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Register by **6 April 2009** for reduced rates!

Rocky Mountain

Plan your 2009 GSA Section Meeting attendance!

61st Annual Meeting, Utah Valley University, Orem, Utah, USA
11–13 May 2009





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Reaching for Greater Heights: Geology in the Rocky Mountains

The 2009 meeting of GSA's Rocky Mountain Section will provide a relatively broad range of topics of specific interest to geoscientists in GSA's Rocky Mountain region. The meeting will be held in the new library on the Utah Valley University (UVU) campus. The library, recognized by Utah Governor Jon Huntsman, Jr. as the most energy-efficient building in the Utah higher education system, is beautiful, with large, comfortable open spaces, sweeping views of the Wasatch Range and Utah Valley, and a full-service café. The fastest growing institute of higher learning in Utah, UVU is within easy walking distance of hotels and restaurants and about an hour's drive of eight ski resorts (at least one of which, Snowbird, should still be open at the time of the meeting).

CONTACT INFORMATION

Find up-to-the minute meeting information at www.geosociety.org/meetings/. If you have questions or special requirements, please contact the general meeting co-chairs, Bart Kowallis, +1-801-422-2467, bkowallis@byu.edu, and Daniel Horns, +1-801-863-8064, hornsda@uvu.edu.

REGISTRATION

Early Registration Deadline: 6 April 2009

Cancellation Deadline: 13 April 2009

REGISTRATION FEES (ALL FEES ARE IN U.S. DOLLARS)

	Early		Standard	
	Full Meeting	One-Day	Full Meeting	One-Day
Professional Member	\$140	\$80	\$170	\$100
Professional Nonmember	\$160	\$110	\$190	\$140
Professional Member 70+	\$75	\$45	\$100	\$65
Student Member	\$45	\$35	\$65	\$55
Student Nonmember	\$55	\$45	\$75	\$65
K–12 Teacher	\$45	\$30	\$55	\$40
Guest or Spouse	\$30	\$15	\$40	\$25
Field Trip or Short Course Only	\$30	n/a	\$30	n/a



Cover and above: Early Jurassic strata in Capitol Reef National Park at sunset, 2007. Photo by B. Kowallis.

On-Site Registration and Badge Pickup Schedule

Utah Valley University, Orem, Utah, USA

Sun., 10 May 4–8 p.m.

Mon., 11 May 7:30 a.m.–4 p.m.

Tues., 12 May 7:30 a.m.–4 p.m.

Wed., 13 May 7:30–10 a.m.

Cancellations, Changes, and Refunds

Requests for additions, changes, and cancellations must be received at GSA Headquarters by **13 April 2009**. 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 to the card identified on the registration form. GSA cannot provide refunds for on-site registration, *Abstracts with Programs*, or event ticket sales.

ACCOMMODATIONS

Blocks of rooms have been reserved for attendees at the following hotels. Attendees should call the hotel directly to make reservations and reference the 2009 GSA Rocky Mountain Section Meeting to get the group rate.

Hampton Inn & Suites, 851 West 1250 South, Orem, UT 84058, USA, +1-801-426-8700; standard room: \$104+tax.

Comfort Inn & Suites, 427 W. University Pkwy, Orem, UT 84058, USA, +1-801-431-0405; standard room: \$79.99+tax.

LaQuinta Inn & Suites, 521 W. University Pkwy, Orem, UT 84058, USA, +1-801-226-0440; standard room: \$89+tax.

TECHNICAL SESSIONS

Find session description and further information online at www.geosociety.org/meetings/.

Theme Sessions

Stratigraphy, Sedimentology, Paleontology

1. **Neoproterozoic Geology of the Rocky Mountains.** Paul Link, Idaho State University, linkpaul@isu.edu; Carol Dehler, Utah State University, chuaria@cc.usu.edu.
2. **New Developments and Discoveries in Paleozoic Stratigraphy and Paleontology in the Rocky Mountains and Basin and Range.** Scott Ritter, Brigham Young University, scott_ritter@byu.edu; Forest Gahn, Brigham Young University-Idaho, gahnf@byui.edu.
3. **Mesozoic Paleontology, Sedimentology, and Geochronology of the Rocky Mountains and Colorado Plateau.** Brooks Britt, Brigham Young University, brooks_britt@byu.edu.

Hydrology, Surficial Geology, and Engineering Geology

4. **Hydrologic Studies in the Basin and Range and Rocky Mountains.** Lucy Jordan, Utah Geological Survey, lucyjordan@utah.gov.
5. **Getting a Better Handle on the "Dirt" Covering the Bedrock—Mapping and Dating of Surficial Deposits.** Tammy Rittenour, Utah State University, tammy.rittenour@usu.edu.
6. **Quaternary Tectonics and Earthquake-Hazard Characterization in the Rocky Mountain Region.** Christopher B. DuRoss, Dept of Geology & Geophysics, University of Utah, cbdurross@hotmail.com; Ivan Wong, URS Corp., ivan_wong@urscorp.com.
7. **Geologic Hazards in the Rocky Mountain Region and Their Impacts on Development: A Tribute to the Career of Gary Christensen.** Danny Horns, Utah Valley University, hornsda@uvsc.edu.

Structure and Tectonics

8. **Compression and Extension—Thrusts and Normal Faults and Their Interplay in the Rocky Mountains and Basin and Range.** Adolph Yonkee, Weber State University, ayonkee@weber.edu.
9. **Contributions from Geophysics to Better Understanding the Structure and Tectonics of the Western United States.** John McBride, Brigham Young University, john_mcbride@byu.edu.

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Cover inset and above: Cretaceous and Jurassic strata, eastern Utah, May 2005. The wet spring helped the desert bloom. Photo by B. Kowallis.



Mount Timpanogos, the second highest mountain in Utah's Wasatch Range (11,749 ft [3,582 m]), in May 2008. View from Provo, Utah, near the Rocky Mountain Section Meeting site in Orem, Utah, USA. Photo by B. Kowallis.

Energy and Economic Geology

10. **Energy Resources and Developments in the Rocky Mountain Region.** Michael Vanden Berg, Utah Geological Survey, mvandenber@mines.utah.edu; Bill Keach, Brigham Young University, bill_keach@byu.edu.
11. **Ore Deposits in the Great Basin and Rocky Mountains.** Ken Krahulec, Utah Geological Survey, kenkrahulec@utah.gov.
12. **Industrial Mineral Deposits of the Rocky Mountain Region.** Bryce Tripp, Utah Geological Survey, brycetripp@utah.gov.

Igneous and Metamorphic Rocks

13. **Magmatism from the Mesozoic to the Present in the Great Basin and Colorado Plateaus: A Tribute to the Career of Myron G. Best.** Eric Christiansen, Brigham Young University, eric_christiansen@byu.edu.
14. **New Developments in Understanding Metamorphic Rocks in the Rocky Mountains and Great Basin.** Bill Dinklage, Utah Valley University, dinklawi@uvsc.edu; Mark Colberg, Southern Utah University, colberg@suu.edu.

Other Theme Sessions

15. **Geologic Mapping Supported by EDMAP and STATEMAP in the Rocky Mountains Region.** Bart Kowallis, Brigham Young University, bkowallis@byu.edu; Grant Willis, Utah Geological Survey, grantwillis@utah.gov.
16. **Geological Studies in National Parks and Monuments of the Rocky Mountains Region.** Paul Anderson, consulting geologist, paul@pbageo.com.
17. **Geoinformatics.** Walt Snyder, Boise State University, wsnyder@boisestate.edu.
18. **Geology and Public Policy in the West.** Christine Turner, U.S. Geological Survey, cturner@usgs.gov.
19. **Undergraduate Research (Posters).** *Cosponsored by the Council on Undergraduate Research.* Bill Dinklage, Utah Valley University, dinklawi@uvsc.edu.

FIELD TRIPS

All field trips begin and end at the Hampton Inn near Utah Valley University unless otherwise indicated.

Pre-Meeting

1. **Hot Springs of Utah Valley and the Wasatch Range.** Sun., 10 May, 8 a.m.–6 p.m. Cost: US\$50. Max.: 25. Steven H. Emerman, Utah Valley University.
This field trip includes visits to hot springs in Saratoga Springs, Diamond Fork Canyon, Spanish Fork Canyon, and Wasatch Mountain State Park. At Wasatch Mountain State Park, we will see 70-ft-thick deposits of calcareous tufa along with both flowing hot springs and hot pots, which are pools of hot water occupying craters on the tops of tufa mounds. We will discuss recent research on the arsenic cycle in hot springs and its implications for the use of hot springs as a source water for public swimming pools.

During the Meeting

2. **Behind the Scenes at the Museum of Paleontology.** Tues., 12 May, 1–5 p.m. Cost: US\$15. Max.: 30. Brooks Britt, Brigham Young University (BYU), brooks_britt@byu.edu; Rod Scheetz, BYU, rod_scheetz@byu.edu.
This excursion will include hands-on activities in the museum lab. Participants will experience preparing bones, get an introduction to the taphonomy of select quarries, and learn how global information systems (GIS) are used to better map and analyze bone locations in quarries. The Brigham Young University Museum of Paleontology has one of the largest and finest collections of Jurassic dinosaur bones as well as important collections of fossil plants and marine invertebrates.

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Post-Meeting

3. **Geologic Hazards of the Southern Wasatch Front.** Thurs., 14 May, 8 a.m.–6 p.m. Cost: US\$60. Max.: 25. Christopher DuRoss, Utah Geological Survey, cbduross@hotmail.com.

This field trip focuses on the most significant geologic hazards expressed along the southern Wasatch Front, from about Lehi to Levan. We will examine surface faulting related to large prehistoric earthquakes on the Wasatch fault zone, discuss the results of paleoseismic trenching studies, observe recent fire-related debris flows and risk-reduction measures, and examine the morphologies and damaging effects of active landslides.

4. **Tectonics and Stratigraphy of the Western Colorado Plateau.** Three-day trip, Thurs.–Sat., 14–16 May. Departing at 8 a.m. from the Hampton Inn parking lot. Cost: US\$370. Max.: 24. Bill Keach, Brigham Young University (BYU), bill_keach@byu.edu; Tom Morris, BYU, tom_morris@byu.edu; Scott Ritter, BYU, scott_ritter@byu.edu.

This robust field trip will visit and study classic Utah exposures of fluvial, shoreline, colian, and carbonate sediments within Sevier and Laramie structures and the transition between two of North America's great geologic provinces, the Colorado Plateau and the Basin and Range. On Day 1, participants will visit the "Wasatch Front," Book Cliffs, San Rafael Swell, Price Canyon, and the Wasatch Plateau. On Day 2, participants will visit Capitol Reef National Park, which is centered on the Waterpocket Fold, a 50 ± 1 Ma Laramide structure. The Capitol Reef area exposes more than 17 bedrock formations ranging in age from Permian to Cretaceous. We will view slot canyons along the Western Escarpment of the park, overview the incision and landscape evolution of the Fremont River through the Waterpocket Fold, and overview recent research completed on the Entrada Sandstone, a small coastal erg system. In the late afternoon/evening, we will drive from Torrey to Tropic via Highway 12, one of Utah's "Scenic Byways." On Day 3, participants will visit Bryce Canyon National Park, the Covenant Oil Field, and the Central Utah overthrust belt. Our visit to Bryce Canyon National Park will begin at Inspiration Point. Here one can view the Bryce Amphitheater, one of the most picturesque places on Earth. At this viewpoint, we will discuss the bedrock history, the stratigraphic succession of the Grand Staircase, and amphitheater erosional styles and rates. We will then take an ~2-hour hike on the Navajo Loop. During our return to Provo, we will stop at the Covenant Oil Field, a 200-million-plus barrel discovery within the central Utah overthrust belt. We will have several stops along the return to more closely examine the structure of the Central Utah overthrust belt.

5. **Classic Geology of the Central Wasatch Mountains: Almost Two-Billion Years of Geologic History.** Two-day trip, Thurs.–Fri., 14–15 May. Departing 8 a.m. Thurs.; returning 6 p.m. Fri. Cost: US\$170. Max.: 38. Grant Willis, Utah Geological Survey, grantwillis@utah.gov; Robert Biek, Utah Geological Survey, bobbiek@utah.gov; Mark Milligan, Utah Geological Survey, markmilligan@utah.gov.

Few places in the Intermountain West reveal a geologic history as long and complex as the central Wasatch Mountains between Salt Lake City and Provo. This area sits at the bulls-eye of many north-south and east-west structures and events, including Early Proterozoic colliding plate boundaries; Late Proterozoic rifting and subsidence; Paleozoic sagging along the Utah hingeline; Cretaceous thrusting; Cenozoic intrusions, volcanism, extension, mineralization, and mountain-building; and Late Quaternary glaciations, mass-wasting, and lacustrine events. This trip will highlight the geologic history of the central Wasatch Mountains between Salt Lake City and Provo, with stops at many of the classic sites that have helped unravel this story and at sites that show the challenges of living in harmony with such diverse geology. The trip departs Utah Valley University on Thursday morning and travels north and then east, with stops at Cedar Hills, Alpine City, the east Traverse Mountains, the G.K. Gilbert geologic park at the mouth of Little Cottonwood Canyon, Big Cottonwood Canyon, and Park City, where we will spend the night. On Friday, participants will visit classic geologic sites in Heber Valley, the Keetley volcanics at the Jordanelle Dam, the Midway hot springs, the Charleston-Nebo thrust near Deer Creek, geology of the lower Provo Canyon, the Indian Hills subdivision landslide, and stratigraphy at Rock Canyon.



Back cover and above: Thistle Landslide, which formed in 1983 during an unusually wet spring, in Spanish Fork Canyon near Provo/Orem, Utah, USA. Photo by B. Kowallis.



Triassic and Early Jurassic strata, Capitol Reef National Park, 2007. Photo by B. Kowallis.

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Bridal Veil Falls, Provo Canyon, Utah.

6. **Geology of the Kennecott Open-Pit Mine.** Thurs., 14 May, 8 a.m.–6 p.m. Cost: US\$40. Max.: 22. David Simon, Simon Bymaster Inc., david@sbigeo.com; Geoff Bedell, Kennecott Utah Copper Corp.

This trip addresses the engineering, geologic, and mining aspects of operating one of the largest open-pit copper mines in the world, and includes entering the bottom of the pit. Topics covered: the geology of the ore deposit, history of mining activities, slope stability, engineering geology, ore control, groundwater and surface-water control, and blasting techniques.

SPECIAL EVENTS

Rocky Mountain Section Banquet and Business Meeting.

Tues., 12 May, 6–8 p.m. Cost:\$50. The banquet will honor the careers of Myron Best and Gary Christensen in conjunction with the meeting theme sessions focusing on their careers. Following the banquet, we will hold the annual Section business meeting.

OPPORTUNITIES FOR STUDENTS

Mentor Programs

Questions? Contact Anny Jones, ajones@geosociety.org.

Roy J. Shlemon Mentor Program in Applied Geoscience. *Sponsored by the GSA Foundation.* Mon., 11 May, 11:30 a.m.–1 p.m. This is a chance for students to discuss career opportunities and challenges with professional geoscientists from multiple disciplines. Students will find tickets in their registration packets to attend the Shlemon Program and receive a FREE lunch. Learn more at www.geosociety.org/mentors/shlemon.htm.

The John Mann Mentors in Applied Hydrogeology Program. *Sponsored by the GSA Foundation.* Tues., 12 May, 11:30 a.m.–1 p.m. This event gives students and recent graduates with an interest in applied hydrogeology or hydrology as a career an opportunity to interact and network with professionals practicing in these fields of interest. Students will receive a ticket in their registration packets to attend this relaxed but focused small-scale event featuring a FREE lunch. Learn more at www.geosociety.org/mentors/mann.htm.

Travel Grants

Deadline to apply: 6 April 2009

Students must be Rocky Mountain Section members, currently enrolled, and registered for the meeting in order to apply for support. Find information and an application via a link at www.geosociety.org/sectdiv/.

Looking for more adventure in your region?

GSA is offering a GeoVentures™ trip for anyone interested in exploring the **Geology of the Middle Fork of the Salmon River, Idaho**, a seven-day trip running from 29 August to 4 September 2009.

This GeoVenture is a fully outfitted expedition on the Middle Fork of the Salmon River, traveling through the Impassable Canyon in the largest wilderness in the lower 48 states. The Middle Fork is considered a class 4 river and offers adventurers a great opportunity to experience the thrill of river rafting while learning about the geology of this secluded region.

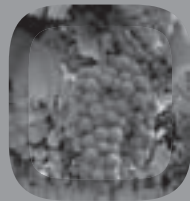
Trip cost: US\$2,350 per person for GSA members and spouses. Nonmembers: US\$2,450 per person. A **US\$600 deposit** is due by **4 May**, and the remaining **balance is due by 2 June**.

Learn more at www.geoventures.org.

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Main fork of the Salmon River a few miles downstream from where this "River of No Return" originates as a bubbling spring in the Sawtooth Mountains. Photo by K.E. Asmus.

From Volcanoes to Vineyards:
2009 PORTLAND, OREGON
Living with Dynamic Landscapes



From Volcanoes to Vineyards: Living with Dynamic Landscapes

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Wonderglobe: Background Earth image produced by Reto Stöckli; used with permission of NASA. Inside globe images: Mount Hood, Portland, Oregon; image courtesy Travel Portland. Erupting volcano photo by Ulrich. Photos of Delicate Arch, Arches National Park, Utah; Echinus Geyser, Yellowstone National Park; flash flood, Death Valley; and Great Sand Dunes, Colorado, by John Karachewski. Photo of USGS scientist conducting electronic distance measurement, South Sister Volcano, Oregon, by Lyn Topinka; used with permission of USGS. Oregon Convention Center rain garden; photo used with permission from the Oregon Convention Center.



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