Luna B. Leopold | ◆ W.R. Peltier | ◆ Kelin X. Whipple |
| ◆ William R. Dickinson | ◆ Jane C.S. Long | ◆ Peter M. Sadler | ◆ John W. Williams |
| ◆ Jeff Dozier | ◆ Kristina D. Louie | ◆ Susan Y. Schwartz | |
| ◆ Rodney C. Ewing | ◆ Peter Molnar | ◆ Bruce M. Simonson | |
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REGISTRATION

- ★ Register online at www.geosociety.org.
- ★ Register by mail to 2004 GSA Annual Meeting, P.O. Box 9140, Boulder, Colorado 80301-9140.
- ★ Register by fax at 303-357-1071 or 303-357-1072 if using a credit card. If you register by fax, please do not send another copy in the mail.

NEW: Early Bird Registration
Deadline: July 13

Standard Registration Deadline: September 30

Cancellation Deadline: October 7

The member fees apply to members of both GSA and its Associated Societies (listed on the form). Registrations will not be processed unless full payment is received. Unpaid purchase orders are NOT accepted as valid registration. The confirmation sent by GSA will be your only receipt. You should receive it within two weeks after your registration is submitted. Badges are needed for access to ALL activities, 8 a.m. Sunday through 5:30 p.m. Wednesday.

A **guest registration** fee of \$80 per person is available for nongelologist spouses or family members and friends of a professional and/or student registrant and is required for those attending all guest activities, tours, and seminars, for refreshments in the Guest Hospitality Suite, and for access to the Exhibit Hall. Formal guest tours are at an additional cost and include professional tour guides, round-trip transportation, admission fees, and gratuities. *Lunch included only if indicated.* The guest registration fee does **NOT** allow access to technical sessions. However, guests can sign in with the

hostess in the Guest Hospitality Suite and get a Visitor Badge allowing them to attend a specific presentation.

Students: A CURRENT student ID is required to obtain student rates. You will have to pay the professional fee unless you have the ID.

Please register only one professional or student per form and retain a copy for yourself.

All registrations received after September 30 will be considered LATE registrations and charged accordingly. Online registration will remain open until November 5. **Absolutely no registrations should be mailed or faxed after November 3.** After this date, we will handle registrations at the Convention Center during normal registration hours.

On-site fees for Continuing Education Courses are an additional \$30.

As a special consideration, GSA is offering a discount rate to our members who are 70 years of age and older. Please write your membership number in the space provided and be sure to bring a picture ID to ensure your discount.

CANCELLATIONS, CHANGES, AND REFUNDS

All requests for additions, changes, and cancellations must be made in writing and received by October 7, 2004. Faxes are accepted. **A \$30 processing fee will be charged for cancellation of a full- or one-day professional registration received in writing prior to October 7.** NO REFUNDS WILL BE MADE ON CANCELLATION NOTICES RECEIVED AFTER THIS DATE. Refunds will be mailed from GSA after the meeting. Refunds for fees paid by credit card will be credited according to the card number on the registration form. There will be NO refunds for on-site registration, *Abstracts with Programs* volumes and CDs, and ticket sales.

REGISTRATION HOURS (ONSITE)

COLORADO CONVENTION
CENTER—LOBBY B

Sat., Nov. 6	7 a.m.–4:30 p.m.
Sun., Nov. 7	6:30 a.m.–7:00 p.m.
Mon.–Tues., Nov. 8–9	7 a.m.–4:30 p.m.
Wed., Nov. 10	7–11 a.m.

REGISTRATION FEES

	Early Bird (by 7/13)	Standard (7/14–9/30)	Onsite/Late (after 9/30)
Professional Member—full meeting	\$275	\$295	\$375
Professional Member—1 day	\$190	\$190	\$200
Professional Member (70 or older)—full meeting	\$220	\$240	\$315
Professional Member (70 or older)—1 day	\$135	\$135	\$145
Professional Nonmember—full meeting	\$350	\$375	\$465
Professional Nonmember—1 day	\$215	\$215	\$225
Student Member—full meeting	\$60	\$90	\$120
Student Member—1 day	\$60	\$60	\$60
Student Nonmember—full meeting	\$80	\$120	\$150
Student Nonmember—1 day	\$75	\$75	\$75
K–12 Professional—full meeting	\$35	\$40	\$40
Field Trip or Short Course Only	\$40	\$40	\$40
Guest or Spouse	\$70	\$80	\$80

Are You Taking Advantage of the GSA Member Rate?

Not a GSA member or a member of one of the GSA Associated or Allied Societies? **Join GSA Now** and pay significantly less for your meeting registration while gaining access to additional member benefits and services.

Professional members save \$80 on their registration for the full meeting (*registration received by September 30*), and Student members save \$30—membership pays for itself!

Reap the benefits of GSA membership immediately. To join, simply visit our Web site at www.geosociety.org and go to the membership section, or contact GSA Member Services at gsaservices@geosociety.org, 1-888-443-4472, or 303-357-1000, option 3.

Save Money by Registering Early!

GSA and GSA Associated Society Members SAVE \$80 (professionals) and \$30 (students) by registering by September 30, 2004.

Badges? Yes, You Need Them!

Badges are needed for access to ALL activities, 8 a.m. Sunday through 5:30 p.m. Wednesday. If you are located within the United States and your registration form is received at GSA before October 7, your badge will be mailed to you about two weeks before the meeting. If you register after October 7, or if you are located outside the United States, you will need to pick up your badge and program at the GSA registration area located in Lobby B of the Colorado Convention Center beginning Saturday, Nov. 6, at 7 a.m.

COFFEE AND CONVERSATION: An Appreciation Reception for GSA Campus Representatives [202]

Mon., Nov. 8, 7–9 a.m.

Colorado Convention Center, Room TBA

GSA Campus Reps: Please join us for coffee before you head off to the technical sessions. This is an informal, come-and-go event, conveniently located in the Convention Center.

- Network with other Campus Reps
- Talk about GSA's Education & Outreach programs and student membership
- Share your ideas with GSA staff hosts

To register, check [202], "Campus Rep. Coffee Recept." on your Registration Form.

Admission is free, but we ask that you register in order to help us make catering plans.



REGISTRATION AND TRAVEL GRANTS AVAILABLE

REGISTRATION GRANT SPONSORED BY



SUBARU OF AMERICA, INC.

Subaru of America, Inc. is once again sponsoring grants to cover one-half of the registration fee for member and non-member earth science and geology faculty of Colorado state community colleges and member and nonmember graduate students of Colorado state universities. For more information please visit: www.geosociety.org/meetings/2004/rsubaru.htm.

NEW: GSA Student Travel Fund

GSA is pleased to offer assistance to member undergraduate and graduate students to help cover some of the costs associated with attending the GSA Annual Meeting. A fund has been set up within the GSA Foundation for attendee contributions, and GSA and the Foundation will each contribute \$1,000 for the Denver Annual Meeting. The number and amount of awards will be solely based on contributions received, and 100% of the contributions received will go to help fund student travel. For more information on this fund or to apply online for the Student Travel Fund, please visit www.geosociety.org/meetings/2004/sTravel.htm.

Interested in improving your chances of receiving a GSA student research grant?

Looking for tips to improve your proposal writing for future funding?

Announcing GSA's first research proposal writing workshop!

At the annual meeting in Denver, GSA will host its first proposal-writing workshop aimed specifically at graduate students. This workshop will be led by a member of the GSA Research Grant Committee and will be tailored to new and returning student members looking for tips on proposal writing. The instruction will be based on recent GSA graduate research grant proposals and will put several examples into hypothesis-driven studies providing examples of the dos and don'ts to the proposal-writing process.

The workshop will be free; however, the number of participants will be limited by the size of the room. Please see the GSA Web site (www.geosociety.org/meetings/) in August or the October issue of *GSA Today* for more details.

GSA Member #

First Name _____
 Last Name _____
 Mailing Address _____

 City _____ State or Province _____
 ZIP or Postal Code _____ Country _____
 Is this a change of address? Yes No
 Home or Work
 E-mail _____
 Daytime Phone _____
 Fax _____

CHECK MEMBER AFFILIATION(S) (to qualify for member registration discount)

- (a) GSA (b) AAPG (c) AASG (d) AASP (e) AEG
 (f) AESE (g) AGID (h) AGA (i) AIPG (j) AMQUA
 (k) ARMA (l) AWG (m) CF (n) CUR (o) EEGS
 (p) GAC (q) GS (r) GS Aus (s) GSIS (t) GSL
 (u) GSSA (v) HESS (w) IAH (x) KWI (y) MSA
 (z) NABGG (aa) NAGT (bb) NESTA (cc) NGWA (dd) PRI
 (ee) PS (ff) SEG (gg) SGE (hh) SEPM (ii) SSSA
 (jj) SVP


REGISTRATION FEES

	EARLY BIRD (BY 7/13)	STANDARD (7/14–9/30)	LATE/ONSITE (AFTER 9/30)	QTY.	USDS AMT.
(10) Professional Member*—full meeting	\$275	\$295	\$375	1	\$
(11) Professional Member*—1 day	\$190	\$190	\$200	1	\$
(12) Professional Member (70+)—full meeting	\$220	\$240	\$315	1	\$
(13) Professional Member (70+)—1 day	\$135	\$135	\$145	1	\$
(14) Professional Nonmember—full meeting	\$350	\$375	\$465	1	\$
(15) Professional Nonmember—1 day	\$215	\$215	\$225	1	\$
(30) Student Member*—full meeting	\$60	\$90	\$120	1	\$
(31) Student Member*—1 day	\$60	\$60	\$60	1	\$
(32) Student Nonmember—full meeting	\$80	\$120	\$150	1	\$
(33) Student Nonmember—1 day	\$75	\$75	\$75	1	\$
(60) K–12 Professional—full meeting	\$35	\$40	\$40	1	\$
(62) K–12 Workshop-Only Fee—Member**	\$0	\$0	\$0	1	\$
(63) K–12 Workshop-Only Fee—Nonmember**	\$40	\$40	\$40	1	\$
(95) Field Trip or Short Course Only	\$40	\$40	\$40	1	\$
(90) Guest or Spouse***	\$70	\$80	\$80	1	\$

REGISTRATION FEES SUBTOTAL \$

*Member Fee applies to any current Professional or Student Member of GSA or Associated Societies listed above. Discount does not apply to guest registrants.
 **K–12 Workshop-Only fee gives you access to the K–16 Workshops you register for. It does not allow access to the full meeting or technical sessions.
 ***Guest or Spouse registration fee does NOT allow access to technical sessions.

BADGE INFORMATION

First Name _____
 Nickname _____
 School/Company _____
 City _____ State/Prov. _____
 Spouse/Guest First Name/Nickname _____
 Last Name _____
 City _____ State/Prov. _____
 Do you or your guest require any special considerations? Yes No
 Will you be working in the Exhibit Hall? Yes No

Yes, I would like to contribute to the GSA Student Travel Fund

\$10 \$25 \$50 \$75 \$100 Other \$ _____
 (May be tax deductible, consult tax advisor).

SUBTOTAL (P. 1) \$

SUBTOTAL (P. 2) \$

TOTAL OF ALL FEES REMITTED \$

A \$30 processing fee will be charged for cancellation of a full or one day professional registration received in writing prior to October 7. No refunds will be given after the cancellation deadline of October 7 for all registration types.

Photographs will be taken at the 2004 GSA Annual Meeting and Exposition. By registering for this meeting, you agree to allow GSA to use photographs that may include shots of you in any GSA-related publications, marketing and promotional materials, or Web site.

FAX TO: 303-357-1071 or 303-357-1072
MAIL TO: 2004 GSA ANNUAL MEETING
 P.O. Box 9140, Boulder, CO 80301-9140
REGISTER ONLINE AT: WWW.GEOSOCIETY.ORG

Remit in U.S. funds payable to:
2004 GSA ANNUAL MEETING

(All preregistrations must be prepaid. Purchase orders not accepted.)

PAYMENT BY (CHECK ONE): Check (No.)

American Express Visa MasterCard Discover

Card Number _____

Expiration Date _____

Signature _____
 (name as appears on card)

Registration confirmations will be sent via one of the following methods:

- ① Email (if valid email address is provided) or ② Fax, or ③ Mail

REGISTER ONLINE AT WWW.GEOSOCIETY.ORG.

QTY. USD\$ AMT.

GUEST PROGRAM (P. 10)

		QTY.	USD\$ AMT.		
1. Beautiful Breckenridge, Sun.	(101)	\$40			\$
2. Highlights of Boulder, Sun.	(102)	\$26			\$
3. Rocky Mountain High Tour, Mon.	(103A)	\$48			\$
RMH Tour with lunch included	(103B)	\$58			\$
4. Castle in the Sky, Mon.	(104)	\$40			\$
5. Western Grandeur, Tues.	(105)	\$67			\$
6. Pure Gold, Tues.	(106)	\$37			\$
7. Butterfly Pavilion, Wed.	(107)	\$35			\$

SPECIAL EVENTS & TICKETED FUNCTIONS (P. 6 and P. 23, or see Web site)

1. Geology & Public Policy Lunch, Sat.	(301)	\$33			\$
2. History of Geology Lunch, Sun.	(302)	\$33			\$
3. NAGT/GSA Geoscience Education Div. Lunch, Sun.(303)	(303)	\$33			\$
4. Hydrogeology Div. Lunch, Mon.	(304)	\$33			\$
5. Assoc. for Women Geoscientists Breakfast, Mon.					
Professional	(305A)	\$22			\$
Student	(305B)	\$10			\$
6. Campus Reps. Coffee Recept., Mon. (Add Qty.)	(306)				FREE
7. Paleontological Society Lunch, Mon.					
Professional	(307A)	\$33			\$
Student	(307B)	\$15			\$
8. GIS Lunch, Tues.	(308)	\$33			\$
9. Mineralogical Society of America Lunch, Tues.	(309)	\$33			\$
10. Mineralogical Soc. of Amer./Geochemical Soc. Recept., Tues.					
Professional	(310A)	\$10			\$
Student	(310B)	\$5			\$
11. Engineering Geology Div. Lunch, Tues.	(311)	\$33			\$
12. Planetary Art Exhibit, Tues.	(312)	\$2			\$

FIELD TRIPS (P. 11)

1. Navajo Sand Sea of Near-Equatorial Pangea	(401)	\$475			\$
2. Strike-Slip Tectonics & Thermochronology	(402)	\$255			\$
3. Geology of the Silver Cliff-Rosita Hills Mining District	(403)	\$185			\$
4. Hyperpynal Wave-Modified Turbidites	(404)	\$155			\$
5. Structural Implications of Underground Coal Mining	(405)	\$240			\$
6. A New K-T Boundary in the Denver Basin	(406)	\$105			\$
7. Buried Paleo-Indian Landscapes & Sites	(407)	\$85			\$
8. Colorado Front Range—Anatomy of a Laramide Uplift	(408)	\$100			\$
9. Continental Accretion, Colorado Style	(409)	\$90			\$
10. Eco-Geo-Hike Along the Dakota Hogback	(410)	\$45			\$
11. Geological Reconnaissance of Dinosaur Ridge	(411)	\$90			\$
12. Glenwood Springs, Colorado Coal Fire	(412)	\$105			\$
13. Overview of Laramide Structures of the Front Range	(413)	\$120			\$
14. Paleoclimate, Paleohydrology, Paleocology—Morrison Formation	(414)	\$105			\$
15. Paleontology & Volcanic Setting, Florissant Fossil Beds	(415)	\$125			\$
16. Stratigraphy & Paleobiology of Mammoth Sites	(416)	\$95			\$
17. Tour of USGS National Earthquake Information Center	(417)	\$25			\$
18. Upper Cambrian & Lower Ordovician Stratigraphy	(418)	\$325			\$
19. Stratigraphy of Groundwater Resources	(419)	\$110			\$
20. Cenozoic Geology & Fossils, Pawnee Buttes Area	(420)	\$85			\$

QTY. USD\$ AMT.

21. Consequences of Living with Geology	(421)	\$100			\$
22. Geological Reconnaissance of Dinosaur Ridge	(422)	\$90			\$
23. Laramide Horizontal Shortening in the Rockies	(423)	\$100			\$
24. Underground Tour of Henderson Molybdenum Mine	(424)	\$140			\$
25. Walking with Dinosaurs along Colorado's Front Range	(425)	\$85			\$

K-16 WORKSHOPS (P. 19)

1. Earthquakes—Workshop for College & University Faculty	(601)	\$20			\$
2. Earth Science Inquiry-Based Curriculum	(602)	\$10			\$
3. Internet in the Earth Science Classroom	(603)	\$60			\$
4. Geoscience Classroom to the Workforce	(604)	\$60			\$
5. Establish & Sustain an Undergraduate Research Program	(605)	\$30			\$
6. Conceptests to Improve Teaching in Large Classes	(606)	\$10			\$
7. Toward a Sustainable Future: Connect the Dots	(607)	\$25			\$
8. Implement Effective Science Writing Activities	(608)	\$25			\$
9. Online Geoscience Education	(609)	\$40			\$
10. Inquiry-Based Digital Lab Materials	(610)	\$25			\$
11. Creating an Online Learning Environment	(611)	\$25			\$

SHORT COURSES (P. 16)

1. Evaporates: A Practical Approach	(501)	\$365			\$
2. Intro to Geographic Information Systems (GIS)	(502)	\$240			\$
3. Multi-Temporal Stereo Aerial Photography	(503)	\$420			\$
4. Calibrated Peer Review Training	(504)	\$340			\$
5. Characterization & Toxicity Assessment	(505)	\$300			\$
6. Estimating Rates of Groundwater Recharge	(506)	\$270			\$
7. Hydrogeologic Field Methods	(507)	\$245			\$
8. Management & Leadership Skills for Academic Administrators	(508)	\$265			\$
9. Practical Geoscience Ethics: Elements & Examples	(509)	\$250			\$

OTHER WORKSHOPS (P. 18)

1. Media Relations Workshop					
Professional	(650A)	\$40			\$
Student	(650B)	\$15			\$
2. Give Effective Presentations					
Professional	(651A)	\$40			\$
Student	(651B)	\$15			\$
3. Media Relations AND Effective Presentations					
Professional	(652A)	\$65			\$
Student	(652B)	\$20			\$
4. Fund Your Science					
Professional	(653A)	\$40			\$
Student	(653B)	\$15			\$

ABSTRACTS WITH PROGRAMS VOLUME

1. Abstracts with Programs	(901A)	\$33			\$
AWP shipped within CO subject to 7.2% sales tax	(901B)	\$2.38			\$

AWP will be mailed out approximately 3 weeks prior to the meeting. Delivery prior to the start of the meeting is not guaranteed.

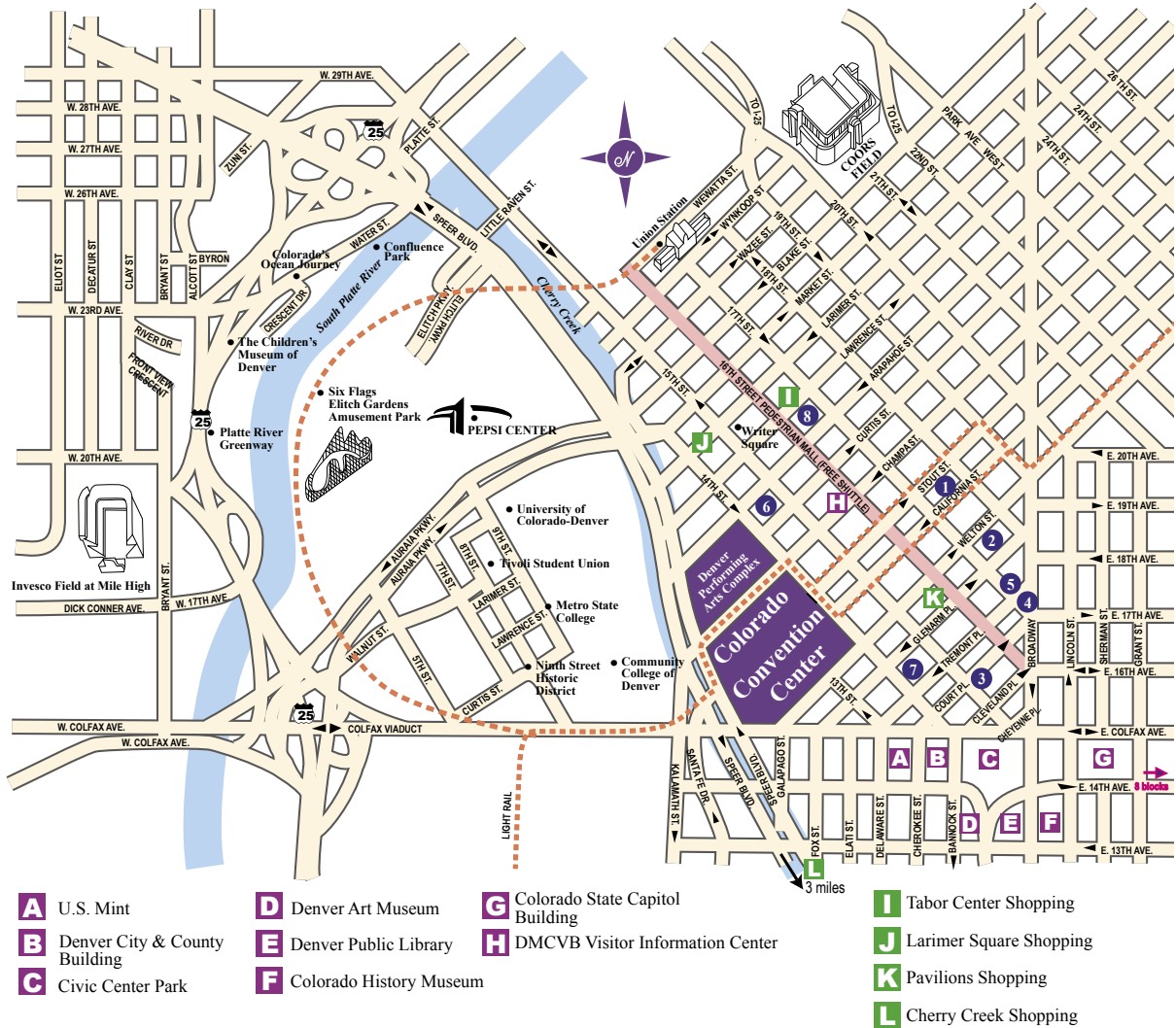
2. Abstracts with Programs* (to be picked up on-site)	(902)	\$35.38			\$
3. Abstracts on CD-ROM** (to be picked up on-site)	(903)	\$25.73			\$

* This price includes tax.

** Includes 2004 Section Meetings Abstracts and tax.

SUBTOTAL (P. 2) \$**REGISTER ONLINE AT WWW.GEOSOCIETY.ORG.**

DENVER HOTEL & STREET MAP



DENVER HOTELS	RATES (single/double)	NO. ON MAP	DISTANCE TO COLORADO CONVENTION CENTER
Marriott City Center (Co-Headquarters Hotel)	\$152/\$165	1	4 blocks
Hyatt Regency (Co-Headquarters Hotel)	\$150/\$162	2	4 blocks
Adam's Mark	\$142/\$142	3	4 blocks
Brown Palace	Standard \$160/\$160 Superior \$180/\$180	4 4	5 blocks 5 blocks
Comfort Inn Downtown	\$109/\$119	5	5 blocks
Executive Tower	\$105/\$105	6	3 blocks
Holiday Inn Downtown	\$115/\$125	7	1.5 blocks
Westin Tabor Center	\$157/\$157	8	5 blocks

For more information and to view the hotels, go to the online Hotel Reservation Form at www.geosociety.org.

HOTEL RESERVATION FORM

PLEASE PRINT OR TYPE THE FOLLOWING INFORMATION
TO ENSURE CORRECT AND TIMELY PROCESSING.

Arrival Date	Departure Date
Reservation for	Last Name
Share with	First Name
Share with	
SEND MY ACKNOWLEDGMENT BY (SELECT ONE) <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> Mail to	
Name	
E-mail	
Company	
Address	
City	State / Province Zip/Postal Code Country
Daytime Phone	Fax (include country code if International)

HOTEL PREFERENCE

(please write out hotel name)

1. _____

2. _____

3. _____

IF HOTEL CHOICES ARE UNAVAILABLE, WHICH IS MORE IMPORTANT?

Low Rate Location

TYPE OF ACCOMMODATIONS REQUESTED (Circle correct number)

Number of people 1 2 3 4

Number of beds 1 2

Request rollaway bed (not available in rooms w/2 beds)

Request wheelchair accessible room

Request non-smoking

LIST OTHER ACCOMMODATIONS NEEDED

All reservations require a one-night room and tax deposit. By sending in this form, you agree to the hotel charging your credit card for this deposit, or you will send a check directly to the HOTEL with a copy of your official housing acknowledgement. You also understand that if you do not send a deposit or provide a credit card, your reservation will be canceled. DO NOT SEND DEPOSIT CHECK TO THE HOUSING BUREAU.

INDICATE FORM OF PAYMENT

Visa MasterCard AMEX Discover Diners Club

by check made payable to hotel. (If paying by check, send check directly to hotel with a copy of your official housing acknowledgement. Do not send any checks to the Housing Bureau.)

Name (as appears on card) _____

Card Number _____ EXP. Date _____

Signature _____

All reservations must be processed through the Denver Housing Bureau. TELEPHONE RESERVATIONS WILL NOT BE ACCEPTED. The Housing Bureau will acknowledge reservations within 5-7 days of receipt of this form.

GSA Annual Meeting & Exposition

Nov. 7-10, 2004 Denver, Colorado

IF YOU ARE FAXING THIS FORM, DO NOT MAIL IN A DUPLICATE FORM. SUBMIT ONE ROOM REQUEST PER FORM. MAKE ADDITIONAL COPIES IF NEEDED. RESERVATIONS MUST BE RECEIVED BY THE DENVER HOUSING BUREAU BY Tuesday, October 5, 2004. Make all changes and cancellations online or contact the Housing Bureau by Friday, October 29, 2004. After Friday, October 29, 2004, you must call your assigned hotel directly. Cancellations made after Tuesday, October 5, 2004, will incur a charge of \$25.00 regardless of when the initial room request was received.

ONLINE:
www.geosociety.org

MAIL OR FAX TO:
GSA HOUSING BUREAU
1555 CALIFORNIA STREET,
SUITE 300
DENVER, CO 80202-4264
FAX: 303-571-9435

**CHANGES AND/OR
CANCELLATIONS ONLY:**

E-MAIL:
dmcvb-housing@dmcvb.org
(Be sure to refer to
the GSA Annual Meeting
when e-mailing.)
(303) 892-1112, ext. 601,
Mon.-Fri., 9 a.m.-4:45 p.m.
Mountain Time

**DO NOT CALL TO BOOK
YOUR RESERVATION.**

≈ TRAVEL & TRANSPORTATION ≈

Air Travel

Denver International Airport (DIA) is one of the largest airports in the world and is served by most major airlines. DIA is located 24 miles northeast of downtown Denver.

The following airlines have been contracted to provide convention rates to/from Denver for the GSA Annual Meeting & Exposition. You can save up to 15% on published airfares by booking through the group reservation desks at the numbers listed below. (Airport code—DEN)

Frontier Airlines

www.frontierairlines.com

For Web site only, use Ticket Designator #G878.

or 1-800-908-9069

For phone calls only, use Shell Number MC0878.

Frontier Airlines is offering a 10% discount on all round-trip tickets purchased for the GSA Annual Meeting. Discount is applicable for travel from Oct. 31, 2004, through Nov. 14, 2004, only. Go to www.frontierairlines.com, fill in your dates of travel, and enter the code G878 in the "ticket designator" box. If you would prefer to book with one of Frontier's reservations agents, or if you experience difficulty in making your online reservation, call 1-800-908-9069 and give the reservations agent the code MC0878.

United Airlines

1-800-521-4041

Meeting ID #: 530GJ

United is offering a 10% discount off the unrestricted, fully refundable coach fare or 5% discount off the lowest applicable fares, including first class, to all attendees of the GSA Annual Meeting. An additional 5% discount will apply when tickets are purchased at least 30 days in advance of the attendee's travel. This special offer applies to travel on

domestic segments of all United Airlines and United Express flights. United's convenient schedule and discounted fares are available through United's Meeting Desk or your travel agent. Call 1-800-521-4041 and reference Meeting ID number 530GJ. Dedicated reservationists are on duty seven days a week, 8 a.m.–10 p.m. EST.

TRANSPORTATION OPTIONS TO/FROM DENVER INTERNATIONAL AIRPORT

DIA Ground Transportation Information counters are located on the fifth level of the main terminal, near the baggage claim area. Airport car rental desks and commercial shuttle desks are also on the fifth level. Taxis can be found outside of baggage claim near the sidewalks. For more information, contact DIA's Ground Transportation Information Center at (303) 342-4059 or by e-mail at ground.transportation@diadenver.net.

Car Rental: See www.geosociety.org for information (click on "Meetings").

SHUTTLE SERVICE

SuperShuttle—(303) 370-1300, (800) BLUE-VAN (258-3826), (800) 525-3177, or online at www.supershuttle.com.

Shuttles operate daily from 4:30 a.m. until midnight, serving all downtown hotels to/from DIA for \$18 each way or \$28 round-trip (for a special round-trip rate for the GSA Meeting, please bring the coupon that will be printed in the October issue of GSA Today, or print it out from the GSA Meeting Web site). Travel time is 45 minutes to one hour depending on hotels and number of stops. To arrange passage, stop at the SuperShuttle counter on Level 5 at the airport, or order service from a hotel doorman. Shuttles will stop at the Convention Center with advance reservation (2 hour minimum notice).

Taxis

East Terminal, exit door 507, West Terminal, exit door 510

Freedom Cab (303) 292-8900—up to 4 people

Metro Taxi (303) 333-3333—up to 5 people

Yellow Cab (303) 777-7777—up to 5 people

Rates: DIA to downtown: flat rate of \$43.00 + \$2.50 gate fee

Wheelchair-Accessible Buses, Shuttles, Taxis, or Vans

All of RTD's SkyRide buses are wheelchair accessible. SuperShuttle, Yellow Taxi, and Metro Taxi have accessible vehicles and can provide assistance for limited numbers with prior notice and reservation. The following companies will pick-up with prior notice at DIA and provide specialized transportation:

Mobility Transportation and Service Inc.
(303) 295-3900

Mobile Access
(303) 274-9895

Wheelchair Getaways
(303) 674-1498
(Rental vans—\$89.00 per day)

Public Bus Transportation Services

Regional Transportation District (RTD), (303) 299-6000, (wheelchair accessible) buses are available outside Level 5, door 511, on the East Terminal. Route information is available at the RTD booth on Level 5. Downtown Denver is serviced by Route AF.

Route AF/Downtown Service: Buses leave DIA for downtown Denver at 50 minutes past the hour from 6:50 a.m. to 12:50 a.m. The route takes approximately 50 minutes and is \$8 each way or \$13 round-trip. Exact fare is required when boarding the bus. Round trip tickets must be purchased in advance at the RTD sales office on Level 5. Stops are made at Stapleton, the Downing Street Light Rail Station, the Denver Bus Center, and Market Street Station, which is two blocks from Union Station.

Buses leave from the downtown Market Street Station to DIA at 30 minutes past the hour from 5:28 a.m. until 10:28 a.m. for the same fare.

For complete RTD route information call (303) 299-6000 or visit them at www.rtd-denver.com.

TRANSPORTATION OPTIONS IN DENVER

GSA will NOT be providing shuttle service from the hotels to the Convention Center this year, but Denver does have the following inexpensive—or free—options for getting around downtown. Alternative arrangements to/from the GSA hotels and the Colorado Convention Center will be provided by GSA for the elderly or disabled. For more information, contact Tammy White, twhite@geosociety.org, (303) 357-1041.

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Light Rail

Denver's Light Rail runs from some downtown Denver hotels to the Colorado Convention Center, the suburbs, Invesco Field at Mile High, the Pepsi Center, and much more. Catch the "C Line" to LoDo or the "D Line" to the heart of Downtown Denver. You must have a validated ticket before you board the Light Rail. To purchase a ticket, use the stainless-steel ticket vending machines (TVMs) located at each station. For more information, call (303) 628-9000 or visit them at www.rtd-denver.com.

16th Street Pedestrian Mall Shuttle Bus

The 16th Street Mall is located between Market and Broadway Streets in the heart of downtown Denver, just two blocks from the Colorado Convention Center. This mall is a 14-block-long pedestrian promenade lined with shops, restaurants and cafes, trees, street performers, and cart vendors. The 2,000 chairs and benches set along the mall near fountains and flowers make it the perfect place to sit and watch Denver walk by. Traffic is banned from this street except for the shuttle buses. The 16th Street Mall Shuttle is a free service that runs in a continuous loop up and down the mall. The buses run every 1-2 minutes from 6 a.m.-10:30 p.m., then every half-hour until 12:55 a.m.

General Meeting Information

Accessibility for Registrants with Special Needs

GSA is committed to making the Annual Meeting accessible to all people interested in attending. If you need auxiliary aids or services because of a disability, check the appropriate box on the registration form. If you have suggestions or need further information, contact Kevin Ricker at kricker@geosociety.org, (303) 357-1090. Please let us know your needs by October 8.

Tourist Information

For general information about sightseeing, accommodations, restaurants, and shopping in Denver, visit www.denver.org, or see the GSA Meeting Web site, www.geosociety.org/meetings/2004/.

Weather and Climate

Denver is located just east of a high mountain barrier and a long distance from any moisture source. Denver has a mild, dry, and arid climate. The average temperature in November is 52 °F for a high and 25 °F for a low, with only .87 inches of precipitation for the month. Denver normally records over 300 days of sunshine a year.



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~ PARDEE KEYNOTE SYMPOSIA ~

(Invited Papers)

The Pardee Keynote Symposia are made possible by a grant from the Joseph T. Pardee Memorial Fund.

These Pardee keynote sessions are *special events* of broad interest to the geoscience community. They represent hot issue topics on the leading edge in a scientific discipline or area of public policy, address broad fundamental issues and are interdisciplinary. Selection was on a competitive basis. This year's eight Pardee Symposia were reviewed and accepted by the Annual Program Committee. (*All speakers are invited.*)

P1. Early Paleoproterozoic (2.5–2.0 Ga) Events and Rates: Bridging Field Studies and Models

Geochemical Society; Astrobiology Program; GSA Sedimentary Geology Division; SEPM—Society for Sedimentary Geology

Andrey Bekker, Geophysical Lab, Carnegie Institution of Washington, Washington, D.C.; Mark E. Barley, The University of Western Australia, Western Australia, Australia; Robert H. Rainbird, Geological Survey of Canada, Ottawa, Ontario. Mon., Nov. 8, 1:30–5:30 p.m.

Field-oriented and modeling studies dealing with the 2.5–2.0 Ga Earth's evolution are invited. Session will be focused on relationships between tectonics, change in atmospheric composition, and climatic changes as well as the rates of these changes.

P2. Geoinformatics and the Role of Cyberinfrastructure in Geosciences Research

Randy Keller, University of Texas, El Paso, Texas; Lee Allison, Kansas Geological Survey, Lawrence, Kans. Tues., Nov. 9, 8 a.m.–noon.

This session consists of presentations on geoinformatics and the use of advanced information technology in support of research in the geosciences. The talks will provide an overview of cyberinfrastructure that is emerging and describe projects that are developing as well as using this cyberinfrastructure.

P3. Geoscientific Aspects of Human and Ecosystem Vulnerability

U.S. National Committee for Geosciences; GSA Critical Issues Caucus; GSA Geology and Public Policy Committee; GSA Geology and Society Division

Susan W. Kieffer, University of Illinois, Urbana-Champaign, Ill.; Grant Heiken, Los Alamos National Lab, Los Alamos, N.Mex. Sun., Nov. 7, 1:30–5:30 p.m.

Humans and the ecosystems on which they depend are vulnerable to a variety of natural hazards and their mismanagements. This session will explore the response to, and need for, mitigation of large-scale hazards with long time scales.

P4. Medical Geology

GSA Engineering Geology Division

Syed E. Hasan, University of Missouri, Kansas City, Mo. Sun., Nov. 7, 8 a.m.–noon.

Many health problems, including cancer, heart and central nervous system diseases, etc., have links to geologic factors. Experts from geosciences, public policy, and health sciences will discuss new developments in the emerging field of medical geology.

P5. Adversity, Advantages, Opportunities: Phanerozoic Stromatolites as “Survivor” vs. “Disaster” Taxa

Paleontological Society; GSA Geobiology and Geomicrobiology Division

Constance M. Soja, Colgate University, Hamilton, N.Y.; Robert Riding, University of Cardiff, Cardiff, United Kingdom. Mon., Nov. 8, 8 a.m.–noon.

This interdisciplinary forum will reexamine the role of stromatolites in Phanerozoic ecosystems, particularly the importance of post-Cryptozoic microbial communities; the biotic and abiotic agents that contributed to their development, decline, and preservation; and their co-evolutionary history with metazoans.

P6. Pre-Mesozoic Impacts: Their Effect on Ocean Geochemistry, Magnetic Polarity, Climate Change, and Organic Evolution

GSA Planetary Geology Division; Paleontological Society; GSA Geobiology and Geomicrobiology Division

Charles A. Sandberg, U.S. Geological Survey, Denver, Colo.; Jared R. Morrow, University of Northern Colorado, Greeley, Colo.; Christian Koeberl, University of Vienna, Vienna, Austria. Tues., Nov. 9, 8 a.m.–noon.

Pre-Mesozoic comet and meteorite impacts produced extreme oceanic and climate changes, causing mass extinctions followed by rapid radiation of surviving organisms. Thus, they were the driving mechanism in the early evolution of life on Earth.

P7. Seeing Mars with New Eyes: Active Missions, Science Results, and Geoscience Education

GSA Planetary Geology Division; Geoscience Education Division

Eric B. Grosfils, Pomona College, Claremont, Calif.; Susan Sakimoto, NASA/GSFC, Greenbelt, Md. Wed., Nov. 10, 8 a.m.–noon.

In 2004, multiple spacecraft are exploring Mars simultaneously. This session will present some of the most recent and exciting science results and demonstrate how the available data can be used to enhance geoscience education activities.

P8. Weathering, Slopes, Climate, and Late-Quaternary Geomorphic Change in Arid and Semi-Arid Landscapes

GSA Quaternary Geology and Geomorphology Division

Leslie D. McFadden, University of New Mexico, Albuquerque, N.Mex.; Grant A. Meyer, University of New Mexico, Albuquerque, N.Mex.; Peter J. Fawcett, University of New Mexico, Albuquerque, N.Mex. Tues., Nov. 9, 1:30–5:30 p.m.

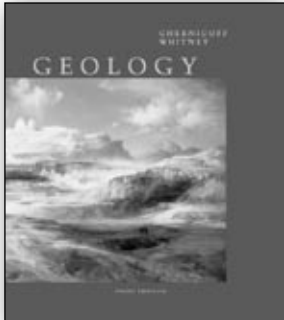
Dryland slopes are climatically sensitive because large changes in vegetation and weathering can result from modest changes in moisture. This session explores effects of late Quaternary and potential future climates on slope processes and forms.

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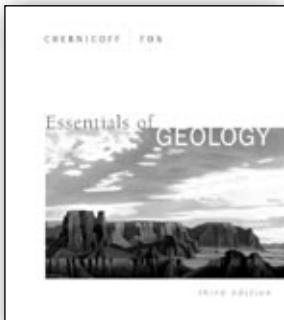
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To effectively introduce core concepts, this first-year survey text shifts the focus from learning terminology to understanding — and observing —

the range of earth's geologic processes. The Third Edition retains popular features from the past, while integrating: a significantly revised art program; flow charts, photos, and figures that present difficult concepts visually; and technology resources to support classroom management.



Essentials of Geology, 3/e

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Text & Technology Package: 0-618-44988-5

Essentials of Geology extracts the most important principles from the comprehensive *Geology* text to provide a condensed look at the subject.



Earth: Geologic Principles and History

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Earth provides more coverage of geologic history for freshman-level courses. The text combines the first 18 chapters from *Essentials of Geology* with 8 additional chapters that explore the four

major periods of earth's evolution: the Precambrian, the Paleozoic, the Mesozoic, and the Cenozoic eras.



An Introduction to Physical Science, 10/e

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0-618-22319-3

This text presents a survey of the physical sciences — physics, chemistry, astronomy, meteorology, and geology — for non-science majors. Topics are treated both descriptively and quantitatively, providing flexibility for instructors who wish to emphasize a highly descriptive approach, a highly quantitative approach, or anything in between.



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TOPICAL & DISCIPLINE SESSIONS

(Invited and Volunteered Papers)

Topical Sessions

Below is a listing of all approved topical sessions. These sessions are topically focused with a mix of invited and volunteered papers. Session descriptions can be found on the Web at www.geosociety.org/meetings/2004/techprog.htm. Sessions are designed to promote the exchange of interdisciplinary, state-of-the-art information. Papers can be submitted to a specific topical session, and you may choose up to three scientific categories. After each topical description below, the categories are identified as they appear on the abstract form. PLEASE SUBMIT ONLY IN THE MODE (oral or poster) AND CATEGORIES INDICATED in the description. An abstract submitted in the incorrect mode will be transferred automatically to a discipline session.

Abstracts Deadline: July 13

Please use the online electronic abstract form found on the GSA Web site, www.geosociety.org. An abstract submission fee will be charged. The fee is \$18 for all students; \$30 for all others. If you cannot submit your abstract electronically, contact Nancy Carlson, (303) 357-1061, ncarlson@geosociety.org.

Discipline Sessions

From the list found on the electronic abstract form, you may choose up to three discipline categories you feel your abstract would fit best. Joint Technical Program Committee representatives organize the papers in sessions focused on disciplines (e.g., environmental geoscience or mineralogy).

T1. The Future of Hydrogeology

GSA Hydrogeology Division; International Association of Hydrogeologists/U.S. National Chapter; National Ground Water Association
Hydrogeology

Clifford I. Voss, U.S. Geological Survey, Reston, Va. ORAL

T2. Upcoming Revolutions in Observing Systems: Implications for Hydrogeology

GSA Hydrogeology Division

Hydrogeology; Geochemistry, Aqueous; Environmental Geoscience

John L. Wilson, New Mexico Institute of Mining and Technology, Socorro, N.Mex.; Richard P. Hooper, Consortium of Universities for the Advancement of Hydrologic Science, Inc., Washington, D.C. ORAL

T3. History of Hydrogeology in the United States: Celebrating the Contributions of O.E. Meinzer, Stan Lohman, and John Ferris

GSA Hydrogeology Division; International Association of Hydrogeologists/U.S. National Chapter

Hydrogeology; History of Geology; Geoscience Education

John Ezra Moore, Consultant, Denver, Colo.; Philip LaMoreaux, Tuscaloosa, Ala. ORAL

T4. Over 40 Years of Influence in Environmental Hydrogeology: In Honor of Dick Parizek

GSA Hydrogeology Division

Hydrogeology; Environmental Geoscience; Engineering Geology

Ward E. Sanford, U.S. Geological Survey, Reston, Va.; E. Scott Bair, Ohio State University, Columbus, Ohio. ORAL

T5. Groundwater Depletion and Overexploitation in the Denver Basin Bedrock Aquifers

GSA Hydrogeology Division; International Association of Hydrogeologists/U.S. National Chapter; GSA Geology and Public Policy Committee

Hydrogeology; Engineering Geology; Geoscience Information/Communication

Peter Barkmann, Colorado Geological Survey, Denver, Colo.; John Ezra Moore, Consultant, Denver, Colo. ORAL

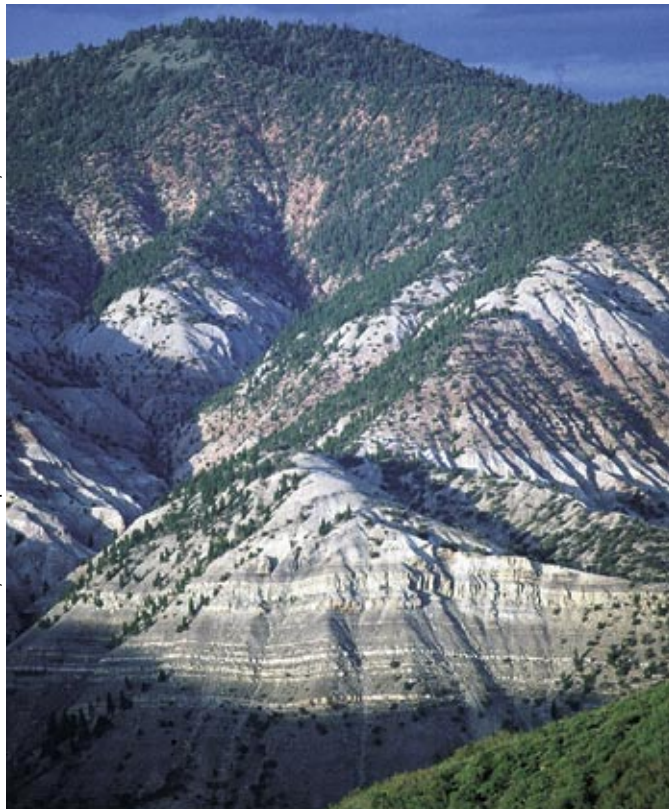
T6. Hydrologic Impacts of Urbanization and Suburbanization on Water Resources

GSA Hydrogeology Division; GSA Engineering Geology Division

Hydrogeology; Environmental Geoscience; Engineering Geology

Anne E. Carey, The Ohio State University, Columbus, Ohio; W. Berry Lyons, The Ohio State University, Columbus, Ohio; John E. McCray, University of Texas, Austin, Texas; John M. Sharp, University of Texas, Austin, Texas. ORAL

Late Paleozoic sedimentary rocks exposed near Colorado River. Photo by John Karachewski.



Topical & Discipline Sessions continued on page 41

BOOKSTORE UPDATED 2004



★ Coming Attractions ★

GSA Memoir

Proterozoic Tectonic Evolution of the Grenville Orogen in North America

edited by Richard P. Tollo, Louise Corriveau, James McLelland, and Mervin J. Bartholomew, 2004

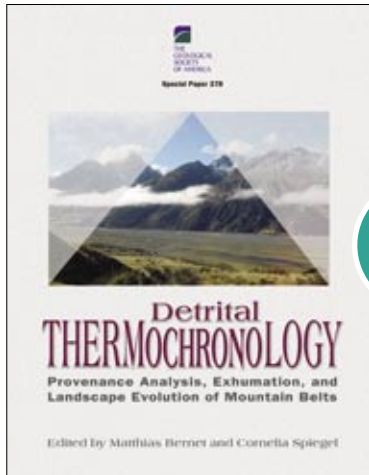
The geological evolution of the Grenville orogenic belt represents one of the most widespread episodes of crustal modification in Earth's history. The 39 papers in this volume offer a system-wide perspective on rocks and processes of the Mesoproterozoic Grenville orogen and Appalachian inliers and include many multidisciplinary studies presenting results from integrated petrologic, geochemical, and geochronologic investigations. The volume includes contributions concerning the Grenvillian geology of Canada, the United States, and Mexico, focusing on both the tectonic evolution of the orogen and on innovative approaches to deciphering the igneous, metamorphic, structural, and metallogenic history of Mesoproterozoic assembly and Neoproterozoic rifting. The timing and regional correlation of events and processes is emphasized in order to bridge knowledge gaps within the orogen and to better understand the geodynamic framework.

MWR197, 798 p., plus index, ISBN 0-8137-1197-5, \$195.00, member price \$156.00



COMING SOON!

GSA Special Papers



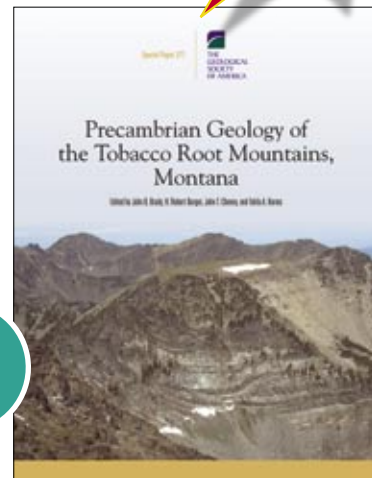
NEW!

Detrital Thermochronology—Provenance Analysis, Exhumation, and Landscape Evolution of Mountain Belts

edited by Matthias Bernet and Cornelia Spiegel, 2004

Detrital thermochronology is one of the fastest-growing disciplines in geosciences today because it provides valuable insights into the long-term evolution of mountain belts and the interplay of tectonics and climate in orogenic systems. The ability to determine cooling or crystallization ages of detrital apatite, zircon, or white mica from synorogenic sediments using a variety of techniques such as fission-track, Ar-Ar, or U-Pb dating enables us to determine potential sediment source areas, reconstruct the thermal history of an orogen, calculate exhumation rates, and detect changes in topography and drainage divides. The different dating techniques can easily be combined on the same samples or with other analytical methods to obtain the maximum amount of information. This book discusses some of the fundamental aspects of detrital thermochronology and presents applications in different orogenic settings that highlight the value of this current development.

SPE378, 126 p., ISBN 0-8137-2378-7, \$55.00, member price \$44.00



Precambrian Geology of the Tobacco Root Mountains, Montana

edited by John B. Brady, H. Robert Burger, John T. Cheney, and Tekla A. Harms, 2004

The Tobacco Root Mountains occupy a unique niche in the Archean Wyoming province of North America. Located near the northwestern margin of the province, the Precambrian rocks of the Tobacco Root Mountains were subjected to an intense tectonothermal event (Big Sky Orogeny) during the collision of the Wyoming and Hearne provinces in the Early Proterozoic. This event overprinted earlier periods of deformation and metamorphism, but the unique lithologic packages present in the Tobacco Root Mountains aid in unraveling early from later events and in detailing many results stemming from this Early Proterozoic collision. Several papers in this volume review the geochemistry and petrology of the four major Precambrian rock sequences present in the Tobacco Root Mountains, focusing on what each rock suite represents in terms of original protolith and providing the foundation for understanding the extensive petrological and geochronological information that follows. Another paper considers the meta-ultramafic rocks that are dispersed throughout all Precambrian exposures in the Tobacco Root Mountains. Petrologic observations from all four rock suites are interpreted in terms of a metamorphic history and a pressure-temperature path for the Tobacco Root Mountains during the Proterozoic event. Numerous and extensive radiometric age determinations from all four major rock suites are presented in subsequent papers. Taken together, the papers provide a solid base for understanding the timing of the tectonothermal events that affected these rock suites and for separating the effects of the last major event in the Early Proterozoic. Finally, two papers examine the structures and fabrics present in the Precambrian rocks and synthesize observed field relations, structures and fabrics with age determinations and metamorphic history into a sequence of events by which the rocks of the Tobacco Root Mountains evolved, placing Tobacco Root geology into the context of the northern Wyoming province.

SPE377, 256 p., plate, ISBN 0-8137-2377-9, \$100.00, member price \$80.00

Arriving This Summer:

Special Paper 379

Sulfur Biogeochemistry—Past and Present

Edited by Jan P. Amend, Katrina J. Edwards, and Timothy W. Lyons

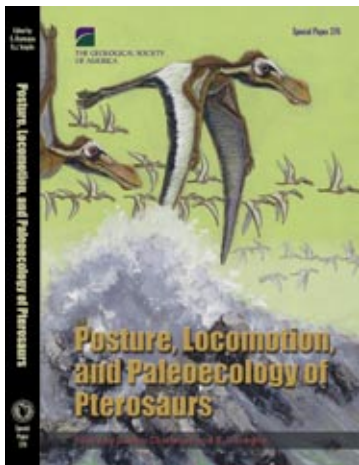
ISBN 0-8137-2379-5, in prep.

Special Paper 380

Gneiss Domes in Orogeny

Edited by Donna L. Whitney, Christian Teyssier, and Christine S. Siddoway

ISBN 0-8137-2380-9, in prep.



Posture, Locomotion, and Paleoecology of Pterosaurs

by Sankar Chatterjee and R.J. Templin, 2004

SPE376, 64 p., ISBN 0-8137-2376-0
\$50.00, member price \$40.00

Natural Hazards in El Salvador

edited by William I. Rose, Julian J. Bommer, Dina L. López, Michael J. Carr, and Jon J. Major, 2004

SPE375, 480 p. plus index, ISBN 0-8137-2375-2
\$100.00, member price \$80.00

Tectonic Evolution of Northwestern México and the Southwestern USA

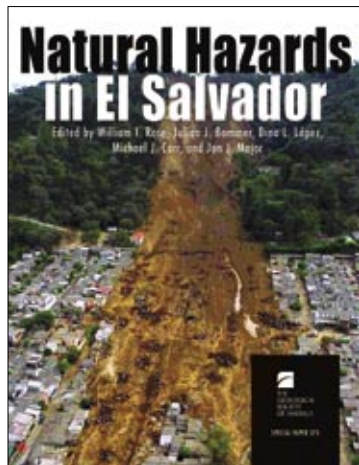
edited by Scott E. Johnson, Scott R. Paterson, John M. Fletcher, Gary H. Girty, David L. Kimbrough, and Arturo Martín-Barajas, 2003

SPE374, 455 p. plus index, CD-ROM, ISBN 0-8137-2374-4
\$95.00, member price \$76.00

Ophiolite Concept and the Evolution of Geological Thought

edited by Yildirim Dilek and Sally Newcomb, 2003

SPE373, 470 p. plus index, plate, ISBN 0-8137-2373-6
\$90.00, member price \$72.00



RECENTLY
PUBLISHED BOOKS

GSA Special Papers

Evolution and Dynamics of the Australian Plate

edited by R.R. Hillis and R.D. Müller, 2003

SPE372, 430 p. plus index, ISBN 0-8137-2372-8
\$90.00, member price \$72.00

This volume co-published simultaneously with the Geological Society of Australia as Special Publication No. 22.

Geology of a Transpressional Orogen Developed During Ridge-trench Interaction Along the North Pacific Margin

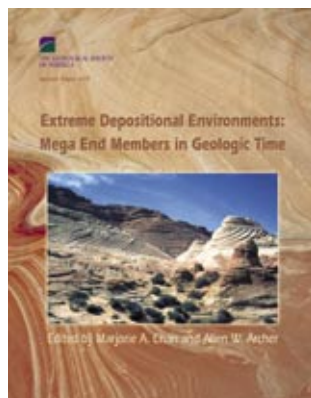
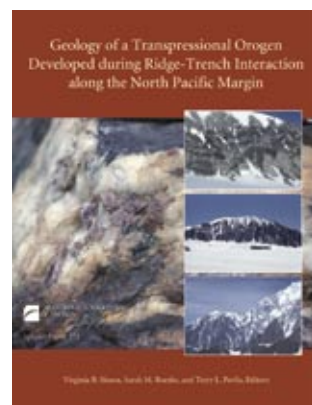
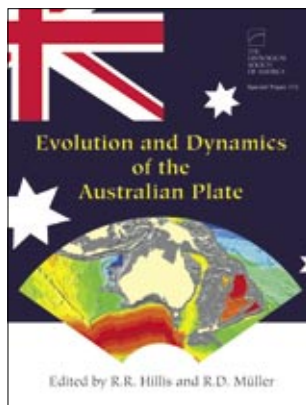
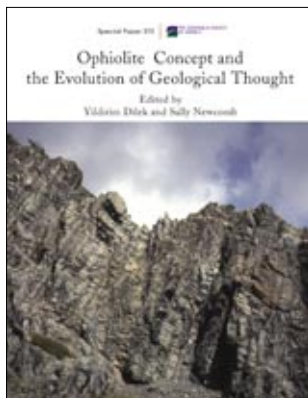
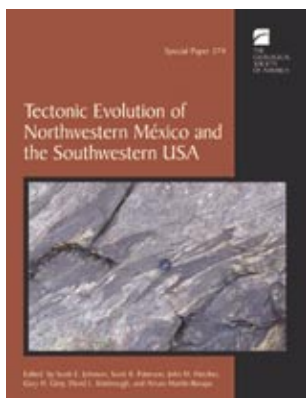
edited by Virginia B. Sisson, Sarah M. Roeske, and Terry L. Pavlis, 2003

SPE371, 353 p. plus index, CD-ROM, ISBN 0-8137-2371-X
\$90.00, member price \$72.00

Extreme Depositional Environments: Mega End Members in Geologic Time

edited by Marjorie A. Chan and Allen W. Archer, 2003

SPE370, 264 p. plus index, ISBN 0-8137-2370-1
\$80.00, member price \$64.00



GSA Memoir

The Large-Wavelength Deformations of the Lithosphere: Materials for a History of the Evolution of Thought from the Earliest Times to Plate Tectonics
by A.M.C. Şengör

MWR196, 333 p. plus index, plates,
ISBN 0-8137-1196-7
\$100.00, member price \$80.00

GSA Field Guides

Western Cordillera and Adjacent Areas

edited by Terry W. Swanson, 2003

FLD004, 284 p., ISBN 0-8137-0004-3, softcover \$45.00 (sorry, no additional discounts)



INQUA 2003 Field Guide Volume: Quaternary Geology of the United States

edited by Don J. Easterbrook, 2003

FLDINQ01, 438 p., softcover ISBN 0-945920-50-4 \$45.00 (sorry, no additional discounts)



Geologic Field Trips, Western Montana and Adjacent Areas

edited by Sheila Roberts and Don Winston, 2000

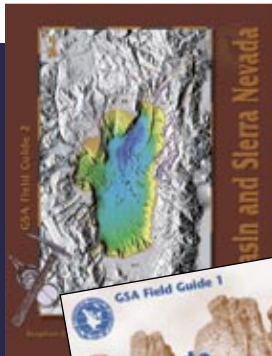
FLDSEC01, 233 p., softcover \$25.00, member price \$20.00



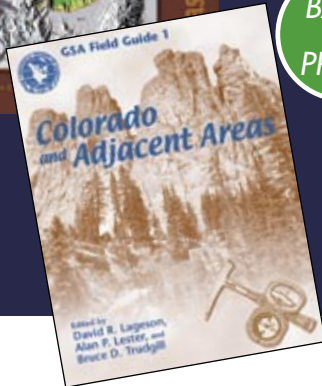
Great Basin and Sierra Nevada

edited by David R. Lageson, co-editors Stephen G. Peters and Mary M. Lahren, 2000

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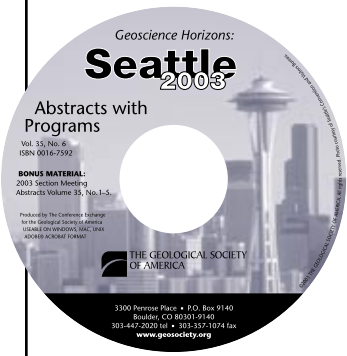
edited by David R. Lageson, co-editors Alan P. Lester and Bruce D. Trudgill, 1999

FLD001, 201 p., ISBN 0-8137-0001-9, softcover \$35.00, member price \$28.00

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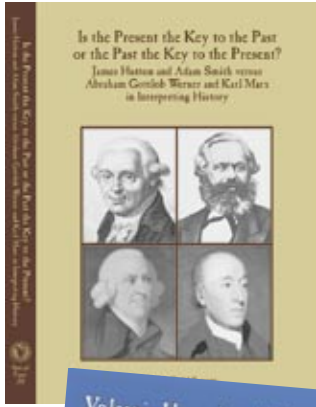


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Is the Present the Key to the Past or the Past the Key to the Present? James Hutton and Adam Smith versus Abraham Gottlob Werner and Karl Marx in Interpreting History

by A.M.C. Şengör, 2001
SPE355, 51 p., ISBN 0-8137-2355-8
\$36.00, member price \$28.00

Volcanic Hazards and Disasters in Human Antiquity
edited by Floyd W. McCoy and Grant Heiken, 2000

SPE345, 99 p., ISBN 0-8137-2345-0
\$35.00, member price \$28.00

Structural Geology of the Colorado Plateau Region of Southern Utah, with Special Emphasis on Deformation Bands
by George H. Davis, 1999

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edited by E.M. Moores, D. Sloan, D.L. Stout, 1999

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Glacial Processes Past and Present
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Tectonosomes and Olistostromes in the Argille Scagliose of the Northern Apennines, Italy
by G.A. Pini, 1999

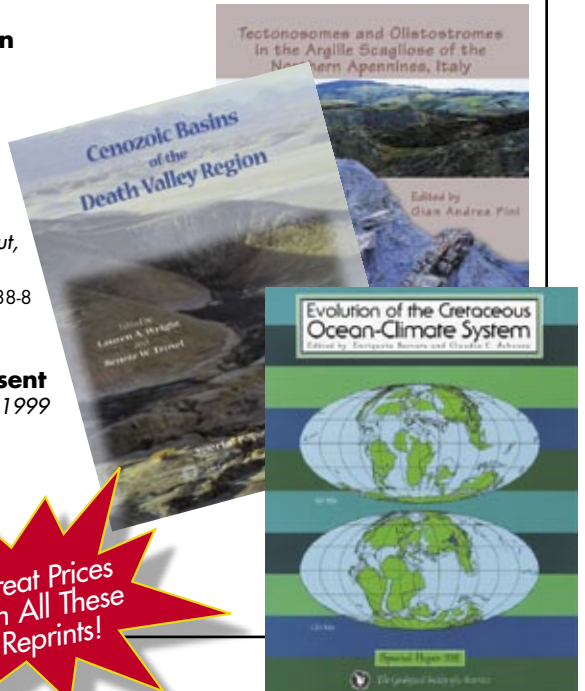
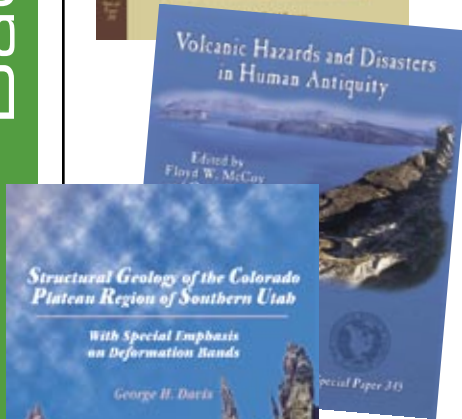
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edited by L.A. Wright and B.W. Troxel, 1999
SPE333, 376 p., plus index, ISBN 0-8137-2333-7
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SPE332, 436 p., plus index, ISBN 0-8137-2332-9
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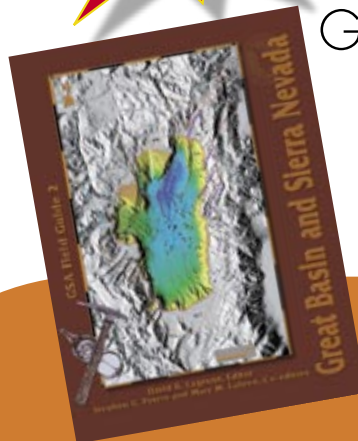


Pre-Mesozoic Ice Ages: Their Bearing on Understanding the Climate System
by J.C. Crowell, 2000

MWR192, 106 p., ISBN 0-8137-1192-4
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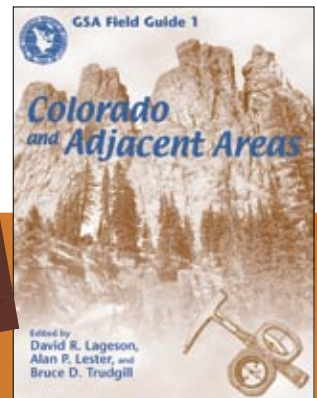
GSA Memoir



Great Basin and Sierra Nevada
edited by David R. Lageson, co-editors Stephen G. Peters, and Mary M. Lahren, 2000

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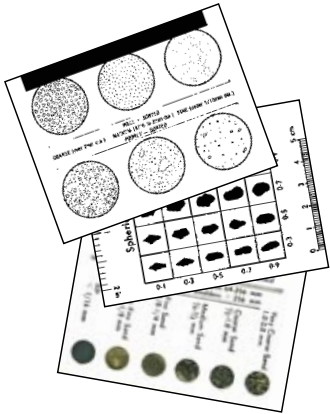
GSA Field Guides



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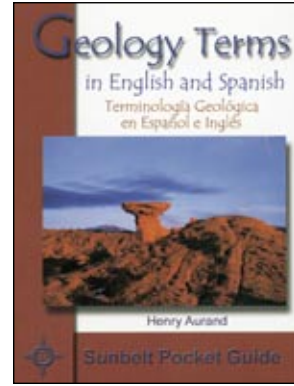
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by Henry Aurand, 2000

A Sunbelt Pocket Guide, published by Sunbelt Publications.
OPB010, 118 p., softcover, perfect bound, 3 5/8" x 5" format, ISBN 9-932653-29-4 \$7.95 (sorry, no discounts)



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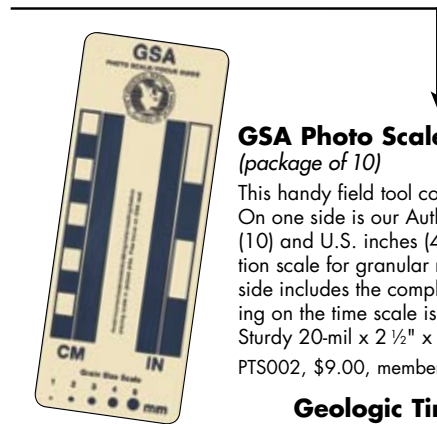
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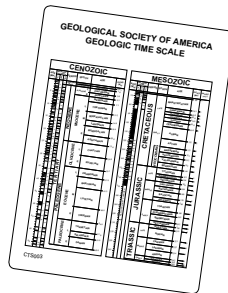


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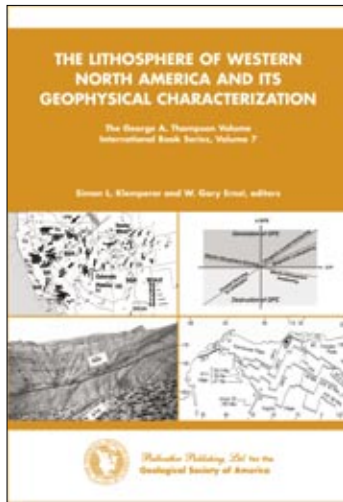
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International Stratigraphic Guide: A Guide to Stratigraphic Classification, Terminology, and Procedure
edited by A. Salvador, 1994

Co-published by GSA and the International Union of Geological Sciences (IUGS)

This revised, second edition updates and expands the discussions, suggestions, and recommendations of the first edition, expansions necessitated by the growth and progress of stratigraphic ideas and the development of new stratigraphic procedures since release of the first edition. A valuable tool for every earth scientist writing for an international audience.

IUG001, 220 p., ISBN 0-8137-7401-2, hardcover, 6" x 9" format, indexed \$24.00, member price \$19.20



**The George A. Thompson Volume:
The Lithosphere of Western
North America and Its
Geophysical Characterization**

edited by Simon L. Klemperer and
W.G. Ernst, 2003

The George Thompson Volume presents an up-to-date overview of the geologic architecture of western North America, from the San Andreas fault to the Colorado Plateau, utilizing techniques as diverse as shear-wave splitting, numerical modeling, Re/Os systematics, and synthesis of field mapping. Scientific contributions highlight new developments in some of the many fields to which George Thompson has contributed over a long career, including the strength and stress state of the crust, the formation of basins and temporal evolution of deformation, and crustal roots and the evolution of lithospheric composition and structure. Twenty-five papers with an international authorship, originally presented at a December 2001 symposium, are grouped in six sections: "Continental Deformation"; "Fault Mechanics and the San Andreas Fault"; "Geology of the Western United States"; "Isostasy and Gravity Methods"; "The Mantle: Flow and Seismic Structure"; and "The Mantle: Geochemistry." Earth scientists concerned with the geologic development of the western conterminous United States need to read this book!

IBS007, 544 p., ISBN 0-9665869-6-4
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**Frontiers in Geochemistry:
Konrad Krauskopf Volume 1
(Global Inorganic Geochemistry)
and Volume 2 (Organic, Solution,
and Ore Deposit Geochemistry)**
edited by W.G. Ernst

The technical papers resulting from a symposium entitled "Frontiers in Geochemistry," held at Stanford University in honor of Professor Konrad B. Krauskopf, were published in separate installments in *International Geology Review* and are collected here in an attempt to recognize Krauskopf's lifetime of extraordinary achievement in both geology and geochemistry. Krauskopf has published a diverse set of international-quality investigations broadly arching across the fields of hard-rock geology, petrology, geochemistry, and mineral deposits. Detailed studies include

illuminating the parageneses of granitoids and basement terranes in the Pacific Northwest, the volcanic eruptions of Parícutin in the Transmexican volcanic belt, and the regional petrologic evolution of coastal Norway. He has generated both mineral deposit and general geologic maps for the California Division of Mines and the U.S. Geological Survey, chiefly in the Sierra Nevada and the White-Inyo ranges of eastern California. He pioneered books applying the principles of physics and chemistry to Earth and provided geoscientists with discipline-defining texts in geochemistry and physical geology over five decades. Special emphases have included elucidation of aqueous solution-metal complex equilibria as well as thermodynamic applications to solid-melt-fluid partitioning. Few geochemists have contributed to the earth sciences in such far-ranging ways as geologist, geochemist, and science and technology advisor to the nation. This two-volume set is an insufficient tribute to the legendary scientific accomplishments of Krauskopf, but it's a start!

Volume 1: IBS005, 324 p., ISBN 09665869-4-8
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Volume 2: IBS006, 265 p., ISBN 09665869-5-6
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**Ultra-High Pressure
Metamorphism and Geodynamics
in Collision-Type Orogenic Belts**
co-edited by W.G. Ernst, and J.G. Liou

Collisional belts that retain the effects of Phanerozoic ultra-high pressure (UHP) metamorphism are increasingly being recognized, especially in Eurasia. Neighboring regions generally lack evidence of coeval arc volcanism or plutonism. Following the consumption of intervening oceanic lithosphere, each UHP orogen marks the site of astonishingly deep subduction of a microcontinental promontory or island-arc fragments. Mafic and ultramafic rocks are volumetrically minor in such belts. Maximum recorded pressures in UHP complexes approach or even exceed 2.8 GPa at temperatures of 600–900 °C. Subduction zones involve low-T prograde trajectories, and constitute the only plate-tectonic environment where such conditions exist. Internal portions of descending lithospheric plates may be characterized by yet lower geothermal gradients, but the crustal upper margins are typified by less extreme high-P, low-T paths of 5–10 °C/km. Mineral parageneses, physical conditions of recrystallization, and the tectonics of subduction and exhumation are thoroughly documented in this volume. Extensional collapse and erosion of rising silicic masses evidently aid in the continued ascent of deeply subducted but buoyant material. Surviving UHP terranes consist of relatively thin slabs of continental crust. Slices evidently rose to midcrustal levels rapidly at remarkably high exhumation rates—approaching or exceeding 10 mm/yr. Back reaction attending decompression in all cases was nearly complete; where UHP relics have persisted, retrogression evidently was limited by declining temperatures, coarse grain size of host minerals, and relative impermeability of the rocks to catalytic aqueous fluids.

Clearly, UHP terranes provide important new constraints on the origin and tectonic evolution of collisional mountain belts.

IBS004, 304 p., ISBN 0-9665869-3-X
\$50.00, member price \$40.00

**Tectonic Studies of Asia and
the Pacific Rim: A Tribute to
Benjamin M. Page (1911–1997)**

co-edited by W.G. Ernst and R.G. Coleman

The late Benjamin M. Page, professor of geology of Stanford University, was a geologic mapper, regional geologist, and plate tectonician par excellence. His many research areas included western Nevada, the Apennines, southern Taiwan, and southwestern Japan, but Page's most notable and extensive works involve elucidation of the geology of the California coast ranges. Page devoted a lifetime to unraveling the geologic architecture and plate-tectonic evolution of this continental-margin mountain belt. Indeed, nearly half of the papers in this volume, including a posthumous contribution by Page, involve the tectonic history of the central California coast ranges. Topics of special concentration include the origin, evolution, and geologic occurrence of ophiolites, accretionary mélanges, continental-margin structural and/or geophysical transects, transform faults, and convergent-margin mountain belts. In 1993, the Geological Society of America recognized Page's numerous seminal scientific papers with the Career Award in Structural Geology and Tectonics.

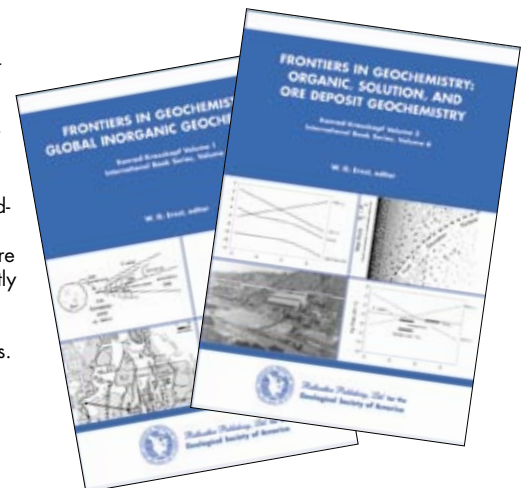
IBS003, 336 p., ISBN 0-9665869-2-1
\$50.00, member price \$40.00

**Planetary Petrology and
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The Lawrence A. Taylor 60th Birthday Volume
co-edited by G.A. Snyder, C.R. Neal,
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IBS002, 277 p., ISBN 0-9665869-1-3
\$50.00, member price \$40.00





Porifera (Revised), Vol. 3

edited by Roger L. Kaesler, coordinating author, J. Keith Rigby, with authors R.M. Finks, R.E.H. Reid, and J. Keith Rigby, 2004

Third volume in the revision of the Porifera. Included in the volume are systematic descriptions for the classes Demospongiae, Hexactinellida, Heteractinida, and Calcarea, followed by a stratigraphic range chart to the subgenus level, comprehensive reference list, and index.

TREEV3R, xxxi + 872 p., ISBN 0-8137-3131-3
\$175.00, member price \$140.00

Porifera (Revised), Vol. 2

edited by Roger L. Kaesler; coordinating author, J. Keith Rigby, with authors R.E.H. Reid, R.M. Finks, and J. Keith Rigby, 2003

Second volume in the revision of the Porifera. Entirely devoted to introductory material, with chapters on general features of the Porifera; morphology, phylogeny, and classification of the Demospongiae, Lyssacinosa, and Hexactinellida; glossary; reproduction and development; physiology; functional morphology and adaptation; variability and variation; ecology and paleoecology; evolution and ecological history; geographic and stratigraphic distribution; and techniques of study. Also included are a comprehensive reference list and an index.

TREEV2R, 344 p., ISBN 0-8137-3130-5,
\$95.00, member price \$76.00

Brachiopoda (Revised) Vol. 2 & 3

edited by R.L. Kaesler, 2000

Second volume of the extensive 4-volume revision of the Brachiopoda. Contains an introductory chapter with the brachiopod classification, systematic descriptions for the phylum as well as the subphyla Linguliformea, Craniiformea, and part of the Rhynchonelliformea, including classes Chileata, Obololata, Kutorginata, Strophomenata, and Rhynchonellata. More than 1,500 genera described, with over 7,000 figures.

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Brachiopoda (Revised), Vol. 4,

edited by Roger L. Kaesler, coordinating author Sir Alwyn Williams, 2003

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edited by R.L. Kaesler, 1997

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Mollusca 4 (revised) Ammonoidea, Vol. 4

edited by R.L. Kaesler, 1995

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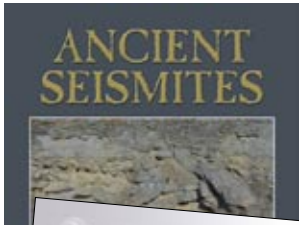
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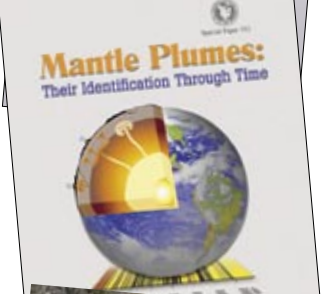
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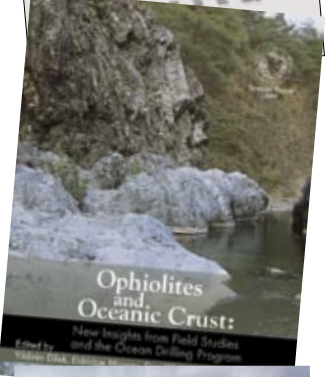
Ancient Seismites
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 SPE359, 190 p., ISBN 0-8137-2359-0
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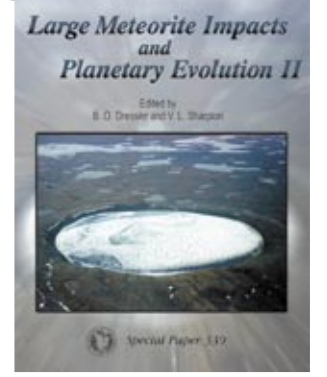
Catastrophic Events and Mass Extinctions: Impacts and Beyond
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 Kenneth G. MacLeod, 2002
 SPE356, 729 p., ISBN 0-8137-2356-6,
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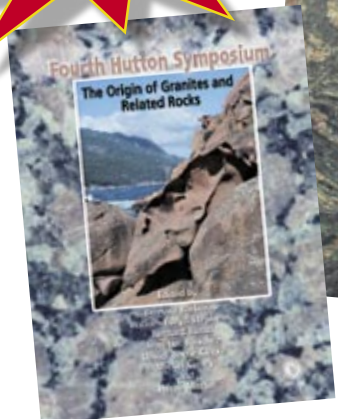
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 SPE352, 575 p., ISBN 0-8137-2352-3,
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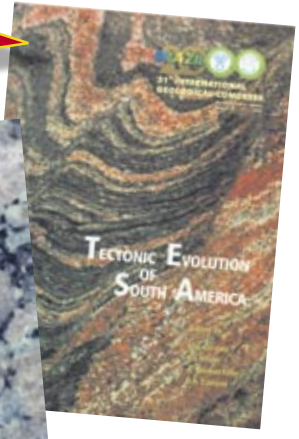
Ophiolites and Oceanic Crust: New Insights from Field Studies and the Ocean Drilling Program
 edited by Yildirim Dilek, Eldridge M. Moores,
 Don Elthon, and Adolphe Nicolas, 2000
 SPE349, 536 p., ISBN 0-8137-2349-3, indexed
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Large Meteorite Impacts and Planetary Evolution II
 edited by B.O. Dressler and V.L. Sharpton, 1999
 SPE339, 442 p., ISBN 0-8137-2339-6, indexed
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Fourth Hutton Symposium The Origin of Granites and Related Rocks
 edited by Bernard Barbarin, William Edryd Stephens,
 Bernard Bonin, Jean-Luc Bouchez, David Barrie Clark,
 Michel Cuney, and Hervé Martin, 2001
 SPE350, 326 p., ISBN 0-8137-2350-7
 \$85.00, member price \$68.00



Tectonic Evolution of South America
 edited by U.G. Cordani, E.J. milani, A. Thomaz Filho,
 and D.A. Campos, 2000
 OPB019, 854 p., ISBN 85-901482-1-1
 \$60.00, (sorry, no discounts)

Reviews in Engineering

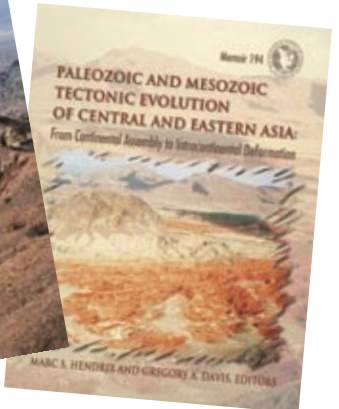


Reviews in Engineering Geology XV
Catastrophic Landslides: Effects, Occurrence, and Mechanisms
 edited by Stephen G. Evans and
 Jerome V. DeGraff, 2002
 REG015, 400 p., ISBN 0-8137-4115-7, indexed
 \$140.00, member price \$112.00



Geologic Evolution of the Mojave Desert and Southwestern Basin and Range
 edited by Allen F. Glazner, Doug Walker, and John Bartley, 2002
 MWR195, 314 p., ISBN 0-8137-1195-9, color figures, plates,
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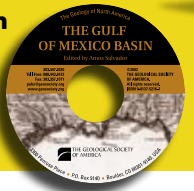


Paleozoic and Mesozoic Tectonic Evolution of Central Asia: From Continental Assembly to Intracontinental Deformation
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The Gulf of Mexico Basin
 edited by Amos Salvador, 1992
 GNAJ CD, 577 p.,
 ISBN 0-8137-5216-7,
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Topical & Discipline Sessions continued from page 32

T7. The Occurrence, Storage, and Flow of Groundwater in Mountainous Terrain

GSA Hydrogeology Division; U.S. Geological Survey, American Geophysical Union Hydrology Section

Hydrogeology; Environmental Geoscience; Geochemistry, Aqueous

Andrew H. Manning, U.S. Geological Survey, Denver, Colo.; Jonathan Saul Caine, U.S. Geological Survey, Denver, Colo. ORAL

T8. Mountain Watershed Pollutant Transport and Water Quality Issues, Including Groundwater–Surface-Water Interplay in Pollutant Transfer

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Hydrogeology

Geoffrey D. Thyne, Colorado School of Mines, Golden, Colo.; John E. McCray, University of Texas, Austin, Texas. ORAL

T9. Sustainable Management of Water Resources

International Association of Hydrogeologists/U.S. National Chapter; GSA Geology and Public Policy Committee

Hydrogeology; Environmental Geoscience

Bridget R. Scanlon, University of Texas, Austin, Texas; Marios Sophocleous, The University of Kansas, Lawrence, Kans. ORAL and POSTER

T10. Comprehensive Monitoring Approaches at Regional and Statewide Levels—Advantages and Limitations

GSA Hydrogeology Division; Association of Ground Water Scientists and Engineers, a Division of the National Ground Water Association

Hydrogeology; Geoscience Information/Communication

David R. Wunsch, New Hampshire Geological Survey, Concord, N.H.; Charles J. Taylor U.S. Geological Survey, Louisville, Ky. ORAL

T11. Hydraulic and Geochemical Behavior of Man-Made Aquifers

GSA Hydrogeology Division

Hydrogeology; Geochemistry, Aqueous

Joseph J. Donovan, West Virginia University, Morgantown, W.Va.; Mary Stoertz, Ohio University, Athens, Ohio. ORAL

T12. Fluid Flow and Solute Transport in Fractured Rocks

GSA Hydrogeology Division

Hydrogeology

Paul A. Hsieh, U.S. Geological Survey, Menlo Park, Calif. ORAL

T13. Modeling Flow and Transport in Chemically and Physically Heterogeneous Media

GSA Hydrogeology Division

Hydrogeology

Zhenxue Dai, Wright State University, Dayton, Ohio; Robert W. Ritz, Wright State University, Dayton, Ohio. ORAL and POSTER

T14. Applications of Geophysics to Groundwater Resource Management

GSA Geophysics Division; GSA Hydrogeology Division

Hydrogeology; Geophysics/Tectonophysics/Seismology; Environmental Geoscience

Dennis L. Harry, Colorado State University, Fort Collins, Colo.; David W. Hyndman, Michigan State University, East Lansing, Mich. ORAL

T15. How Effectively Are We Using Advanced Groundwater Modeling Tools in Practice?

GSA Hydrogeology Division

Hydrogeology

David L. Rudolph, University of Waterloo, Waterloo, Ontario; Rene Therrien, Université Laval, Québec City, Québec. ORAL

T16. Linking Groundwater Models and Watershed Models

GSA Hydrogeology Division; GSA Engineering Geology Division

Hydrogeology; Environmental Geoscience

Tom Winter, U.S. Geological Survey, Lakewood, Colo. ORAL

T17. Aquitard Studies: Understanding Geologic Constraints on Flow and Transport in Groundwater Flow Systems

GSA Hydrogeology Division

Hydrogeology; Environmental Geoscience

Kenneth R. Bradbury, Wisconsin Geological and Natural History Survey, Madison, Wisc.; Beth Parker, University of Waterloo, Waterloo, Ontario; David Hart, Wisconsin Geological and Natural History Survey, Madison, Wisc.; Timothy T. Eaton, Wisconsin Geological and Natural History Survey, Madison, Wisc. ORAL

T18. Characterization, Attenuation, and Remediation of Contaminants in Runoff

GSA Hydrogeology Division

Hydrogeology; Geochemistry, Aqueous; Environmental Geoscience

Thomas Boving, University of Rhode Island, Kingston, R.I.; William Blanford, Louisiana State University, Baton Rouge, La. ORAL

T19. Innovative Tracer Applications in Hydrogeology: New Techniques, Design and Interpretation Methods, and Case Studies

GSA Hydrogeology Division; International Association of Hydrogeologists—International Commission on Tracers

Hydrogeology; Geochemistry, Other

Craig E. Divine, Colorado School of Mines, Golden, Colo.; Jeffrey McDonnell, Oregon State University, Corvallis, Ore. ORAL

T20. Dissolved Gases as Indicators of Geochemical and Hydrogeologic Processes

GSA Hydrogeology Division; GSA Geobiology and Geomicrobiology Division

Hydrogeology; Geochemistry, Aqueous; Geomicrobiology

D. Kip Solomon, University of Utah, Salt Lake City, Utah; Stephen J. Van der Hoven, Illinois State University, Normal, Ill. ORAL and POSTER

T21. Vadose Zone Nitrogen: Sources, Fate, and Transport

GSA Hydrogeology Division; GSA Geobiology and Geomicrobiology Division

Hydrogeology; Geochemistry, Aqueous; Geomicrobiology

Scott W. Tyler, University of Nevada, Reno, Nev.; W. Mike Edwards, Oxford University, Oxford. ORAL and POSTER

T22. Assessing the Importance of Colloids in Natural Waters

GSA Hydrogeology Division

Hydrogeology; Geochemistry, Aqueous; Environmental Geoscience

James F. Ranville, Colorado School of Mines, Golden, Colo.; John C. Seaman, The University of Georgia, Aiken, S.C. ORAL and POSTER

T23. Sources, Transport, Fate, and Toxicology of Trace Elements in the Environment

GSA Geobiology and Geomicrobiology Division; International Association of Geochemistry and Cosmochemistry

Geochemistry, Aqueous; Environmental Geoscience; Geomicrobiology

David T. Long, Michigan State University, East Lansing, Mich.; LeeAnn Munk, University of Alaska, Anchorage, Alaska; W. Berry Lyons, The Ohio State University, Columbus, Ohio. ORAL

T24. Organic Compounds in Near-Surface Environments as Drivers on the Redox-Reaction Highway: A Tribute to the Career of Mary Jo Baedeker

GSA Hydrogeology Division

Hydrogeology; Geochemistry, Organic; Geomicrobiology

Isabelle M. Cozzarelli, U.S. Geological Survey, Reston, Va.; Janet S. Herman, University of Virginia, Charlottesville, Va.; Robert P. Eaganhouse, U.S. Geological Survey, Reston, Va.. ORAL and POSTER

T25. Stable Isotope Tracers of Water Balance and Biogeochemical Cycling in Large River Basins

GSA Quaternary Geology and Geomorphology Division

Geochemistry, Aqueous; Environmental Geoscience; Geochemistry, Other

Leonard I. Wassenaar, Environ Canada, Saskatoon, Saskatchewan; John Gibson, Environ Canada, Victoria, British Columbia. ORAL and POSTER

T26. Seasonal and Long-Term Groundwater Quality Changes in Alluvial Aquifer Systems

GSA Hydrogeology Division

Geochemistry, Aqueous; Hydrogeology; Environmental Geoscience

Wendy A. Timms, University of New South Wales, Manly Vale, New South Wales, Australia. ORAL and POSTER

T27. Characterization and Representation of Flow through Karst Aquifers

GSA Hydrogeology Division

Hydrogeology; Sediments, Carbonates; Environmental Geoscience

Allan D. Woodbury, University of Manitoba, Winnipeg, Manitoba; Ron Green, Southwest Research Institute, San Antonio, Texas. ORAL

T28. New Perspectives in Karst Geomicrobiology and Redox Geochemistry

GSA Hydrogeology Division; Karst Waters Institute; GSA Geobiology and Geomicrobiology Division

Hydrogeology; Geomicrobiology; Geochemistry, Other

Annette Engel, University of Texas, Austin, Texas; Toby Dogwiler, Winona State University, Winona, Minn.; Diana Northup, University of New Mexico, Albuquerque, N.Mex. ORAL and POSTER

T29. From Subterranean Crawlways to Scientific Hallways: Research on Our Public Cave and Karst Lands

GSA Quaternary Geology and Geomorphology Division; National Park Service; National Cave and Karst Research Institute

Quaternary Geology/Geomorphology; Hydrogeology; Environmental Geoscience

Louise D. Hose, National Cave and Karst Research Institute, Carlsbad, N.Mex.; Penelope J. Boston, New Mexico Institute of Mining and Technology, Socorro, N.Mex. ORAL and POSTER

T30. New and Multidisciplinary Approaches to Dating Cave Deposits

GSA Archaeological Geology Division; GSA Quaternary Geology and Geomorphology Division; Karst Waters Institute

Archaeological Geology; Quaternary Geology/Geomorphology; Geochemistry, Other

Donald McFarlane, The Claremont Colleges, Claremont, Calif.; Joyce Lundberg, Carleton University, Ottawa, Ontario. ORAL and POSTER

T31. Impacts of Water Storage and Consumption on Watershed Processes

GSA Quaternary Geology and Geomorphology Division; GSA Engineering Geology Division

Quaternary Geology/Geomorphology

Sara L. Rathburn, Colorado State University, Fort Collins, Colo.; Ellen E. Wohl, Colorado State University, Fort Collins, Colo. ORAL

T32. Geological Mapping: Providing for Successful Water and Land Resource Planning (Posters)

GSA Quaternary Geology and Geomorphology Division; GSA Engineering Geology Division; GSA Geology and Society Division; GSA Geology and Public Policy Committee; GSA Hydrogeology Division; Association of American State Geologists

Quaternary Geology/Geomorphology; Hydrogeology; Engineering Geology

Richard C. Berg, Illinois State Geological Survey, Champaign, Ill.; Harvey Thorleifson, Minnesota Geological Survey, St. Paul, Minn.; Peter T. Lyttle, U.S. Geological Survey, Reston, Va. POSTER

T33. Geologic Disposal of Radioactive Waste: Rising to the Challenge of Regulatory Requirements and Environmental Protection at the Waste Isolation Pilot Plant (WIPP) Near Carlsbad, New Mexico, and the Yucca Mountain Site, Southern Nevada

GSA Hydrogeology Division; U.S. Department of Energy; GSA Geology and Public Policy Committee

Public Policy; Environmental Geoscience; Hydrogeology

Robert A. Levich, U.S. Department of Energy, Las Vegas, Nev.; Russell L. Patterson, Carlsbad, N.Mex.; Ronald M. Linden, Las Vegas, Nev. ORAL

T34. Monitoring to Confirm Performance Assessment of Nuclear Waste and Decommissioning Sites: Geoscience Input to Monitoring System Design through Identification and Measurement of Critical Features, Events, and Processes

GSA Hydrogeology Division

Environmental Geoscience; Hydrogeology; Public Policy

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Van Price, Advanced Environmental Solutions, LLC, Lexington, S.C.; George V. Last, Pacific Northwest National Lab, Richland, Wash.; Tom Temples, University of South Carolina, Columbia, S.C. ORAL

T35. Assessment and Characterization of Geologic Formations for Long-Term CO₂ Storage (Sequestration)

GSA Geology and Public Policy Committee

Stratigraphy; Hydrogeology; Structural Geology

Jonathan J. Kolak, U.S. Geological Survey, Reston, Va.; Sean Brennan, U.S. Geological Survey, Reston, Va. ORAL

T36. Geophysical Solutions for Characterizing and Locating Geological Sites for Carbon Dioxide Sequestration

GSA Geophysics Division

Geophysics/Tectonophysics/Seismology; Engineering Geology; Public Policy

John H. McBride, Brigham Young University, Provo, Utah; James A. Drahovzal, University of Kentucky, Lexington, Ky.; Hannes E. Leetaru, Illinois State Geological Survey, Champaign, Ill.; John Rupp, Indiana Geological Survey, Bloomington, Ind. ORAL

T37. GIS, GPS, and Remote Sensing in Geologic Hazard Assessment

GSA Engineering Geology Division

Engineering Geology; Remote Sensing/Geographic Information System; Public Policy

William C. Haneberg, Haneberg Geoscience, Seattle, Wash.; Norman S. Levine, Charleston, S.C. ORAL and POSTER

T38. Rural Source Water Protection—Stakeholder Needs, Public Policy, and Hydrogeologic Realities for Small Systems

GSA Hydrogeology Division; U.S. Environmental Protection Agency, Office of Water

Environmental Geoscience; Geoscience Information/Communication; Hydrogeology

John All, Technical Assistance Center for Water Quality, Bowling Green, Ky.; Chris Groves, Hoffman Environmental Research Institute, Bowling Green, Ky.; Stephen Kenworthy, Technical Assistance Center for Water Quality, Bowling Green, Ky. ORAL

T39. Current Perspectives in Environmental Biogeochemistry

GSA Hydrogeology Division; GSA Geobiology and Geomicrobiology Division

Environmental Geoscience; Geochemistry, Aqueous; Hydrogeology

Dibyendu Sarkar, University of Texas, San Antonio, Texas; Rupali Datta, University of Texas, San Antonio, Texas. ORAL

T40. Hydrogeomorphology, Chemistry, Archaeology, and Evolution of Coastal Plain Depressions and Related Features

GSA Hydrogeology Division; GSA Quaternary Geology and Geomorphology Division; GSA Sedimentary Geology Division

Hydrogeology; Quaternary Geology/G geomorphology; Stratigraphy

C. William Zanner, University of Nebraska, Lincoln, Nebr.; Andrew H. Ivester, University of West Georgia, Carrollton, Ga. ORAL and POSTER

T41. The Gulf of Mexico—Past, Present, and Future: Relating Ecology to Geology

GSA Quaternary Geology and Geomorphology Division; GSA Sedimentary Geology Division

Marine/Coastal Science; Environmental Geoscience; Quaternary Geology/Geomorphology

Charles W. Holmes, Center for Coastal Geology, St. Petersburg, Fla.; John W. Tunnell, Harte Institute for Gulf of Mexico Research, Corpus Christi, Texas. ORAL and POSTER

T42. Authigenic Minerals in Modern and Ancient Terrestrial Aquatic Environments

GSA Limnogeology Division; GSA Sedimentary Geology Division; GSA Geobiology and Geomicrobiology Division

Limnogeology; Sediments, Carbonates; Sediments, Clastic

Daniel Larsen, University of Memphis, Memphis, Tenn.; Daniel Deocampo, California State University, Sacramento, Calif. ORAL

T43. Hydrologic and Paleoclimatic Significance of Nonmarine Microbial Carbonates (Tufas, Microbialites, Stromatolites and Thrombolites)

GSA Limnogeology Division; GSA Sedimentary Geology Division; GSA Geobiology and Geomicrobiology Division

Limnogeology; Sediments, Carbonates; Paleoclimatology/Paleoceanography

Michael R. Rosen, U.S. Geological Survey, Carson City, Nev.; Robin Renaut, University of Saskatchewan, Saskatoon, Saskatchewan. ORAL

T44. Lacustrine Records of Landscape Evolution

GSA Limnogeology Division; GSA Quaternary Geology and Geomorphology Division; GSA Sedimentary Geology Division

Limnogeology; Quaternary Geology/Geomorphology; Sediments, Clastic

Jeffrey T. Pietras, BP Exploration Alaska, Inc., Anchorage, Alaska; Eric C. Carson, San Jacinto College, Houston, Texas; Alan R. Carroll, University of Wisconsin, Madison, Wisc. ORAL

T45. Alkaline Evaporative Lakes and Playas: Insights into Microbial Physiology and Mineral Facies in Semiarid Settings

GSA Geobiology and Geomicrobiology Division; GSA Limnogeology Division; GSA Sedimentary Geology Division

Geomicrobiology; Geochemistry, Aqueous; Limnogeology

David Finkelstein, Indiana University, Bloomington, Ind.; Thomas R. Kulp, U.S. Geological Survey, Menlo Park, Calif.; Lisa M. Pratt, Indiana University, Bloomington, Ind. ORAL and POSTER

T46. Biomineralization in Terrestrial Hot Springs: The Preservation of Thermophiles in Past and Present-Day Systems

GSA Geobiology and Geomicrobiology Division; GSA Sedimentary Geology Division

Geomicrobiology; Paleontology/Paleobotany; Geochemistry, Aqueous

Paul A. Schroeder, University of Georgia, Athens, Ga.; Sherry L. Cady, Portland State University, Portland, Ore. ORAL

T47. Ocean Chemistry through the Precambrian and Paleozoic

GSA Sedimentary Geology Division

Paleoclimatology/Paleoceanography; Sediments, Carbonates; Geochemistry, Other

Matthew R. Saltzman, The Ohio State University, Columbus, Ohio; Michael C. Pope, Washington State University, Pullman, Wash. ORAL

T48. Unraveling the History of Ocean Crust Production: Evidence For and Against Changes in Seafloor Spreading Rates since the Mesozoic

Paleoclimatology/Paleoceanography; Tectonics; Geochemistry, Other

Jenney M. Hall, Yale University, New Haven, Conn.; David B. Rowley, University of Chicago, Chicago, Ill.; Mark Pagani, Yale University, New Haven, Conn. ORAL and POSTER

T49. Stable Isotopes in Fossils and Paleosols: Records of Late Cenozoic Environmental Change

GSA Sedimentary Geology Division

Geochemistry, Other; Paleoclimatology/Paleoceanography; Paleontology/Paleobotany

Yang Wang, Florida State University and National High Magnetic Field Lab, Tallahassee, Fla.; Pennilyn Higgins, University of Florida, Gainesville, Fla. ORAL

T50. Marine Hard Substrates: Colonization and Evolution

Paleontological Society; GSA Sedimentary Geology Division

Paleontology/Paleobotany; Marine/Coastal Science; Stratigraphy

Stephen K. Donovan, National Natuurhistorisch Museum, Leiden; Paul D. Taylor, The National History Museum, London. ORAL

T51. Protistan Paleobiodiversity: Understanding Evolutionary Patterns

Cushman Foundation

Paleontology/Paleobotany; Paleoclimatology/Paleoceanography; Geomicrobiology

Susan T. Goldstein, University of Georgia, Athens, Ga.; Brian T. Huber, Smithsonian Institution, Washington, D.C. ORAL

T52. The Hunters and the Hunted: Predation On and By Gastropods

Paleontological Society

Paleontology/Paleobotany

Patricia H. Kelley, University of North Carolina, Wilmington, N.C.; Thor A. Hansen, Western Washington University, Bellingham, Wash.; Gregory P. Dietl, University of North Carolina, Wilmington, N.C. ORAL

T53. Critical Events in the Evolution of Terrestrial Arthropods

Paleontological Society; GSA Geobiology and Geomicrobiology Division

Paleontology/Paleobotany; Sediments, Clastic; Stratigraphy

Robert E. Nelson, Colby College, Waterville, Maine; Dena M. Smith, University of Colorado, Boulder, Colo.; S. Bruce Archibald, Harvard University, Cambridge, Mass. ORAL and POSTER

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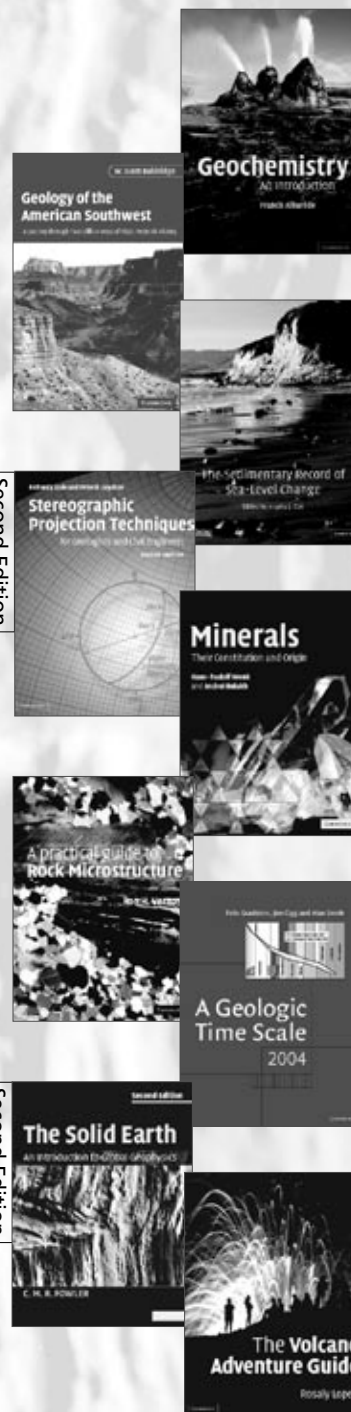
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Topical & Discipline Sessions continued from page 44

T54. The Evolution and Expansion of C4 Plants

Paleontology/Paleobotany; Paleoclimatology/Paleoceanography; Geochemistry, Organic

Mark Pagani, Yale University, New Haven, Conn.; Darren Grocke, McMaster University, Hamilton, Ontario. ORAL and POSTER

T55. Anatomy of an Anachronistic Period: The Early Triassic Environment and Its Effect on the History of Life

Paleontological Society; GSA Sedimentary Geology Division

Paleontology/Paleobotany; Sediments, Carbonates; Paleoclimatology/Paleoceanography

Adam D. Woods, California State University, Fullerton, Calif.; Frank Corsetti, University of Southern California, Los Angeles, Calif. ORAL

T56. Paleontology and Stratigraphy of the Late Eocene Florissant Formation, Colorado

Paleontological Society; GSA Limnogeology Division; GSA Sedimentary Geology Division

Paleontology/Paleobotany; Geoscience Information/Communication; History of Geology

Herbert W. Meyer, Florissant Fossil Beds National Monument, Florissant, Colo.; Dena M. Smith, University of Colorado, Boulder, Colo. ORAL

T57. The Concept of Layer-Cake Stratigraphy—Then and Now

GSA History of Geology Division; GSA Sedimentary Geology Division
History of Geology; Stratigraphy

Charles W. Byers, University of Wisconsin, Madison, Wisc. ORAL

T58. Sedimentary and Stratigraphic Principles and Concepts Applied to the Study of Metamorphic Terranes and Igneous Provinces

North American Commission on Stratigraphic Nomenclature

Petrology, Metamorphic; Sediments, Clastic; Economic Geology

Lisa Lytle, Colorado School of Mines, Golden, Colo.; Thomas R. Fisher, Colorado School of Mines, Golden, Colo. ORAL

T59. Resolving the Late Paleozoic Gondwanan Ice Age in Time and Space: Comparison of Southern and Northern Hemisphere Records

GSA Sedimentary Geology Division

Stratigraphy; Sediments, Clastic; Sediments, Carbonates

Christopher R. Fielding, University of Nebraska, Lincoln, Nebr.; Tracy D. Frank, University of Nebraska, Lincoln, Nebr. ORAL

T60. Sedimentary Geology and Earth History: Retrospective and Prospective: In Honor of the Career and Contributions of Robert H. Dott Jr.

GSA Sedimentary Geology Division; GSA History of Geology Division
Stratigraphy; History of Geology; Geoscience Education

Joanne Bourgeois, University of Washington, Seattle, Wash.; Marjorie A. Chan, University of Utah, Salt Lake City, Utah; Gary Kocurek, University of Texas, Austin, Texas. ORAL and POSTER

T61. Frontiers in Understanding the Geologic Record of Climate Change: A Session in Honor of William W. Hay

GSA Sedimentary Geology Division; GSA Geobiology and Geomicrobiology Division; GSA Limnogeology Division; GSA Structural Geology and Tectonics Division

Paleoclimatology/Paleoceanography; Marine/Coastal Science; Paleontology/Paleobotany

Eric J. Barron, Pennsylvania State University, University Park, Penn.; Robert DeConto, University of Massachusetts, Amherst, Mass. ORAL and POSTER

T62. Wild Coal Fires: Burning Questions with Global Consequences?

GSA Coal Geology Division

Coal Geology; Environmental Geoscience; Engineering Geology

Glenn Blair Stracher, East Georgia College, University System of Georgia, Swainsboro, Ga.; Ed Heffern, Cheyenne, Wyo. ORAL

T63. Raton Basin: From Coal to Coalbed Methane

GSA Coal Geology Division

Coal Geology; Tectonics; Hydrogeology

Gretchen K. Hoffman, New Mexico Institute of Mining and Technology, Socorro, N.Mex.; Christopher J. Carroll, Colorado Geological Survey, Denver, Colo. ORAL and POSTER

T64. Genetic Links among Syngenetic Metal Accumulations in Sedimentary Basins: Giant Sediment-Hosted Metal Deposits to Metalliferous Black Shales

Society of Economic Geologists

Economic Geology

Poul Emsbo, U.S. Geological Survey, Denver, Colo.; Eric E. Hiatt, University of Wisconsin, Oshkosh, Wisc. ORAL

T65. Stable Isotopes of Ore-forming Metals: Analysis and Applications

Economic Geology; Geochemistry, Other; Environmental Geoscience

Jamie J. Wilkinson, Imperial College London, London. ORAL

T66. Widespread Importance of Immiscible H₂O-CO₂ Fluids for Petrologic and Geochemical Processes in Low to Moderate Temperature Crustal Environments

Geochemical Society

Geochemistry, Aqueous; Geochemistry, Other; Petrology, Metamorphic

John P. Kaszuba, Los Alamos National Lab, Los Alamos, N.Mex.; David R. Janecky, Los Alamos National Lab, Los Alamos, N.Mex. ORAL

T67. Advanced Characterization of the Structures and Behaviors of Minerals

Mineralogical Society of America

Mineralogy/Crystallography

Peter J. Heaney, Pennsylvania State University, University Park, Penn.; Jeffrey E. Post, Smithsonian Institution, Washington, D.C.; Michael C. Carpenter, Tucson, Ariz. ORAL

T68. Nano-Geochemistry and Nano-Structures in Earth Systems

GSA Geobiology and Geomicrobiology Division

Geochemistry, Other; Mineralogy/Crystallography; Environmental Geoscience

Huifang Xu, University of New Mexico, Albuquerque, N.Mex. ORAL and POSTER

T69. Looking Forward to the Past: A Session in Honor of Paul Ribbe and the Reviews in Mineralogy and Geochemistry

Mineralogical Society of America

Mineralogy/Crystallography; Petrology, Experimental; Petrology, Metamorphic

Ross Angel, Virginia Tech, Blacksburg, Va.; Nancy Ross, Virginia Tech, Blacksburg, Va. ORAL and POSTER

T70. Modeling Grain-Scale Processes in Metamorphic Rocks

Mineralogical Society of America; GSA Structure and Tectonics Division

Petrology, Metamorphic; Structural Geology; Mineralogy/Crystallography

W.D. Carlson, University of Texas, Austin, Texas; C.T. Foster, University of Iowa, Iowa City, Iowa. ORAL and POSTER

T71. Granitic Pegmatites: Recent Advances in Mineralogy, Petrology, and Understanding

Mineralogical Society of America

Petrology, Igneous; Mineralogy/Crystallography; Geochemistry, Other

David London, University of Oklahoma, Norman, Okla. ORAL and POSTER

T72. Impact Geology

GSA Planetary Geology Division; GSA Sedimentary Geology Division
Planetary Geology

David King, Auburn University, Auburn, Ala.; Jared Morrow, University of Northern Colorado, Greeley, Colo. ORAL and POSTER

T73. Early Paleoproterozoic (2.5–2.0 Ga) Events and Rates: Bridging Field Studies and Models

Precambrian (At Large); Geochemical Society; GSA Sedimentary Geology Division; SEPM—Society for Sedimentary Geology; Astrobiology Program

Precambrian Geology; Paleoclimatology/Paleoceanography; Tectonics

Andrey Bekker, Geophysical Lab, Carnegie Institution of Washington, Washington, D.C.; Mark E. Barley, The University of Western Australia, Western Australia, Australia; Robert H. Rainbird, Geological Survey of Canada, Ottawa, Ontario. ORAL

T74. 1500 to 2500 Ma: A Period of Changing Mantle Regimes in Earth History?

Precambrian (At Large); GSA Geophysics Division

Precambrian Geology; Tectonics; Paleoclimatology/Paleoceanography

Kent C. Condie, New Mexico Institute of Mining and Technology, Socorro, N.Mex.; Dallas Abbott, Lamont-Doherty Earth

Observatory, Palisades, N.Y.; Alex Pavlov, University of Colorado, Boulder, Colo. ORAL

T75. A Xenolith Perspective on the Physical and Chemical Evolution of Continental Lithosphere

GSA Structural Geology and Tectonics Division; Mineralogical Society of America; GSA Geophysics Division

Geochemistry, Other; Geophysics/Tectonophysics/Seismology; Petrology, Metamorphic

Jane Selverstone, University of New Mexico, Albuquerque, N.Mex.; Roberta L. Rudnick, University of Maryland, College Park, Md. ORAL and POSTER

T76. Pre-EarthScope Synthesis of the Rocky Mountains I: Framing the Key Geological, Geophysical, and Geodynamic Controversies

GSA Structural Geology and Tectonics Division; GSA Geophysics Division; GSA Quaternary Geology and Geomorphology Division; Rocky Mountain Association of Geologists; Colorado Scientific Society; EarthScope

Tectonics; Geophysics/Tectonophysics/Seismology; Quaternary Geology/Geomorphology

Karl E. Karlstrom, University of New Mexico, Albuquerque, N.Mex.; Rick Aster, New Mexico Institute of Mining and Technology, Socorro, N.Mex. ORAL and POSTER

T77. Pre-EarthScope Synthesis of the Rocky Mountains II: Surface Processes, Geodynamics, and the Roles of Neotectonics and Climate in Development of Modern Topography

GSA Structural Geology and Tectonics Division; GSA Geophysics Division; GSA Quaternary Geology and Geomorphology Division; Rocky Mountain Association of Geologists; Colorado Scientific Society; EarthScope

Tectonics; Geophysics/Tectonophysics/Seismology; Quaternary Geology/Geomorphology

Eric Kirby, Pennsylvania State University, University Park, Penn.; Margaret E. McMillan, University of Arkansas at Little Rock, Little Rock, Ark.. ORAL and POSTER

T78. Pre-EarthScope Synthesis of the Rocky Mountains III: New Advances in Laramide Deformation and Tectonics of Rocky Mountain Basement-Involved Structures: In Honor of Donald L. Blackstone Jr.

GSA Structural Geology and Tectonics Division; GSA Geophysics Division; Wyoming Geological Association; Rocky Mountain Association of Geologists; Colorado Scientific Society; EarthScope
Structural Geology; Tectonics; Geophysics/Tectonophysics/Seismology

Eric Erslev, Colorado State University, Fort Collins, Colo.; David Lageson, Montana State University, Bozeman, Mont.; Arthur Snoke, University of Wyoming, Laramie, Wyo. ORAL and POSTER

T79. Pre-EarthScope Synthesis of the Rocky Mountains IV: New Ideas on Late Paleozoic Intraplate Orogenesis: The Greater Ancestral Rocky Mountains

GSA Structural Geology and Tectonics Division; GSA Geophysics Division; Friends of the Ancestral Rocky Mountains; EarthScope

Tectonics; Stratigraphy; Structural Geology

Charles F. Kluth, Colorado School of Mines, Golden, Colo.; Gerilyn S. Soreghan, University of Oklahoma, Norman, Okla. ORAL and POSTER

T80. Pre-EarthScope Synthesis of the Rocky Mountains V: New Insights in Basement Tectonics, Deep Crustal Structure and Precambrian Tectonic Evolution

GSA Structural Geology and Tectonics Division; GSA Geophysics Division; Rocky Mountain Association of Geologists; Colorado Scientific Society; EarthScope

Tectonics; Geophysics/Tectonophysics/Seismology; Quaternary Geology/Geomorphology

Michael Williams, University of Massachusetts, Amherst, Mass.; Karl E. Karlstrom, University of New Mexico, Albuquerque, N.Mex. ORAL and POSTER

T81. Regional Geology of the Northern Rockies: A Session Honoring Betty Skipp

GSA Structural Geology and Tectonics Division; GSA Sedimentary Geology Division; SEPM—Society for Sedimentary Geology

Tectonics; Structural Geology; Stratigraphy

Paul K. Link, Idaho State University, Pocatello, Idaho; Susanne Janecke, Utah State University, Logan, Utah; David Lageson, Montana State University, Bozeman, Mont. ORAL and POSTER

T82. Bill Braddock's Backyard—Proterozoic to Recent Geology of the Northern Colorado Front Range

GSA Structural Geology and Tectonics Division

Precambrian Geology; Structural Geology; History of Geology

James C. Cole, U.S. Geological Survey, Denver, Colo.; William Nesse, University of Northern Colorado, Greeley, Colo. ORAL

T83. Cordilleran Arc Magmatism, BATHOLITHS and Continental Crustal Genesis

GSA Geophysics Division; GSA Structural Geology and Tectonics Division

Tectonics; Petrology, Igneous; Geophysics/Tectonophysics/Seismology

Mihai N. Ducea, University of Arizona, Tucson, Ariz.; Christopher Andronicos, University of Texas, El Paso, Texas; Paul Wetmore, University of Arizona, Tucson, Ariz. ORAL

T84. Terrane Translation, Orogenesis, and Plate Interactions in the Late Mesozoic to Early Cenozoic North American Cordillera, and Implications for Paleogeographic Reconstructions

GSA Geophysics Division; GSA Structural Geology and Tectonics Division

Tectonics; Stratigraphy; Geophysics/Tectonophysics/Seismology

Paul Umhoefer, Northern Arizona University, Flagstaff, Ariz.; Sandra Wyld, University of Georgia, Athens, Ga.; James E. Wright, University of Georgia, Athens, Ga. ORAL and POSTER

T85. Whence the Mountains? New Developments in the Tectonic Evolution of Orogenic Belts: Celebrating the Dynamic Career of Raymond A. Price at the 50-Year Mark

GSA Structural Geology and Tectonics Division; Geological Association of Canada

Tectonics; Structural Geology; Geophysics/Tectonophysics/Seismology

James W. Sears, University of Montana, Missoula, Mont.; Tekla A. Harms, Amherst College, Amherst, Mass.; Carol Evenchick, Natural Resources Canada, Vancouver, British Columbia. ORAL and POSTER

T86. Ribbon Continents: Their Origin, Development, and Role in Rifting and Orogenesis

GSA Structural Geology and Tectonics Division; GSA Geophysics Division

Tectonics; Structural Geology; Geophysics/Tectonophysics/Seismology

Phil J.A. McCausland, University of Michigan, Ann Arbor, Mich.; Stephen T. Johnston, University of Victoria, Victoria, British Columbia. ORAL

T87. Recent Advances in Himalayan Geology

GSA Structural Geology and Tectonics Division

Tectonics; Volcanology; Geophysics/Tectonophysics/Seismology

Elizabeth J. Catlos, Oklahoma State University, Stillwater, Okla.; Richard A. Marston, Oklahoma State University, Stillwater, Okla. ORAL

T88. Thrust Belts and Plateaus: The Anatomy of Convergent Systems

GSA Structural Geology and Tectonics Division; GSA Geophysics Division

Tectonics; Geophysics/Tectonophysics/Seismology; Structural Geology

Delores M. Robinson, University of Alabama, Tuscaloosa, Ala.; Nadine McQuarrie, California Institute of Technology, Pasadena, Calif. ORAL and POSTER

T89. Tectonic Evolution of the Arctic Basin and its Margins

GSA Structural Geology and Tectonics Division

Tectonics; Geophysics/Tectonophysics/Seismology; Marine/Coastal Science

Jaime Toro, West Virginia University, Morgantown, W.Va.; Jeffrey M. Amato, New Mexico State University, Las Cruces, N.Mex. ORAL and POSTER

T90. Low-angle Normal Faults and Faulting: Field Studies, Fault Rocks, Mechanics, and Weakening Mechanisms

GSA Structural Geology and Tectonics Division; GSA Geophysics Division

Structural Geology; Tectonics; Petrology, Metamorphic

Robert E. Holdsworth, University of Durham, Durham, UK; Darrel S. Cowan, University of Washington, Seattle, Wash.; Cristiano Collettini, Università di Perugia, Perugia, Italy. ORAL and POSTER

T91. Paleomagnetism and Rock Magnetism Perspective of Shear Zone Kinematics

GSA Geophysics Division; GSA Structural Geology and Tectonics Division

Geophysics/Tectonophysics/Seismology; Tectonics; Structural Geology

Tim F. Wawrzyniec, University of New Mexico, Albuquerque, N.Mex.; Mike Petronis, University of New Mexico, Albuquerque, N.Mex. ORAL and POSTER

Topical & Discipline Sessions continued on page 50

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Topical & Discipline Sessions continued from page 48

T92. Neotectonics and Earthquake Potential of the Eastern Mediterranean Region

GSA Structural Geology and Tectonics Division; GSA Geophysics Division

Geophysics/Tectonophysics/Seismology; Neotectonics/Paleoseismology; Tectonics

Ibrahim Çemen, Oklahoma State University, Stillwater, Okla.; Eric Sandvol, University of Missouri, Columbia, Mo.; Omer Emre, MTA, Ankara, Turkey. ORAL and POSTER

T93. Crustal Seismic Anisotropy as a Measure of Regional Tectonic Deformation (Posters)

GSA Geophysics Division; GSA Structural Geology and Tectonics Division

Geophysics/Tectonophysics/Seismology; Tectonics; Structural Geology

David Okaya, University of Southern California, Los Angeles, Calif.; Nikolas Christensen, University of Wisconsin, Madison, Wisc. POSTER

T94. Geoinformatics and Geological Sciences: The Next Step (Posters)

GSA Geophysics Division

Geophysics/Tectonophysics/Seismology; Tectonics; Geoscience Information/Communication

Ramon Arrowsmith, Arizona State University, Tempe, Ariz.; Charles Meertens, UNAVCO, Inc., Boulder, Colo. POSTER

T95. Differentiating Climatic from Tectonic Controls on Landscape Evolution (Posters)

GSA Quaternary Geology and Geomorphology Division; GSA Structural Geology and Tectonics

Quaternary Geology/Geomorphology; Tectonics; Structural Geology

Claudia J. Lewis, Los Alamos National Lab, Los Alamos, N.Mex.; Eric V. McDonald, Desert Research Institute, Reno, Nev.; John Gosse, Dalhousie University, Halifax, Nova Scotia. POSTER

T96. Records of Late Quaternary Climatic Change From the Americas: Interhemispheric Synchronicity or Not

GSA Quaternary Geology and Geomorphology Division

Quaternary Geology/Geomorphology; Paleoclimatology/Paleoceanography

Donald T. Rodbell, Union College, Schenectady, N.Y.; John T. Andrews, University of Colorado, Boulder, Colo.; Geoffrey O. Seltzer, Syracuse University, Syracuse, N.Y. ORAL and POSTER

T97. Geologic History and Processes of the Colorado River

GSA Quaternary Geology and Geomorphology Division

Quaternary Geology/Geomorphology; Environmental Geoscience; Stratigraphy

Keith A. Howard, U.S. Geological Survey, Menlo Park, Calif.; Cassandra Fenton, Tucson, Ariz. ORAL and POSTER

T98. Evolution of the Great Plains Landscape

GSA Quaternary Geology and Geomorphology Division

Quaternary Geology/Geomorphology

Joseph A. Mason, University of Wisconsin, Madison, Wisc.; James B. Swinehart, School of Natural Resources, Lincoln, Nebr.; J. Elmo Rawling, University of Wisconsin, Platteville, Wisc. ORAL and POSTER

T99. The Midwest from Deglaciation to Settlement

GSA Quaternary Geology and Geomorphology Division

Quaternary Geology/Geomorphology; Paleoclimatology/Paleoceanography; Limnogeology

Kathy J. Licht, Indiana University–Purdue University, Indianapolis, Ind.; Tom Lowell, University of Cincinnati, Cincinnati, Ohio. ORAL

T100. Glacial Outburst Floods: Causes and Consequences

GSA Quaternary Geology and Geomorphology Division

Quaternary Geology/Geomorphology

Amir Mokhtari Fard, Stockholm University, Stockholm, Sweden. ORAL

T101. The Red River Raft of Louisiana

GSA Quaternary Geology and Geomorphology Division

Quaternary Geology/Geomorphology; Engineering Geology; Hydrogeology

Nalini Torres, U.S. Army Corps of Engineers, Vicksburg, Miss.; Danny W. Harrelson, U.S. Army Engineer Research and Development Center, Vicksburg, Miss. ORAL

T102. Quaternary Paleoenvironments of the Middle East: Proxy Records, Human Prehistory, and Regional Cross-Correlation

GSA Archaeological Geology Division; GSA Quaternary Geology and Geomorphology Division

Quaternary Geology/Geomorphology; Archaeological Geology; Paleoclimatology/Paleoceanography

Carlos E. Cordova, Oklahoma State University, Stillwater, Okla.; Caroline Davies, University of Missouri, Kansas City, Mo. ORAL

T103. Documenting the Geomorphic and Ecosystem Evolution of National Park Landscapes Using Repeat Photography

GSA Quaternary Geology and Geomorphology Division; National Park Service, Natural Resources Program Center, Geologic Resources Division

Quaternary Geology/Geomorphology; Environmental Geoscience; Remote Sensing/Geographic Information System

Harold S. Pranger, Denver, Colo. ORAL and POSTER

T104. Unveiling the Hidden Components in Archaeological Landscapes—The Role of Geoscience Techniques in Archaeological Site Analysis

GSA Archaeological Geology Division; GSA Quaternary Geology and Geomorphology Division

Archaeological Geology; Quaternary Geology/Geomorphology; Environmental Geoscience

Cynthia A. Stiles, University of Wisconsin, Madison, Wisc. ORAL and POSTER

T105. Archaeological Geology of Stratigraphically Complex Localities

GSA Archaeological Geology Division; GSA Quaternary Geology and Geomorphology Division

Archaeological Geology; Quaternary Geology/Geomorphology; Sediments, Clastic

E.A. Bettis III, University of Iowa, Iowa City, Iowa. ORAL

T106. Geological Context of Early Humans from Ethiopian Rift Basins

GSA Archaeological Geology Division; GSA Sedimentary Geology Division; GSA Limnogeology Division

Archaeological Geology; Stratigraphy; Paleontology/Paleobotany

Jay Quade, University of Arizona, Tucson, Ariz.; Jonathon Wynn, University of Oregon, Eugene, Ore. ORAL

T107. Toward Effective Interdisciplinary Education in Archaeological Geology: Progress and Prospects

GSA Archaeological Geology Division; GSA Geoscience Education Division; GSA Quaternary Geology and Geomorphology Division

Archaeological Geology; Geoscience Education; Quaternary Geology/Geomorphology

Jennifer R. Smith, Washington University, St. Louis, Mo. ORAL

T108. Geoarchaeology, Geoconservation, and Georesources: Integrated Approaches to Investigating, Conserving, and Managing Past and Present Landscapes

GSA Archaeological Geology Division; GSA Quaternary Geology and Geomorphology Division; GSA Geology and Society Division; GSA Geology and Public Policy Committee

Environmental Geoscience; Archaeological Geology; Geoscience Education

Jasper Knight, Loughborough University, Loughborough, UK. ORAL and POSTER

T109. Geology, Decisionmakers, and the Public: Challenges in Communication

GSA Geology and Society Division; GSA Geology and Public Policy Committee

Public Policy; Environmental Geoscience; Geoscience Information/Communication

Thomas J. Evans, University of Wisconsin—Extension, Madison, Wisc.; John Kiefer, Kentucky Geological Survey, Lexington, Ky. ORAL

T110. Information Technology Initiatives in the Geosciences: Policy, Strategy, and Management Issues

Geoscience Information/Communication; Public Policy; Geoscience Education

Soumava Adhya, University at Albany, SUNY, Albany, N.Y. ORAL

T111. Geoscience Information and Librarianship in a Global Context

Geoscience Information Society

Geoscience Information/Communication; Geoscience Education

Linda R. Musser, Pennsylvania State University, University Park, Penn. ORAL and POSTER

T112. Geologic Time and CHRONOS: Databases, Tools, Outreach, Education, and the Geoinformatics Revolution

Geoscience Information Society; Paleontological Society; CHRONOS

Geoscience Information/Communication; Stratigraphy; Geoscience Education

Cinzia Cervato, Iowa State University, Ames, Iowa; Walter S. Snyder, National Science Foundation, Arlington, Va. ORAL and POSTER

T113. Geology in the National Forests—Stewardship, Education, and Research

GSA Engineering Geology Division; USDA Forest Service, Minerals & Geology Management Program

Geoscience Information/Communication; Environmental Geoscience; Geoscience Education

Joe T. Gurreri, USDA Forest Service, Butte, Mont.; Andrew H. Rorick, USDA Forest Service, Sandy, Ore.; Jim Gauthier-Warinner, USDA Forest Service, Arlington, Va. ORAL

T114. Geology in the National Parks: Research, Mapping, and Resource Management

National Park Service

Geoscience Information/Communication; Paleontology/Paleobotany; Marine/Coastal Science

Bruce A. Heise, National Park Service, Geologic Resources Division, Lakewood, Colo.; Tim Connors, National Park Service, Denver, Colo.; Rebecca Beavers, National Park Service, Denver, Colo.; Greg McDonald, National Park Service, Lakewood, Colo.; Jeff Mow, Florissant Fossil Beds National Monument, Florissant, Colo. ORAL

T115. The Keys to Opportunities with the National Park Service

National Park Service; Geological Society of America; American Geological Institute; Association for Women Geoscientists

Public Policy; Geoscience Information/Communication; Geoscience Education

Judy Geniac, Denver, Colo.; Gary Lewis, GSA Education and Outreach, Boulder, Colo.; Ann Beenbow, Alexandria, Va.; Marguerite Toscano. ORAL

T116. Geology for the Masses: Engaging the Public through Informal Geoscience Education in Parks, Monuments, Open Spaces, and Public Lands

GSA Geoscience Education Division; National Park Service; Bureau of Land Management; Association of Earth Science Editors

Geoscience Education; Geoscience Information/Communication; Environmental Geoscience

Jim Wood, National Park Service, Denver, Colo.; Allyson Mathis, National Park Service, Grand Canyon, Ariz.; Marion Malinowski, Bureau of Land Management, Lakewood, Colo.; Carol Ruthven, Association of Earth Science Editors, Lexington, Ky.; Monica Gaiswinkler Easton, Ministry of Northern Development & Mines, Sudbury, Ontario. ORAL and POSTER

T117. Innovative Approaches to Teaching “Geology of National Parks”: Tales from the Classroom, Field, Page, Web, and Beyond

GSA Geoscience Education Division; National Association of Geoscience Teachers

Geoscience Education; Geoscience Information/Communication

Robert J. Lillie, Oregon State University, Corvallis, Ore.; Carol J. Ormand, Wittenberg University, Springfield, Ohio; Joseph F. Reese, Edinboro University of Pennsylvania, Edinboro, Penn. ORAL

T118. The Science of Sustainability: How Can We Most Effectively Educate Students, the Public, and Policymakers?

Critical Issues Caucus, GSA Geology and Public Policy Committee

Geoscience Education; Environmental Geoscience; Public Policy

Paul H. Reitan, SUNY at Buffalo, Buffalo, N.Y.; Pete Palmer, Institute for Cambrian Studies, Boulder, Colo.; Christine V. McLelland, GSA Education and Outreach, Boulder, Colo. ORAL

T119. Sigma Gamma Epsilon Student Research (Posters)

Sigma Gamma Epsilon

Environmental Geoscience

Donald W. Neal, East Carolina University, Greenville, N.C.; Charles Mankin, Oklahoma Geological Survey, Norman, Okla. POSTER

T120. Integrative Interdisciplinary Undergraduate Research in the Earth Sciences (Posters)

Council on Undergraduate Research, Geosciences Division

Geoscience Education

Edward C. Hansen, Hope College, Holland, Mich.; Karen H. Fryer, Ohio Wesleyan University, Delaware, Ohio. POSTER

T121. Involvement of Undergraduates in Geological Research: Critical Tools for Background Enrichment (Posters)

GSA Geoscience Education Division

Geoscience Education

Nazrul I. Khandaker, York College of CUNY, New York, N.Y. POSTER

T122. Inspiring First-Rate Research through Undergraduate Teaching: A Special Session in Honor of John B. Reid Jr.

National Association of Geoscience Teachers; GSA Quaternary Geology and Geomorphology Division

Quaternary Geology/Geomorphology; Petrology, Igneous; Geoscience Education

Eric J. Steig, University of Washington, Seattle, Wash.; John Eichelberger, University of Alaska, Fairbanks, Alaska; Daniel P. Murray, University of Rhode Island, Kingston, R.I. ORAL

T123. Teaching Structural Geology in the 21st Century (Posters)

GSA Structural Geology and Tectonics Division; National Association of Geoscience Teachers; On the Cutting Edge

Geoscience Education; Structural Geology

Barbara Tewksbury, Hamilton College, Clinton, N.Y.; Robert Burger, Smith College, Northampton, Mass.; Jan Tullis, Brown University, Providence, R.I.; Michael Williams, University of Massachusetts, Amherst, Mass. POSTER

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T124. Using Field Observations and Field Experiences to Teach Geoscience: An Illustrated Community Discussion (Posters)

National Association of Geoscience Teachers; GSA Education Division
Geoscience Education

David W. Mogk, Montana State University, Bozeman, Mont.; Cathryn A. Manduca, Carleton College, Northfield, Minn.; Barbara Tewksbury, Hamilton College, Clinton, N.Y. POSTER

T125. Using Digital Geological Maps to Build Deeper Understanding of Earth Science Relationships (Posters)

Geoscience Education; Geoscience Information/Communication

Andrew H. Wulff, Western Kentucky University, Bowling Green, Ky. POSTER

T126. Teaching Geology and Human Health: Expanding the Curriculum

National Association of Geoscience Teachers; GSA Geoscience Education Division

Geoscience Education

Jean M. Bahr, University of Wisconsin, Madison, Wisc.; H. Catherine W. Skinner, Yale University, New Haven, Conn.; Jill K. Singer, SUNY—College at Buffalo, Buffalo, N.Y. ORAL and POSTER

T127. STEMS: Science Teaching Enhanced with Museums and Surveys

GSA Geoscience Education Division; National Association of Geoscience Teachers

Geoscience Education

Sarah D. Zellers, Central Missouri State University, Warrensburg, Mo.; Ann Molineux, University of Texas, Austin, Texas. ORAL and POSTER

T128. Integration of Geoscience into Programs of Integrated Science and Math

GSA Engineering Geology Division; GSA Geoscience Education Division

Geoscience Education; Environmental Geoscience; Engineering Geology

John D. Rockaway, Northern Kentucky University, Highland Heights, Ky.; Denice N. Robertson, Northern Kentucky University, Highland Heights, Ky. ORAL

T129. Innovative and Unique Advanced Geology/Geoscience Courses at the K–12 Level

GSA Geoscience Education Division; National Association of Geoscience Teachers

Geoscience Education; Geoscience Information/Communication

Steve Kluge, Fox Lane High School, Bedford, N.Y. ORAL

T130. Authentic Research Collaborations: Bringing Scientific Researchers, K–12 Schools, and Other Community Groups Together in the Scientific Endeavor

GSA Geoscience Education Division; National Association of Geoscience Teachers

Geoscience Education

William Slattery, Wright State University, Dayton, Ohio; Dave Mayo, California State University, Los Angeles, Calif. ORAL

T131. Online Geoscience Education at Two-Year Colleges: Hybrid or Strictly Distance Learning Instruction for Nontraditional Students

GSA Geoscience Education Division

Geoscience Education; Geoscience Information/Communication; Remote Sensing/Geographic Information System

Suzanne G. Traub-Metlay, Front Range Community College, Boulder County Campus, Longmont, Colo. ORAL

T132. Why Earth Science Curriculum: National Science Foundation–Funded Projects for Improving Earth Science Education

GSA Geoscience Education Division; American Geological Institute; National Science Foundation

Geoscience Education

Roderic Brame, American Geological Institute, Alexandria, Va.; Michael Smith, American Geological Institute, Alexandria, Va. POSTER

T133. Current Research on Situated Teaching and Learning in Geoscience: Field-Based, Case-Based, Problem-Based, Place-Based

National Association of Geoscience Teachers; GSA Geoscience Education Division

Geoscience Education; Geoscience Information/Communication; Public Policy

Steven Semken, Arizona State University, Tempe, Ariz.; Eric Riggs, San Diego State University, San Diego, Calif. ORAL and POSTER

T134. We Can Do Better: Alternatives to the Same Old Lab-Lecture Format in the College Classroom

GSA Geoscience Education Division; National Association of Geoscience Teachers

Geoscience Education

Elizabeth M. King, Illinois State University, Normal, Ill.; Dexter Perkins, University of North Dakota, Grand Forks, N.D. ORAL and POSTER

T135. Improving Delivery in Geoscience Education (IDIG): A Session Celebrating Dorothy LaLonde Stout

National Association of Geoscience Teachers; GSA Geoscience Education Division

Geoscience Education; Public Policy

Marilyn J. Suiter, National Science Foundation, Arlington, Va.; Phillip R. Romig Jr., Colorado School of Mines, Golden, Colo. ORAL

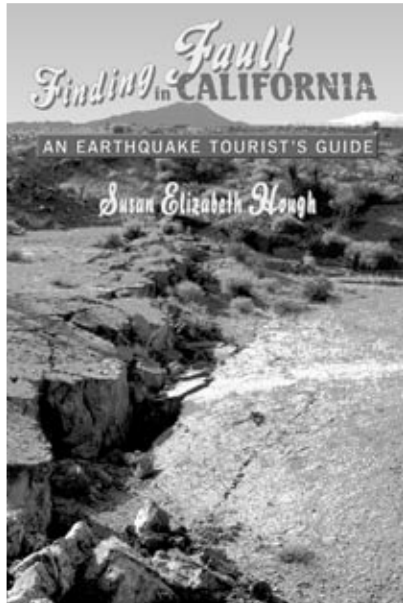
T136. Electronic Student Response Technology in the Geoscience Classroom: Is It a Valuable Teaching and Learning Tool?

National Association of Geoscience Teachers; GSA Geoscience Education Division

Geoscience Education

Lisa Greer, Washington and Lee University, Lexington, Va.; Peter J. Heaney, Pennsylvania State University, University Park, Penn. ORAL

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T137. Minorities, Women, and Persons with Disabilities in the Geosciences: Continuing Issues and Innovative Solutions

GSA Geoscience Education Division; GSA Committee on Minorities and Women in the Geosciences

Geoscience Education; Public Policy; Geoscience Information/Communication

Maya Elrick, University of New Mexico, Albuquerque, N.Mex.; Marc Carrasco, University of California, Berkeley, Calif.; John William Pennington, Oregon State University, Corvallis, Ore.; Cassandra Runyon, College of Charleston, Charleston, S.C. ORAL and POSTER

T138. New Methods and Technologies in Teaching Geology to Nontraditional and Disabled Students—The Aspects of Change to Incorporate Technology and Hands-On Methods

GSA Geoscience Education Division

Geoscience Education; Geoscience Information/Communication; History of Geology

Mark Howe, Arizona State University, Tempe, Ariz.; Connie Gibb, University of Nebraska, Lincoln, Nebr. ORAL and POSTER

T139. Geoscience Education Strategies and Methods that Encourage ALL Students (Especially Students with Disabilities) to Participate in the Geosciences

GSA Geoscience Education Division; National Science Foundation; National Aeronautics and Space Administration
Geoscience Education

Roderic Brame, American Geological Institute, Alexandria, Va.; Wendi Williams, University of Arkansas at Little Rock, Ark. ORAL

T140. Beyond Video Games—Promoting Active Learning for All Students

Geoscience Education

Terry L. Oroszi, Biological Sciences, Wright State University, Dayton, Ohio; Heidi J. Turner, CLASS—Wright State University, Dayton, Ohio. ORAL

T141. Building a Digital Library that Supports Diversity: Goals, Lessons Learned, and Future Directions

National Association of Geoscience Teachers; Geoscience Information Society; GSA Geoscience Education Division

Geoscience Education; Geoscience Information/Communication; Public Policy

Mary R. Marlino, University Corporation for Atmospheric Research (UCAR), Boulder, Colo.; Rajul E. Pandya, UCAR, Boulder, Colo. ORAL and POSTER

T142. Building Strong Geoscience Departments: Opportunities, Successes, and Challenges

National Association of Geoscience Teachers; GSA Geoscience Education Division
Geoscience Education

R. Heather Macdonald, College of William and Mary, Williamsburg, Va.; Cathryn A. Manduca, Carleton College, Northfield, Minn.; Randall M. Richardson, University of Arizona, Tucson, Ariz. ORAL and POSTER

T143. Pre-Mesozoic Impacts: Their Effect on Ocean Geochemistry, Magnetic Polarity, Climate Change, and Organic Evolution (Posters)

GSA Planetary Geology Division; Paleontological Society

Planetary Geology; Paleontology/Paleobotany; Paleoclimatology/Paleoceanography

Charles A. Sandberg, U.S. Geological Survey, Denver, Colo.; Jared R. Morrow, University of Northern Colorado, Greeley, Colo.; Christian Koeberl, University of Vienna, Vienna, Austria. POSTER

T144. Mars Mineralogy: The View from MER

Mineralogical Society of America; GSA Planetary Geology Division

Planetary Geology; Mineralogy/Crystallography; Geochemistry, Other

Bradley L. Jolliff, Washington University, St. Louis, Mo.; William H. Farrand, Space Science Institute, Boulder, Colo. ORAL

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Please use the online abstract form found on the GSA Web site, www.geosociety.org. An abstract submission fee of \$18 for all students and \$30 for all others will be charged. If you cannot submit your abstract electronically, contact Nancy Carlson, (303) 357-1061, ncarlson@geosociety.org.

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Select your preferred mode of presentation: oral, poster, or either (no preference). Please note: The program organizers will do their best to fit you into your preferred mode. However, they will override your original mode selection if they feel your paper would fit well in a particular session with other compatible abstracts. **The decision of the program organizers is final!**

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Poster Mode. Each poster session presenter is provided with one horizontal, freestanding display board approximately 8' wide and 4' high. Precise measurements will appear in the Speaker Guide, which will be posted on the GSA Web site in September. Speakers must be at their poster booths for at least two of the four presentation hours.

Papers for discipline sessions may be submitted in either oral or poster mode. Papers for topical sessions are to be submitted *only* in the mode noted in the session description. If a topical abstract is submitted in the incorrect mode, the abstract will be transferred automatically to a discipline session.

Abstract Body

Please keep the abstract body to 2,000 characters or fewer. The online abstract system will reject it if it exceeds this limit.

You can include a table with your abstract, but understand that the table might reduce the number of words allowed in your abstract. Taken together, the body of the abstract should take up no more space

than would be occupied by roughly 2,000 characters alone.

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Once the abstract is in place, a window to submit payment will appear. The non-refundable submission fee is \$18 for all students; \$30 for all others.

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- Please submit only one *volunteered* abstract as speaker or poster presenter in topical and/or discipline sessions. This helps avoid speaker-scheduling conflicts and gives everyone an equal opportunity to be heard. **Multiple submissions as speaker-presenter will result in rejection of all abstracts.**
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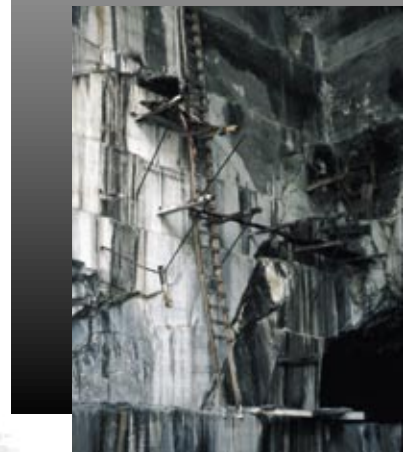
JTPC to Finalize Program in Early August

The Joint Technical Program Committee (JTPC) selects abstracts and determines the final session schedule. All authors will be notified in August. The JTPC includes representatives from those GSA Associated Societies and Divisions participating in the technical program. GSA Council approved the JTPC technical program chairs.

SCIENTIFIC CATEGORIES

Determine if your paper would fit neatly under one of the topical sessions. If it doesn't, please submit your abstract for inclusion in the general discipline sessions. The available choices are:

Archaeological Geology
 Coal Geology
 Economic Geology
 Engineering Geology
 Environmental Geoscience
 Geochemistry, Aqueous
 Geochemistry, Organic
 Geochemistry, Other
 Geomicrobiology
 Geomorphology
 Geophysics/Tectonophysics/Seismology
 Geoscience Education
 Geoscience Information/Communication
 History of Geology
 Hydrogeology
 Limnogeology
 Marine/Coastal Science
 Mineralogy/Crystallography
 Neotectonics/Paleoseismology
 Paleoclimatology/Paleoceanography
 Paleontology, Diversity, Extinction, Origination
 Paleontology, Biogeography/Biostratigraphy
 Paleontology, Paleocology/Taphonomy
 Paleontology, Phylogenetic/Morphological Patterns
 Petrology, Experimental
 Petrology, Igneous
 Petrology, Metamorphic
 Planetary Geology
 Precambrian Geology
 Public Policy
 Quaternary Geology
 Remote Sensing/Geographic Information System
 Sediments, Carbonates
 Sediments, Clastic
 Stratigraphy
 Structural Geology
 Tectonics
 Volcanology



Yule marble quarry. Photo by John Karachewski.

ANNOUNCEMENTS

2004

- August 2–8 SPIE's (International Society for Optical Engineering) International Symposium on Optical Science and Technology, Program on Remote Sensing and Space Technology, Denver, Colorado. **Information:** <http://spie.org/events/am>.
- September 12–16 ASPRS Fall Conference—Images to Decisions: Remote Sensing Foundations for GIS Applications, Kansas City, Missouri. **Information:** (301) 493-0290, www.asprs.org/fall2004.
- September 26–30 European Meteorological Society (EMS) 4th Annual Meeting and 5th European Conference on Applied Climatology (ECAC) Conference, Nice, France. **Information:** www.emetsoc.org/EMS4, www.emetsoc.org/ECAC. (*Preregistration deadline: June 30, 2004.*)
- October Second International Conference on Geodynamics of Oil and Gas Basins, Moscow, Russia. **Information:** Victor Petrovich Gavrilov, Gavrilov@gubkin.ru, ph./fax (095) 135-87-75, Alexander Vladimirovich Muradov, ph/fax (095) 135-72-86, Olga Vladimirovna Konovalova, ph./fax (095) 930-90-17, Elena Alexandrovna Leonova, LeonovaE@gubkin.ru, ph./fax (095) 930-90-11, Gubkin Russian State University of Oil and Gas, Department of Geology, (105), Leninsky Avenue, 65, 119991 Moscow, Russia. (*Abstract deadline: July 1, 2004.*)
- October 1–3 2004 Binghamton Geomorphology Symposium on Weathering and Landscape Evolution, Lexington, Kentucky, USA. **Information:** Alice Turkington, Department of Geography, University of Kentucky, 1473 Patterson Office Tower, Lexington, KY 40506-0027, USA, (859) 257-9682, fax 859-323-1969, alicet@uky.edu, www.uky.edu/AS/Geography/Binghamton04/.
- October 12–15 The Lithoprobe Celebratory Conference: From Parameters to Processes—Revealing the Evolution of a Continent, Toronto, Ontario, Canada. **Information:** www.lithoprobe.ca/conference/, litho@lithoprobe.ubc.ca, Ron Clowes, Director, Lithoprobe, (604) 822-4138.
- Oct. 31–Nov. 4 Science to Secure Food and the Environment: International Annual Meetings of the American Society of Agronomy–Crop Science Society of America–Soil Science Society of America, Seattle, Washington, USA. **Information:** www.asa-cssa-sssa.org/anmeet, headquarters@agronomy.org, (608) 273-8080.
- November 3–6 64th Annual Meeting of the Society of Vertebrate Paleontology, Denver, Colorado, USA. **Information:** The Society of Vertebrate Paleontology, 60 Revere Drive, Suite 500, Northbrook, IL 60062, USA, (847) 480-9095, meetings@vertpaleo.org, www.vertpaleo.org/meetings.
- November 26–27 International Conference on Applied Geophysics, Chiang Mai, Thailand. **Information:** Dr. Pisanu Wongpornchai, scipwngp@chiangmai.ac.th, Dept. of Geological Sciences, Chiang Mai University, Chiang Mai, Thailand 50200, www.geol.science.cmu.th (Geophysics 2004).

2005

- January 24–27 Third International Conference on Remediation of Contaminated Sediments, New Orleans, Louisiana, USA. **Information:** www.battelle.org/sedimentscon. (*Abstracts deadline: June 30, 2004.*)
- May 16–20 1st Alexander von Humboldt International Conference on The El Niño phenomenon and its global impact, Guayaquil, Ecuador. **Information:** Centro Internacional para la Investigación del Fenómeno de El Niño (CIIFEN) and European Geosciences Union (EGU), Jose Luis Santos, Director, CIIFEN, jlsantos@espol.edu.ec, Peter Fabian, President, EGU, fabian@met.forst.tu-muenchen.de, EGU Office, egu@copernicus.org.
- May 15–18 Halifax 2005: A Joint Meeting of the Geological Association of Canada, the Mineralogical Association of Canada, the Canadian Society of Petroleum Geologists and the Canadian Society of Soil Science, Halifax, Nova Scotia, Canada. **Information:** www.halifax2005.ca, hfx2005@gov.ns.ca.
- November 6–10 International Annual Meetings of the American Society of Agronomy–Crop Science Society of America–Soil Science Society of America, Salt Lake City, Utah, USA. **Information:** www.asa-cssa-sssa.org/anmeet, headquarters@agronomy.org, (608) 273-8080.

Visit www.geosociety.org/calendar/ for a complete list of upcoming geoscience meetings.

About People

GSA Fellow **Vincent Matthews** is the new State Geologist of Colorado. Matthews has a background in academia and the natural resources industry.

Siemens Foundation Scholarships Announced

The Siemens Westinghouse Competition, a program of the Siemens Foundation, is a research-based science and math competition for high school students. The competition awards college scholarships ranging from \$1,000 to \$100,000. Students may enter as individuals or as members of a team.

Online registration for the 2004–2005 competition begins June 30, 2004, at www.siemens-foundation.org. Students who are not able to apply online may call 1-800-626-9795, ext. 5930, from 9 a.m.–5 p.m. EST. The deadline for entries is Friday, October 1, 2004.

Back-In-Print

Reviews in Engineering Geology XIII **Military Geology in War and Peace**

edited by J.R. Underwood Jr., P.L. Guth, 1998

In warfare, military geologists pursue five main categories of work: tactical and strategic terrain analysis, fortifications and tunneling, resource acquisition, defense installations, and field construction and logistics. In peace, they train for wartime operations and may be involved in peace-keeping and nation-building exercises. The classic dilemma for military geology has been whether support can best be provided by civilian technical-matter experts or by uniformed soldiers who routinely work with the combat units. In addition to the introductory paper this volume includes 24 papers, covering selected aspects of the history of military geology from the early 19th century through the recent Persian Gulf war, military education and operations, terrain analysis, engineering geology in the military, use of military geology in diplomacy and peacekeeping, and the future of military geology.

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International Ground Water Modeling Center 2004 Short Course Schedule

Plan to Learn More Modeling Skills During Your GSA Trip

MODFLOW: Introduction to Numerical Ground-Water Modeling by Eileen Poeter, November 4-6

This course is designed for the hydrogeologist and environmental engineer familiar with ground-water flow concepts, but who have limited or no experience with ground-water flow modeling. Basic modeling concepts: conceptual model development, definition of boundary and initial conditions, parameter specification, finite-differencing, gridding, time stepping, solution control, and calibration are presented using MODFLOW-2000. Registration fee: \$995/\$1195 after Oct. 21.

Polishing Your Ground-Water Modeling Skills by Peter Andersen and Robert Greenwald, November 4-6

This course is designed to provide significant detail on practical ground-water flow modeling concepts and techniques. It will explore development of conceptual models for complex sites or regions. This course takes the user beyond topics covered in introductory modeling courses and beyond courses that teach the mechanics of applying various pre- and post-processing software. Registration fee: \$995/\$1195 after Oct. 21.

Modeling Water Flow & Contaminant Transport in Soils and Groundwater Using the HYDRUS Software Packages by Rien van Genuchten and Jirka Simunek, November 5-6

This course begins with a detailed conceptual and mathematical description of water flow and solute transport processes in the vadose zone, followed by an brief overview of the use of finite element techniques for solving the governing flow and transport equations. "Hands-on" computer sessions will provide participants an opportunity to become familiar with the Windows-based HYDRUS1D, HYDRUS2D, STANMOD, & RETC software packages. Registration fee: \$495/\$595 after Oct. 21.

UCODE: Universal Inversion Code for Automated Calibration by Eileen Poeter, November 11-12

If you have a working knowledge of ground-water flow modeling and some knowledge of basic statistics, you will benefit from this short course. This course introduces ground-water professionals to inverse modeling concepts and their use via UCODE, relying heavily on hands-on exercises for automatic calibration of ground-water models to promote understanding of UCODE and avoid "black-boxing". If you would like to spend more time being a hydrologist and less time as a "number twaker", please join us in the UCODE course. The latest version to be released in 2004 will be used. Registration fee: \$795/\$995 after Oct. 28.

For more information, contact: International Ground-Water Modeling Center
Colorado School of Mines
Golden, Colorado, 80401-1887, USA
Tel: (303) 273-3103 / Fax: (303) 384-2037
Email: igwmc@mines.edu

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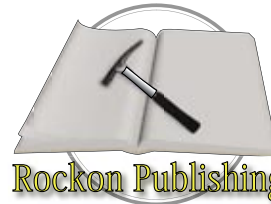
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ANNOUNCEMENTS

Call for Nominations: A.G. Huntsman Awards—Silver Jubilee

The A.G. Huntsman Award was created in 1980 to recognize excellence in marine sciences. To mark its 25th Anniversary, a 2-day jubilee is planned for the fall of 2005, hosted by the Bedford Institute of Oceanography and Dalhousie University. Awards will be presented in each of the following categories:

- Biological/Fisheries Oceanography
- Marine Geosciences
- Physical/Chemical Oceanography
- Interdisciplinary Marine Science

The latter category is intended to recognize exceptional contributions across two or more marine science disciplines, at the interface between the oceans and other natural systems, or in the expansion of marine sciences into new fields.

Nominations for outstanding individuals in the above categories are encouraged. The deadline for their receipt is June 30, 2004. More information on the Huntsman Award and on the nomination procedure can be found at www.bio.gc.ca/huntsman/huntsman-e.html. **For further information**, contact John Loder (Chair, Huntsman Selection Committee) at loderj@mar.dfo-mpo.gc.ca.

Limnogeology Division Establishes the Kerry Kelts Research Awards

The Limnogeology Division announces the establishment of student research awards, named in honor of Kerry Kelts, a visionary limnogeologist and inspiring teacher. Our inaugural round will comprise two awards of \$250 each for use in research related to limnogeology. Application for this award is simple: a summary of the proposed research and its significance (five-page maximum). Please send your summary in PDF format along with your name and associated information to the chair of the Limnogeology Division: Elizabeth Gierlowski-Kordesch (gierlows@ohio.edu).

Deadline: September, 15, 2004. Awards will be announced at the Limnogeology Division Business Meeting/Reception at the 2004 annual GSA meeting in Denver this November.

We hope to increase the amount of the awards in succeeding years. If you are interested in supporting this awards program, please send your donations, designated for the Kerry Kelts Research Awards of the Limnogeology Division, to GSA, P.O. Box 9140, Boulder, CO 80301-9140.

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UMR seeks applicants for the position of Dean of the School of Materials, Energy and Earth Resources (formerly the School of Mines and Metallurgy). The Dean provides academic leadership for the School in its teaching, research, and service missions; shares responsibility for the academic quality of all degree programs, increasing sponsored research and strengthening program offerings; and provides leadership in the recruitment and retention of students, staff and faculty of the highest quality and diversity. The candidate's academic and leadership credentials must qualify the individual for a tenured position as full professor in a relevant science or engineering discipline. Further information may be found at: <http://www.umn.edu/index.php?id=1255>.

Applications with a comprehensive resume, cover letter, and the names, addresses, and telephone numbers of five references should be sent to:

Human Resource Services
1202 North Bishop Ave.
University of Missouri - Rolla
1870 Miner Circle
Ref. # 00031668
Rolla, MO 65409-1050

For more information, contact Robert Schwartz, Chair, Search Committee at rwschwar@umr.edu or (573) 341-6025. Applications and nominations will be reviewed beginning August 1, 2004 and will be accepted until a candidate is selected. The University of Missouri - Rolla is an Affirmative Action/Equal Opportunity Employer committed to increasing diversity in its administration. Applications from women and minorities are solicited and strongly encouraged.

Ads (or cancellations) must reach the GSA Advertising office one month prior. Contact Advertising Department, (303) 357-1053, 1-800-472-1988, ext. 1053, fax 303-357-1070, acrawford@geosociety.org. Please include address, phone number, and e-mail address with all correspondence.

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**UNIVERSITY OF NEVADA LAS VEGAS
TERTIARY AND MODERN CLASTIC BASIN FILL**

The Department of Geoscience at the University of Nevada Las Vegas seeks a post-doctoral scholar for a 2-year appointment dealing with Tertiary and modern clastic basin fill in parts of Clark County, Nevada commencing Fall 2004. The successful candidate will have the opportunity to develop aspects of the research project, which will be coordinated with, and compliment, an aggregate minerals assessment being jointly conducted with the USGS and the Nevada Bureau of Mines and Geology. As such, the position presents a great opportunity to establish and carry out research that draws upon the candidate's strengths, interests, and background. Applicants with a Ph.D. from an accredited college or university in sedimentology/stratigraphy, aggregate studies/economic geology, or other relevant backgrounds will be given preference. Review of applications will commence on June 25, 2004.

The successful candidate must have their Ph.D. completed prior to start date. Position contingent upon funding. Salary will be commensurate with qualifications and experience. Please send a cover letter, resume, and relevant information (i.e., name, phone number, email and physical addresses) for three reference providers to: Dr. Andrew Hanson at andrewh@unlv.nevada.edu. For more information, see the UNLV World Wide Web site at: <http://www.unlv.edu>. Information regarding the Geoscience department may be found at <http://geoscience.unlv.edu>. Women and minority post-docs are encouraged to apply. UNLV is an equal opportunity/affirmative action employer committed to achieving excellence through diversity.

**POSTDOCTORAL RESEARCH POSITION AVAILABLE
OAK RIDGE NATIONAL LABORATORY
CHEMICAL AND ISOTOPE MASS SPECTROMETRY**

The Chemical and Isotope Mass Spectrometry group at ORNL, (<http://www.ornl.gov>) seeks outstanding candidates for post-doctoral positions in isotope geochemistry.

The successful candidate will have an opportunity to apply light and heavy isotope geochemistry to geological and environmental problems. The overall research theme utilizes isotopes and micro-textural/structural characterization techniques to understand mass transport processes occurring at a variety of scales during fluid-rock-microbe interaction, with an emphasis on investigation of nano- and micro-scale processes. Experimental studies utilizing labeled isotopes and investigations of natural systems from a variety of environments are ongoing. Available instrumentation includes a Cameca 4f and two other unique ORNL SIMS, a Neptune MC-ICP-MS and Optimass 8000 TOF-ICP, NewWave 213 laser ablation system, Triton TIMS, Finnigan 251, and associated clean laboratories and extraction systems.

Candidates preferably will have experience in mass spectrometry. Preference will be given to candidates willing to develop neutron techniques to study the nano-structures of geological materials. Candidates must have a Ph.D. in geology or a related field at the time of appointment. These are one-year term appointments with possibility of renewal. Applicants should send a CV, description of research interests, and contact information for at least three references to: Dr. Mostafa Fayek, 1 Bethal Valley Rd., Bldg 4500S, Oak Ridge National Laboratory, Oak Ridge, TN 37831 or E-mail, fayekm@ornl.gov. We will begin reviewing submissions immediately and will continue to do so until positions are filled.

Please reference the position title and number (ORNL04-08-CSD), when corresponding about this position.

Appointments are offered through the ORNL Postdoctoral Research Associates Program <http://www.ornl.gov/orise/edu/ornl/ornl-pd/ornlpdoc.htm> which is jointly administered by the Oak Ridge Institute for Science in Education (ORISE). U.S. citizenship is required for some appointments; where possible, postdoctoral program is open to all qualified individuals without regard

to race, color, age, religion, sex, national origin, physical or mental disability, or status as a Vietnam-era veteran or disabled veteran.

**TIER I CANADA RESEARCH CHAIR
IN PRECAMBRIAN GEOLOGY
AT LAURENTIAN UNIVERSITY**

The Department of Earth Sciences and Mineral Exploration Research Centre (MERC) at Laurentian University invite applications for a Tier I Canada Research Chair in Precambrian Geology. The field of specialization may include any aspect of Precambrian geology, including structure, tectonics, ore genesis, geochemistry, igneous petrology, metamorphic petrology, sedimentary processes, or paleontology. The purpose of the Chair is to enhance teaching and research in the geology and ore deposits of Precambrian shields and to advance the position of Laurentian University as a centre of excellence in research and teaching in Mineral Deposits and Precambrian Geology.

Tier I CRC Chairs are funded by the federal government on a renewable 7-year term and the position will be filled at the tenured, Full Professor level. We seek an innovative individual with an outstanding record of research and publication, who will provide leadership for national and international collaborative research and become a focus for integration of research initiatives involving the Department of Earth Sciences, the Ontario Geological Survey (located on the LU campus), and the mining industry. The Chair will be expected to contribute to our BSc, MSc, and PhD programs and assist in our objective to become the leading centre in the study of Precambrian crustal and supracrustal rocks, tectonics, and mineral deposits in the world. Bilingualism (French/English) will be an asset. The successful candidate will have access to excellent geochemical analytical equipment, including facilities for FLINC, XRD, SEM, EPMA, WD-XRF, ICP-OES, ICP-MS, TIMS, and EBSD. Additional information about the Department and MERC can be found at www.laurentian.ca/geology.

Applications, including curriculum vitae, statements of research and teaching interests, and contact information for four academic references, should be sent to des@laurentian.ca or mailed to Chair, CRC Committee, Department of Earth Sciences, Laurentian University, Sudbury, ON, P3E 2C6. Applications will be reviewed in June 2004, but will be accepted until the position is filled.

Laurentian University is committed to equity in employment and encourages applications from all qualified applicants, including women, aboriginal peoples, members of visible minorities and persons with disabilities.

FEDERAL ENERGY REGULATORY COMMISSION

The Federal Energy Regulatory Commission (Commission) has issued a notice requesting applications from those interested in being listed as potential panel members to assist in the Commission's study dispute resolution process for the integrated licensing process for hydropower projects, Docket No. AD04-4-000. Complete details are located on the Commission's hydropower website <http://www.ferc.gov/industries/hydropower/indus-act/ilp.asp>.

For further information, contact Mr. Lon Crow at (202) 502-8749 or lon.crow@ferc.gov.

**DIRECTOR
CENTER FOR GEOPHYSICAL INVESTIGATION
OF THE SHALLOW SUBSURFACE (CGISS)
BOISE STATE UNIVERSITY**

The College of Arts and Sciences at Boise State University invites applications for the Director of the Center for Geophysical Investigation of the Shallow Subsurface. CGISS is a research center founded in 1991 and now consists of 12 associated research scientists with an annual research budget of \$1.5 million dollars. CGISS research focuses on the upper kilometer of the earth; current research includes subsurface hydrology and geothermal applications, geophysical measurements of engineering properties, subsurface environmental monitoring and cleanup, other subsurface characterization, earthquake hazards, and paleoclimate. CGISS is also an integral part of the newly-created PhD program in Geophysics, offered by the Department of Geosciences at Boise State University.

The new Director will have a strong research reputation and a broad understanding of the importance of near-surface geophysics to the study of critical problems in earth science. He or she should have a Ph.D. in geophysics or a related field. The Director will be expected to manage CGISS and to provide a vision for the next stage of program development as Boise State transitions to a metropolitan research university of distinction. The Director will also initiate new collaborative programs involving CGISS, the Geosciences Department, and other academic units and agencies. Strong oral and written communication skills, management skills, and a track record in funding

and publications are essential. Six months of appropriated support at a nationally competitive level are initially provided for this position and the Director is expected to raise the remainder through collaborative research grants or industry-university consortia.

Boise State University, with an enrollment exceeding 18,000 students, is located in Boise, the state capital and Idaho's business, financial, and cultural center. Numerous state and federal agencies are located in the city. These agencies collaborate with CGISS and the associated Department of Geosciences. The Boise area is recognized as one of America's best places to live, and is one of the nation's major growth regions in technology-related industries. The moderate climate and wide variety of wild and scenic areas contribute to an outstanding quality of life, with a wide variety of recreational opportunities. Additional information about CGISS and the Department of Geosciences can be found through: <http://cgiss.boisestate.edu/> and <http://earth.boisestate.edu/>.

Boise State University is strongly committed to achieving excellence through cultural diversity. The university actively encourages applications from women, persons of color, and members of other underrepresented groups. EOE/AA Institution, veterans' preferences may be applicable. Applicants should send (1) a curriculum vitae, (2) statement of research interests and possible future directions for CGISS, and (3) contact information for a minimum of three professional references to: CGISS Search Committee, Boise State University, MS 1500, Boise, ID 83725. Review of applicants will begin on May 15, and will continue until the position is filled. Please direct questions about the position to Mitchell Lyle (mlyle@cgiss.boisestate.edu).

PENN STATE TENURE-TRACK

Geo-Resources & Sustainable Dev. in Africa
The Alliance for Earth Sciences, Engineering and Development in Africa (AESEDA), in the College of Earth and Mineral Sciences at Penn State, invites applications for a tenure-track position with a research and teaching focus on Geo-Resources and Sustainable Development in Africa. The Alliance integrates physical sciences, engineering, and social sciences to develop human and institutional resources, while promoting the stewardship of geo-resources (water, energy and minerals) and the protection of the environment in sub-Saharan Africa. The successful candidate's tenure home may be in any of the diverse departments within the College (Energy and Geo-Environmental Engineering, Geography, Geosciences, Materials Science and Engineering, Meteorology). Penn State is committed to affirmative action, equal opportunity

and the diversity of its workforce. Women and minorities are particularly encouraged to apply. Further information on the position and the application procedure can be found at www.africaalliance.psu.edu.

DIVISION OF EARTH SCIENCES

NATIONAL SCIENCE FOUNDATION, ARLINGTON, VA
NSF's Division of Earth Sciences (EAR) seeks candidates for the position Program Director for the Geomorphology and Land Use Dynamics (GLD) Program. The GLD Program supports studies of: (1) the dynamic processes that produce landforms; (2) the history of geologic changes recorded in surface features; (3) airborne and space borne imaging of the landscape, and (4) changes in land uses and land covers. GLD research includes computer analysis of remote sensing (airborne, satellite) data using pattern recognition tools and includes applications to ecological, hydrological and social systems (including national security applications).

Appointment to this position is under the provisions of the Intergovernmental Personnel Act (IPA). Applicants must have a Ph.D. or equivalent experience in earth sciences, plus six or more years of successful research, research administration, and/or managerial experience beyond the Ph.D. A broad general knowledge of Earth sciences research, familiarity with the U.S. scientific community, and experience in an academic setting are desirable.

Announcement E20040052A-IPA, with position requirements and application procedures, is located on the NSF Home Page at www.nsf.gov/jobs. Applicants may also obtain the announcement by contacting Maria Sutton at 703-292-4364 (Hearing impaired individuals may call TDD 703-292-8044). Applications must be received by June 15, 2004.

NSF is an Equal Opportunity Employer.

ENVIRONMENTAL GIS POSITION, TEXAS CHRISTIAN UNIVERSITY

Texas Christian University (TCU) invites applications for an Assistant Professor position in **Environmental GIS**, beginning August 2004. The appointment will be a tenure track position in the Department of Geology. The successful candidate will liaise with the Center for Remote Sensing and GIS and the Institute of Environmental Studies. Candidates must possess a strong background and track record in environmental and geoscience GIS applications. Responsibilities will include building upon an existing GIS/Remote Sensing curriculum through development of introductory and advanced ArcGIS courses. Other teaching duties will reflect departmental needs, GIS background

and scientific expertise of the individual. Candidates should demonstrate an equal commitment to both teaching and research. This is an opportunity-rich appointment; the candidate will be expected to foster cross-campus collaborations, and bridge the link between the university and a very active regional GIS community.

Applicants should send a vita, statement of teaching and research interests, and contact information for three references to: R.N. Donovan, Chair, Department of Geology, Box 298830, Texas Christian University, Fort Worth, TX 76129. Review of applications will begin April 1 and continue until the position is filled. TCU is an AA/EEO employer and encourages a diversity of applicants.

VISITING FACULTY, GEOSCIENCE EDUCATION WRIGHT STATE UNIVERSITY

The Department of Geological Sciences invites applications for a one-year visiting faculty position for an Assistant Professor (preferred) or Instructor specializing in Geoscience Education, to begin September 2004. Teaching will include undergraduate inquiry-based courses in Earth/Space Science for pre-service K-12 teachers. Participation and direction of a growing Master's program for in-service K-12 teachers in the Department of Geological Sciences is expected. The individual selected will work closely with the Department of Teacher Education. Knowledge of distributed learning technologies and K-12 teaching experience is highly desirable. The successful applicant must have at least a MS degree in Geological Sciences and for appointment as an assistant professor must have earned a Doctorate in Geological Sciences or Science Education with a strong emphasis in Geological Sciences by September, 2004. Applicants should submit a detailed resume by mail or e-mail with a description of research and teaching interests, and the names, addresses, phone numbers, and e-mail addresses of at least three references to Chair, Faculty Search Committee, Department of Geological Sciences, Wright State University, Dayton, OH 45435-0001. Review of applications will begin on June 15, 2004, and continue until the position is filled. Questions may be addressed to William Slattery at william.slattery@wright.edu. A search for a tenure track Assistant Professor position in Geoscience Education is anticipated in the coming year. Wright State University is committed to a policy of equal opportunity and affirmative action, and specifically encourages applications from members of underrepresented groups.



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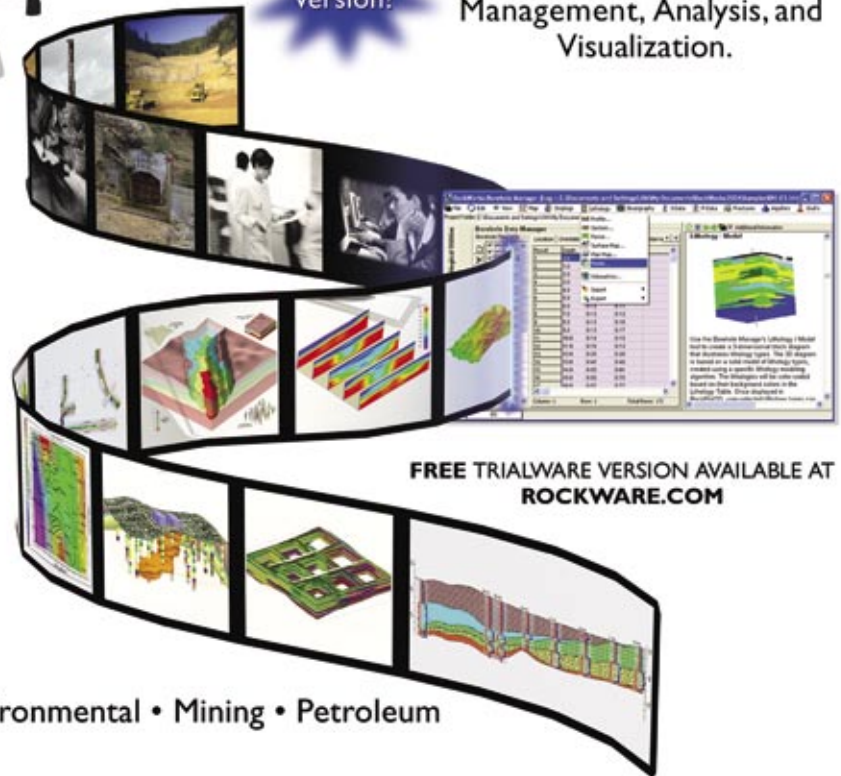
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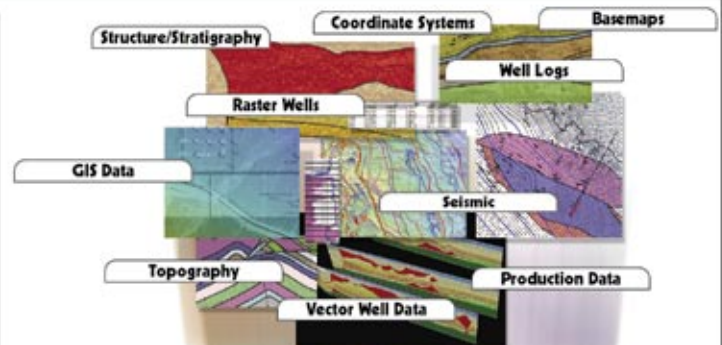
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