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# 2008

## Final Announcement & Call for Papers JOINT MEETING

104th Annual Meeting, GSA Cordilleran Section  
60th Annual Meeting, GSA Rocky Mountain Section  
Las Vegas, Nevada, USA

19-21 March 2008

View looking west at the Spring Mountains, Red Rock Canyon National Conservation Area. Photo by Rod Metcalf.



Lake Mead is only 25 miles (40 km) from Las Vegas at its closest point. Photo: Las Vegas News Bureau, [www.lvcva.com/press/media-resources/vegas-images.jsp](http://www.lvcva.com/press/media-resources/vegas-images.jsp).



Valley of Fire State Park. Photo: Las Vegas News Bureau, [www.lvcva.com/press/media-resources/vegas-images.jsp](http://www.lvcva.com/press/media-resources/vegas-images.jsp).



The Las Vegas Strip. Photo: Las Vegas News Bureau, <http://www.lvcva.com/press/media-resources/vegas-images.jsp>.



Supplement to GSA Today

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The UNLV Department of Geoscience (Cordilleran Section) is pleased to partner with the Northern Arizona University Department of Geology (Rocky Mountain Section) to host this joint meeting.

### SETTING

Located within the Basin and Range province adjacent to the Colorado Plateau, Las Vegas offers many field trip opportunities, including trips in the eastern Mojave Desert, the northwest Colorado Plateau, and the Northern Colorado River Extensional Corridor. The accessible geology includes Proterozoic basement complexes, Paleozoic marine strata, Mesozoic continental strata, Miocene-Pliocene volcanic-plutonic complexes and syn-extensional sedimentary basins, Quaternary volcanic fields, tilted crustal sections, and structures recording Mesozoic and Cenozoic tectonism.

The meeting venue is the newly completed UNLV Student Union on the eastern edge of campus. The second floor of the building houses a modern conference facility, including a large exhibit hall, a food court, and a coffee shop; numerous lunchtime restaurants are a short walk off campus. The meeting is timed to coincide with UNLV's spring break, so ample parking will be available on campus. UNLV campus maps can be found at <http://maps.unlv.edu>.

### CALL FOR PAPERS

**Abstract Deadline:** 11 December 2007

**Submit abstracts online:** [www.geosociety.org/meetings](http://www.geosociety.org/meetings)

**Abstract submission fee:** US\$10

**Technical program chair:** Terry Spell, [terry.spell@unlv.edu](mailto:terry.spell@unlv.edu)

You may present only one volunteered paper, but you may be a co-author on multiple abstracts. Those individuals invited to present a paper in a symposium may present an additional volunteered paper. Oral presentations are 15–20 minutes, with 3–5 minutes reserved for questions and discussions. A single digital projector with standard presentation software will be provided in each room. Use of 35 mm slides will be permitted only under special circumstances and must be requested 30 days in advance by contacting the technical program chair. Dimensions for the poster boards are 4' × 8'.

Contact Nancy Wright at GSA, +1-303-357-1061, [nwright@geosociety.org](mailto:nwright@geosociety.org), if you have any problems with the electronic abstract submission process.

### REGISTRATION

**Early Registration Deadline:** 18 February 2008

**Cancellation Deadline:** 25 February 2008

**Register online at [www.geosociety.org/meetings](http://www.geosociety.org/meetings).** Early registrants receive a significant discount. If you have questions or special requirements, please contact the general meeting co-chairs: Rod Metcalf, +1-702-895-4442, [rod.metcalf@unlv.edu](mailto:rod.metcalf@unlv.edu), and Larry Middleton, +1-928-523-2429, [larry.middleton@nau.edu](mailto:larry.middleton@nau.edu). GSA and UNLV are committed to making this meeting accessible to all people interested in attending.

REGISTRATION FEES	Early	Standard
Professional Member—full meeting	US\$160	US\$190
Professional Member—1 day	US\$100	US\$110
Professional Nonmember—full meeting	US\$180	US\$210
Professional Nonmember—1 day	US\$120	US\$130
Student Member—full meeting	US\$65	US\$80
Student Member—1 day	US\$50	US\$60
Student Nonmember—full meeting	US\$90	US\$110
Student Nonmember—1 day	US\$65	US\$80
K–12 Teacher or Student—full meeting	US\$30	US\$35
K–12 Teacher or Student—1 day	US\$20	US\$25
Guest	US\$50	US\$60
Field Trip or Workshop only	US\$30	US\$40

### ACCOMODATIONS

Blocks of rooms have been reserved at three hotels near campus. To receive the GSA discount, you must reference the Geological Society of America. *Please note the reservation deadline for each hotel.*

**Alexis Park Resort:** 375 East Harmon, Las Vegas, NV 89109, USA, +1-800-582-2228, +1-702-796-3300, [www.alexispark.com](http://www.alexispark.com). Reservations must be received at Alexis Park Resort by **18 February 2008**. Rooms are US\$99 per night, plus tax. Alexis Park Resort also has special GSA rates for deluxe and upgraded suites, based on availability at the time of request.

**AmeriSuites Las Vegas:** 4520 Paradise Rd., Las Vegas, NV 89169, USA, +1-702-369-3366, [www.amerisuites.com](http://www.amerisuites.com). Reservations must be received at AmeriSuites Las Vegas by **1 February 2008**; thereafter, reservations will be taken on a space and rate available basis only. Rooms are US\$159 per night, plus tax.

**Clarion Hotel & Suites Emerald Springs:** 325 East Flamingo Rd., Las Vegas, NV 89109, USA, +1-800-732-7889, +1-702-732-9100, [www.clarionlasvegas.com](http://www.clarionlasvegas.com). Reservations must be received at the Clarion by **17 February 2008**. Rooms are US\$89 per night, plus tax.

### TECHNICAL PROGRAM

#### Symposia

- Seismic Hazards Summit—Southern Nevada Region.** Wanda J. Taylor, UNLV, [wanda.taylor@unlv.edu](mailto:wanda.taylor@unlv.edu); Jim Werle, Converse Consultants, [jWerle@ConverseConsultants.com](mailto:jWerle@ConverseConsultants.com); Craig dePolo, Nevada Bureau of Mines and Geology, [cdepolo@unr.edu](mailto:cdepolo@unr.edu); Barbara Luke, UNLV, [barbara.luke@unlv.edu](mailto:barbara.luke@unlv.edu).

This session provides the opportunity for professionals from a range of disciplines to exchange information on seismic hazards of the southern Nevada region, state-of-the-art practices in earthquake hazard identification and characterization, seismic hazard maps, and mitigation techniques for liquefiable ground, seismically induced landslides, and surface rupture potential. Papers on geology, geophysics, engineering geology, and geotechnical engineering topics are encouraged. Oral and Poster.

2. **The Klamath Mountains Province—500 Million Years of Crustal Accretion and Exhumation.** Cal Barnes, Texas Tech University, cal.barnes@ttu.edu; Aaron Yoshinobu, Texas Tech University, aaron.yoshinobu@ttu.edu; Rod Metcalf, UNLV, rod.metcalf@unlv.edu; Art Snoke, University of Wyoming, snoke@uwyo.edu.

Phanerozoic growth of the North American craton was primarily by accretion of tectonostratigraphic terranes. Therefore, an understanding of continental growth requires a thorough understanding of accretionary processes and their interplay with exhumation. The Klamath Mountains province is one of the best examples of accretion in the continental United States because it records ~500 m.y. of subduction-related terrane accretion and exhumation preserved in a series of shallow-dipping, thrust fault-bounded slices. In addition, the province has undergone Pliocene to recent uplift and exhumation that may relate to on-going accretionary processes along the Cascadian convergent margin. We invite contributions that advance our understanding of ancient and modern terrane accretion, along with associated basin development, metamorphism, and magmatism in the Klamath Mountains and neighboring provinces. Oral and Poster.

3. **Mafic-Silicic Magmatism: Crystallization Histories, Magma Interactions, and Eruption Mechanisms.** Terry Spell, UNLV, terry.spell@unlv.edu; Eugene Smith, UNLV, gene.smith@unlv.edu.

The evolution of crustal magma systems is dominated by open system processes and disequilibrium. This is recorded in plutonic and volcanic rocks by evidence for magma mixing, zonation, and chemical and isotopic heterogeneities at the intracrystalline scale. Eruption triggers, such as basalt injection into silicic magma chambers, are associated with these features. Plutonic and volcanic rocks offer distinctive but complementary data sets that, taken together, have significantly advanced our understanding of crustal magmatism. This symposium brings together workers who approach these problems with both traditional and contemporary tools, including mapping and textural relationships, geochemical and isotopic studies, mineral chronometers, and micron-scale analysis of chemical and isotopic zonation within minerals. Oral and Poster.

4. **Geomorphic Responses to Holocene Climate Change in the Western USA.** Grant Meyer, University of New Mexico, gmeyer@unm.edu; Les McFadden, University of New Mexico, lmfadnm@unm.edu.

Much attention has been focused on variations in geomorphic processes over the last glacial-interglacial transition, but climate change within the Holocene has also prompted substantial response in sensitive landscapes. We invite reports on investigations of climate-process linkages and resulting Holocene geomorphic change, especially involving weathering, soil, hillslope, and fluvial systems, over diverse environments of the western United States. Oral and Poster.

5. **The Neoproterozoic and Lower Paleozoic of the Southern Great Basin and Eastern Mojave Desert Provinces: A Session to Honor the Life of John Cooper.** Nicole Bonuso, CSU-Fullerton, nbonuso@fullerton.edu; Frank Corsetti, University of Southern California, fcorsett@usc.edu; Russell Shapiro, CSU-Chico, rsshapiro@csuchico.edu.

The barren mountains of the southern Great Basin and Eastern Mojave contain one of the world's greatest records of the Neoproterozoic to Paleozoic transition. The Ediacaran strata in the Death Valley region have facilitated the drawing of global correlations, the unraveling of "Snowball Earth," and the understanding of the development of early invertebrates and the decline of microbialites. Similarly, the Cambrian strata have proven invaluable in understanding this pivotal time period of changing tectonics and unique fauna. The Ordovician established the patterns that persisted throughout the remainder of the Paleozoic both in terms of invertebrates and lithologic facies. Throughout his long career at CSU-Fullerton, John Cooper dedicated his life to understanding these problems and to encouraging students to take to the field. As editor for the Pacific Section SEPM, he oversaw one of the most highly regarded series of field guides and conference proceedings dedicated to this subject. We encourage John's many students, colleagues, and friends to come together to honor his accomplishments. Oral.

## THEME SESSIONS

1. **Driving Mechanisms and Structural Styles of Synconvergent Extension.** John P. Platt, University of California, john.platt@usc.edu; Michael L. Wells, UNLV, michael.wells@unlv.edu; Thomas D. Hoisch, Northern Arizona University, thomas.hoisch@nau.edu.

Extension during plate convergence is widely recognized, yet its causes remain controversial. Temporal or spatial changes in plate boundary forces, buoyancy forces, and rock rheology are each inferred to be locally important. We invite contributions from workers studying the processes of both orogen-parallel and orogen-perpendicular synconvergent extension from a variety of tectonic settings in order to investigate the similarities and differences in inferred driving mechanisms, structural styles, kinematics, and tectonic settings. Oral.

2. **Causes and Consequences of Laramide Tectonics in the Forearc, Arc, and Backarc of the Southwestern United States.** Michael L. Wells, UNLV, michael.wells@unlv.edu; Carl E. Jacobson, Iowa State University, cejac@iastate.edu; Andrew P. Barth, Indiana University-Purdue University, ibsz100@iupui.edu.

The Laramide orogeny provides a world-class example of flat-slab subduction, yet the causes and consequences remain controversial. We are soliciting contributions from a broad range of geophysicists and geologists working on the various processes of interaction between the slab and overlying continental lithosphere and the record of these processes in the southwestern United States. Potential topics include the mechanisms of slab flattening, the relative roles of erosional and extensional exhumation and slab refrigeration in causing cooling, subduction erosion versus delamination, Laramide magma production and the role of slab dehydration, and underplating of the Pelona-Orocopia-Rand schists. Oral and Poster.

## Joint Meeting

- 3. Pennsylvanian to Early Triassic Deformation and Sedimentation in the Western United States.** Pat Cashman, University of Nevada–Reno, [pcashman@mines.unr.edu](mailto:pcashman@mines.unr.edu); James Trexler, University of Nevada–Reno, [jtrexler@mines.unr.edu](mailto:jtrexler@mines.unr.edu); Wanda Taylor, UNLV, [wanda.taylor@unlv.edu](mailto:wanda.taylor@unlv.edu); Walt Snyder, Boise State University, [wsnyder@boisestate.edu](mailto:wsnyder@boisestate.edu); Vladimir Davydov, Boise State University, [vdavydov@boisestate.edu](mailto:vdavydov@boisestate.edu).

Detailed field work over the past 20 years in the Great Basin has shown that the Late Paleozoic tectonic history of the western North American continental margin is complex and comprises multiple orogenic events. The most obvious events, the late Devonian Antler and the early Triassic Sonoma orogenies, bracket a time of multiple tectonic episodes that deformed strata and created both basins and regional unconformities. This orogenic activity is the ultimate control on the complex Pennsylvanian through Permian stratigraphic record of the continental margin. We invite presentations that document the details of paleogeography, timing of deformation, or geometry and kinematics of deformation during this period. In particular, we are interested in work that contributes toward the understanding of regional kinematics and possible links to coeval Ancestral Rocky Mountains tectonism in the cratonal interior to the east. Oral and Poster.

- 4. Paleozoic Environmental and Climate Changes: Evidence from the Great Basin and Beyond.** Ganjing Jiang, UNLV, [jiangg@unlv.nevada.edu](mailto:jiangg@unlv.nevada.edu).

The Paleozoic witnessed important ice ages (Ordovician and Carboniferous-Permian), mass extinctions (Late Ordovician, Late Devonian, and Late Permian), and fluctuating carbon dioxide and oxygen levels. High-resolution studies on Paleozoic paleoenvironmental and paleoclimate changes may provide critical information for understanding future climate changes and sustainable Earth environments. The Great Basin of the western United States preserves a rare sedimentary archive amenable for integrated sedimentological, stratigraphic, and geochemical studies, which in combination with coeval strata globally, would provide important information for the Paleozoic earth systems changes. This session welcomes multidisciplinary studies focusing on sedimentology, stratigraphy, and sedimentary geochemistry of the Paleozoic successions in western United States and their comparison with other successions regionally and globally. Oral or Posters.

- 5. Rancholabrean Paleocology of Western North America.** Steve Rowland, UNLV, [steve.rowland@unlv.edu](mailto:steve.rowland@unlv.edu); Aubrey Shirk, UNLV, [shirka2@unlv.nevada.edu](mailto:shirka2@unlv.nevada.edu); Josh Bonde, UNLV, [bondej@unlv.nevada.edu](mailto:bondej@unlv.nevada.edu); Angela Russo, UNLV, [russoa4@unlv.nevada.edu](mailto:russoa4@unlv.nevada.edu).

This session provides an opportunity for Pleistocene researchers to present new data and syntheses of old data concerning terrestrial paleontology, palynology, paleoclimatology, and archaeology during the terminal 500 thousand years of the Pleistocene in Western North America. Oral or Posters.

- 6. Mineralization in the Western United States.** Adam Simon, UNLV, [adam.simon@unlv.edu](mailto:adam.simon@unlv.edu); Jean Cline, UNLV, [jean.cline@unlv.edu](mailto:jean.cline@unlv.edu).

The Cordilleran–Rocky Mountain region of the western United States hosts a number of different ore deposit types ranging from the world-famous Carlin gold deposits in central and northern Nevada to the classic porphyry-copper and molyb-

denum deposits throughout the region to the reduced porphyry-copper and gold deposits of Alaska. The recent upswing in metal prices has caused resurgence in regional exploration, which requires the reevaluation of old formation models and the development of new models to guide exploration. This session invites contributions from researchers involved with mineral deposit formation with an emphasis on new data, new models, reinterpretation of extant models, exploration methods, and challenges for sustained productivity. Oral and Poster.

- 7. Geology in the K–12 Curriculum.** Steve Rowland, UNLV, [steve.rowland@unlv.edu](mailto:steve.rowland@unlv.edu); and Kim Johnson, UNLV, [kimberly.johnson@ccmail.nevada.edu](mailto:kimberly.johnson@ccmail.nevada.edu).

Exciting things are happening in K–12 earth science education. This session is an opportunity for K–12 teachers and higher-education faculty working with K–12 teachers to show off their work and exchange ideas. Posters.

- 8. Importance of Outdoor Education to Earth Sciences.** Peg Rees, UNLV, [peg.rees@unlv.edu](mailto:peg.rees@unlv.edu).

Is experiential outdoor education an essential element in enhancing earth science literacy, developing responsible public policy, and ensuring an earth science workforce in the future? Statistics show that for the first time in Americas' history, more children are being raised in urban environments than rural, and more parents are from urban environments with little or no lived-history in the out-of-doors. How does this affect (1) the future of earth science education at the K–12 and higher education levels, (2) the outdoor recreation and education activities of youths and adults, (3) earth-science literacy and public policy, and (4) the future earth-science work force? Awareness of the social and ecological consequences of Americans divorced from nature is sweeping the nation in part because of the popular book *Last Child in the Woods—Saving our Children from Nature-Deficit Disorder* (2005) by Richard Louv. This theme session will explore the causes and effects of the U.S. urban population's disconnection with nature, discuss intervention strategies, and illustrate successful programs that positively affect earth science education, literacy, public policy, and the future workforce as well as the connection of both children and adults to nature through outdoor activities. Posters.

- 9. New Developments in Earth Science Education.** James Sample, Northern Arizona University, [james.sample@nau.edu](mailto:james.sample@nau.edu).

Earth science is undergoing a rapid teaching-method evolution. New research and technology have led to development of new methods in inquiry-based, learner-centered, and collaborative explorations of science. Technological advances (e.g., Geowall, field computer tablets) have made available to many departments new ways to visualize earth science processes and relationships in lectures, labs, and the field. Papers are welcome on all topics related to innovations in earth science teaching at the K–16 and graduate levels. Oral and Poster.

- 10. Brittle Faults and Fault Damage Zones.** James Sample, Northern Arizona University, [james.sample@nau.edu](mailto:james.sample@nau.edu).

The past 10+ years have seen a rapid advance in our understanding of brittle faults. We are now able to characterize the structural evolution of these systems from incipient to kilometer-scale development of slip. Brittle fault systems are especially important for understanding the response to stress, tectonics, and fluid flow of the upper crust. These systems are spectacularly exposed in the Colorado Plateau and western

United States. Contributions that deal with all aspects of brittle faults are invited. Oral and Poster.

11. **Cenozoic Uplift of the Rocky Mountain–Colorado Plateau Region.** Karl Karlstrom, University of New Mexico, kekl@unm.edu; Eric Kirby, Penn State University, ekirby@geosc.psu.edu.

Controversies about the Cenozoic uplift history of the Rocky Mountain and Colorado Plateau regions have persisted despite over a century of intensive, multidisciplinary investigations. The adjacent Rocky Mountain and Colorado Plateau regions share common tectonic and uplift histories, Laramide uplift associated with the flat slab subduction of the Farallon plate, Middle Tertiary magmatism and associated uplift related to removal of the slab, and possible continued uplift related to Neogene mantle reorganization and asthenospheric upwelling. This session focuses on new studies that evaluate rock and surface uplift components associated with each event, and their driving forces, to arrive at a better understanding of topography, lithospheric structure, and mantle-to-surface interconnections. Papers are encouraged from a variety of datasets, especially multidisciplinary approaches.

12. **Proterozoic Tectonics of the Southwestern United States: Origin and History of the Lithosphere: From Continental Assembly to Breakup to Influence of Old Structures on Younger Tectonic Events.** Karl Karlstrom, University of New Mexico, kekl@unm.edu; Ernie Duebendorfer, Northern Arizona University, Ernie.D@nau.edu.

This session highlights research on the Proterozoic tectonic evolution of the southwestern United States as well as studies of terranes hypothesized to have been adjacent blocks within the Nuna and Rodinian supercontinents. We encourage submissions on the Mojave province, province boundaries, studies at regional to lithospheric scale, and examples of how ancient structures or compositional domains influenced later lithospheric evolution.

13. **The Wasatch Line—Geologic History of a Major Geologic Boundary.** Ronald C. Blakey, Northern Arizona University, ronald.blakey@nau.edu.

The Wasatch Line (aka Cordilleran hinge line) has been a major geologic boundary throughout geologic time. It defines a zone that stretches from the western boundary of the Northern Rockies to southern Nevada. Following Early Proterozoic accretion, it has been a passive margin hinge line, foreland basin margin, thrust belt margin, and margin to continental extension. At present, it divides major geologic provinces: the Colorado Plateau–Rocky Mountains from the Basin and Range. Throughout its history, the Wasatch line has affected sedimentation patterns, structural and tectonic trends, igneous and metamorphic events, and paleogeography. This session welcomes talks addressing any aspect of the Wasatch Line and its geologic history.

14. **Detrital Zircon Studies in Western North America.** William R. Dickinson, University of Arizona, wrdickin@dakotacom.net; Paul Link, Idaho State University, linkpaul@isu.edu.

Over the past decade, U–Pb ages of detrital zircons (DZ) have become indispensable provenance tools for basin analysis, paleogeography, and paleotectonics. Papers are sought that present new datasets, fresh syntheses, or novel approaches to interpretation within the western Cordillera of North America in hopes that the exchange of information and views among

researchers from our combined Sections will improve the utility and enhance the scope of DZ analysis. Oral and Poster.

15. **Long-Distance Transport of Las Vegas: Recent Research along a Transect with Major Neogene Extension.** Paul Umhoefer, Northern Arizona University, paul.umhoefer@nau.edu; Sue Beard, U.S. Geological Survey, sbeard@usgs.gov; Ernie Anderson, U.S. Geological Survey (retired).

The Miocene extensional domain that surrounds Lake Mead in Nevada and Arizona is arguably one of the most classic regions within the Basin and Range province. In the Lake Mead domain, the following advances have been made: low-angle normal faulting was first recognized (Anderson, 1971); lower crustal flow accompanying extension was first proposed (Anderson, 1973); the rolling hinge hypothesis was proposed (Wernicke and Axen, 1988); the eastern part of the central Basin and Range is where large-scale extension was demonstrated and quantified 20 years ago (~300%, Wernicke et al., 1988). In the past few years, there has been increased research in the domain with an emphasis on the Miocene stratigraphic record and exhumation history as well as Quaternary neotectonics. This session will highlight the major advances in recent years in the Lake Mead extensional domain.

16. **Undergraduate Research Poster Session.** Kim Hannula, Fort Lewis College, +1-970-247-7463, hannula\_k@fortlewis.edu; Jeff Marshall, Cal Poly Pomona University, +1-909-869-3461, marshall@csupomona.edu. Cosponsored by the Council on Undergraduate Research Geoscience Division.

Poster presentations are invited from any subfield of the geological sciences. An undergraduate student must be first author and presenter. The Rocky Mountain and Cordilleran Sections will each present an award for best undergraduate poster presented in this session.

## FIELD TRIPS

If you have questions about the following field trips, please contact the field trip leaders or field-trip committee members Eugene Smith, gene.smith@unlv.edu, and Ernie Duebendorfer, ErnieD@nau.edu.

### Premeeting

1. **Wilson Ridge Pluton and River Mountains Volcanic Section: Linked Magmatism in the Lake Mead Area, Nevada and Arizona.** Sun.–Tues., 16–18 March (2 days). Denise Honn, UNLV, +1-702-895-4301, dkhonn@gmail.com; Eugene Smith, UNLV, +1-702-895-3971, gene.smith@unlv.edu.

Cost: US\$305; includes hotel in Boulder City on Monday night, lunches and snacks both days, guidebook, and travel by 4WD vehicles. Participants are responsible for breakfast and dinner both days of the trip. Trip begins and ends at UNLV.

The Wilson Ridge Pluton and River Mountains volcanic section of southern Nevada and northern Arizona exemplify an igneous system with both volcanic and plutonic rocks exposed. This field trip will focus on the links between the volcanic and plutonic segments of the system, including field relationships, mafic enclaves, mineralogy, geochronology, structure, and geochemistry. On the first day, we will examine the Wilson Ridge Pluton and take a two-mile moderately strenuous hike to view spectacular magma commingling textures. On the second day, we will visit the River Mountains volcanic section and take several short hikes to view

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the River Mountains stock, rhyolite domes, and basaltic vent areas. We will return to Las Vegas on Tuesday evening in time to allow hotel check-in and participation in the welcoming party.

2. **Widespread Evidence of Late Paleozoic Tectonism in the Great Basin, Nevada.** Sun.–Tues., 16–18 March (3 days). Pat Cashman, University of Nevada–Reno, pcashman@mines.unr.edu; James Trexler, University of Nevada–Reno, jtrexler@mines.unr.edu; Wanda Taylor, UNLV, wanda.taylor@unlv.edu; Walt Snyder, Boise State University, wsnyder@boisestate.edu; Vladimir Davydov, Boise State University, vdavydov@boisestate.edu.

Cost: US\$300 per person; includes transportation, two nights lodging (two per room), two motel breakfasts, three lunches, some beverages and snacks during the trip, and a field-trip guidebook. Participants must provide their own transportation to Reno.

This field trip starts in Reno and ends at UNLV. We will examine the *widespread* evidence for late Paleozoic deformation in Nevada. (Be prepared for a lot of driving!) On the first day, we will visit Edna Mountain and the Dry Hills (Osgood Mountains), both near Winnemucca, to see evidence for mid-Pennsylvanian and Early Permian folding there. We will also discuss the reinterpretation of the “Iron Point thrust” as a late Paleozoic low-angle normal fault. On the morning of the second day, we will examine localities in the Adobe Range in and around Carlin Canyon that record mid-Mississippian, mid-Pennsylvanian, and early Permian deformation. The afternoon will be spent in the Diamond Mountains, focusing on Early Permian folding. On the third day, we will see superposed folds in the Hot Creek Mountains that record at least two oppositely verging fold-and-thrust events between Pennsylvanian and Triassic time. The trip concludes with a look at a thrust fault of possible late Paleozoic age in the Timpahute Range and a drive along the “Extraterrestrial Highway” to Las Vegas.

3. **Active Tectonics of the Eastern California Shear Zone.** Sun.–Tues., 16–18 March (3 days). Kurt Frankel, Georgia Institute of Technology, +1-404-894-4008, kurt.frankel@eas.gatech.edu; Mike Oskin, University of North Carolina, +1-919-962-4239, oskin@email.unc.edu, Allen Glazner, University of North Carolina, +1-919-962-0689, afg@unc.edu; Eric Kirby, Pennsylvania State University, +1-814-865-0732, ekirby@geosc.psu.edu; Frank Monastero, United States Navy, +1-760-939-4046, francis.monastero@navy.mil; Jeff Unruh, William Lettis & Associates, +1-925-256-6070, unruh@lettis.com; Doug Walker, University of Kansas, +1-785-864-2735, jdwalker@ku.edu.

Cost: US\$385; includes two breakfasts, three lunches, one dinner, snacks, two nights’ accommodation, transportation during trip, and a guidebook.

The eastern California shear zone plays an important role in accommodating Pacific–North America plate boundary deformation east of the San Andreas fault. This field trip will highlight recent research on fault slip rates and displacement histories in this region. Trip participants will examine late Pleistocene fault slip rate sites along the Lenwood and Calico faults in the Mojave Desert, evidence for temporal variations in fault slip rates along the Garlock fault, recent deformation in the Coso Range, total dextral displacement across Owens Valley, and late Pleistocene spatial and temporal variations in slip rate along the Owens Valley, White Mountains, and northern Death Valley–Fish Lake Valley fault zones.

4. **Ediacarian and Early Cambrian Reefs of Esmeralda County, Nevada: Congruent Ecosystems across the Neoproterozoic–Cambrian Boundary.** Mon.–Tues., 17–18 March (2 days). Steve Rowland, UNLV, +1-702-895-3625, steve.rowland@unlv.edu; Melissa Hicks, Exxon-Mobil; Lynn Oliver, U.S. Forest Service; Marty Erwin, UNLV.

Cost: US\$155; includes two lunches, one dinner, one breakfast, and transportation, with primitive camping on Monday night in the scenic wilds of Esmeralda County. Departs from UNLV at 9 a.m. on 17 March and returns to Las Vegas at ~5 p.m. on 18 March. Airport pickup can be arranged.

Participants will visit three of the best examples of Ediacarian and Early Cambrian reefs in North America: (1) the stromatolite-rich, latest Ediacarian reef complex of the Deep Spring Formation at Mount Dunfee; (2) the classic, ecologically zoned, Lower Poleta reef complex at Stewart’s Mill; and (3) a recently described, latest Early Cambrian reef complex in the Harkless Formation in Lida Valley. The Harkless reefs contain the oldest reported tabulate corals in North America; these reefs represent the last pulse of reef-building by metazoans prior to a long hiatus that extends through the Middle and Late Cambrian and Early Ordovician. The focus of the trip will be a comparison of reef community structure across the Ediacarian–Cambrian boundary. Moderately strenuous hiking and steep slopes will be involved, rewarded by spectacular exposures of reefs.

5. **Dinosaurs of Nevada: Sedimentology and Paleontology of the Mesozoic in the Valley of Fire State Park, Nevada.** Tues., 18 March (1 day). Joshua Bonde, UNLV, +1-702-468-2500, bondej@unlv.nevada.edu; David Varricchio, djv@montana.edu; Frankie Jackson, Montana State University–Bozeman, frankiej@montana.edu; Aubrey Shirk, UNLV, shirka2@unlv.nevada.edu.

Cost: US\$40; includes lunch, guidebook, and transportation.

This field trip will explore the Mesozoic sedimentology of the Valley of Fire State Park, with particular attention to the mid-Cretaceous section. We will also tour the vertebrate paleontology of these Mesozoic formations, from ichnofossils in the Jurassic Aztec Sandstone to dinosaur and turtle sites from the Lower Cretaceous Willow Tank Formation. The first Nevada dinosaurs were described from these Lower Cretaceous Formations. The biota recovered extends known Early Cretaceous faunas from western North America to southern Nevada during the Albian. Some long hikes will be included in this trip.

6. **Crustal Properties, Magmatism, and Tectonics in a Tilted Crustal Section, Eastern Transverse Ranges and Southern Mojave Desert.** Sat.–Tues., 15–18 March (3 and a half days). Andrew Barth, IUPUI, +1-317-274-1243, ibsz100@iupui.edu; Lawford Anderson, Carl Jacobson, Scott Paterson, Joseph Wooden.

Cost: US\$310; includes two breakfasts, three lunches, two dinners, transportation, and guidebook. Camping and moderate hiking are involved. Trip begins and ends in Las Vegas.

This field trip offers an overview of the tectonic evolution of a tilted section through the upper and middle crust of the Cretaceous Cordilleran arc. An east-to-west transect affords us a view of continental arc and retro-arc tectonics in the Cretaceous and a top-down view of variations in the composition and emplacement of igneous rocks, culminating in underthrust oceanic lithosphere.

## Postmeeting

7. **Cenozoic Evolution of the Abrupt Colorado Plateau–Basin and Range Boundary, Northwest Arizona: A Tale of Three Basins, Thick Lacustrine-Evaporite Deposits, and the Nascent Colorado River.** Sat.–Mon., 22–24 March (3 days). Jim Faulds, University of Nevada–Reno, +1-775-682-8751, jfaulds@unr.edu; Keith Howard, U.S. Geological Survey–Menlo Park, +1-650-329-4943, khoward@usgs.gov; Ernie Duebendorfer, Northern Arizona University, +1-928-523-7510, Ernie.D@nau.edu.

Cost: US\$380; includes two nights lodging, three lunches, two breakfasts, transportation, and guidebook. Trip begins and ends at UNLV.

In northwest Arizona, the unextended Colorado Plateau abruptly gives way to the highly extended Colorado River extensional corridor along a system of major west-dipping normal faults. Several large growth-fault basins developed in the hanging walls of these faults. Lowering of base level in this part of the Basin and Range facilitated development of the Colorado River and Grand Canyon. This trip will explore stratigraphic constraints on the timing of deformation and paleogeographic evolution of the region. Highlights include examination of mid-to late Miocene growth-fault relations that constrain the timing of structural demarcation between the Colorado Plateau and Basin and Range, a major detachment fault, synextensional megabreccia deposits, thick nonmarine carbonate and halite deposits that immediately predate arrival of the Colorado River, a post–6 Ma roll-over anticline, and basalt flows interbedded with Colorado River sediments.

8. **Interpretation of Pleistocene Glaciation in the Spring Mountains of Nevada: Pros and Cons.** Sat., 22 March (1 day). Jerry Osborn, University of Calgary, +1-403-220-6448, osborn@ucalgary.ca; Nick Saines, Saines Environmental Hydrogeology, Las Vegas, +1-702-896-4049, greatunc@aol.com.

Cost: professionals US\$40, students US\$30; includes bus transportation, lunch, and guidebook. Trip begins and ends at UNLV.

Diamicts and geomorphic features near Charleston Peak in the Spring Mountains (elevation 11,918 ft), a short distance northwest of Las Vegas, have been interpreted as glacial in origin, but a glacial origin for these features is not universally accepted. The area offers seemingly conflicting evidence for and against glaciation and provides a great example of the difficulties of definitive interpretation of diamicts. Participants will view these features at the heads of Kyle and Lee canyons in the Spring Mountains. Outcrops of diamict in the Kyle Canyon fanglomerates will also be visited. The trip includes a round-trip hike of 2+ miles. Although elevation gain on the walk itself is modest, the altitude attained (8360 ft above sea level) is over 6000 ft higher than the trip's starting point in Las Vegas, so participants should be fit and in good health. Trip leaders include a glaciation proponent (Saines) and a skeptic (Osborn).

9. **Quaternary Volcanism in the San Francisco Volcanic Field: Recent Cinder Cone Eruptions that Profoundly Affected the Northern Arizona Physiography and Life of the Ancestral Pueblo Indians.** Sat.–Sun., 22–23 March (2 days: leaves UNLV at 5 p.m. on Fri., 21 March, and returns at 9 p.m. on Sun., 23 March). Sarah L. Hanson, Adrian College, +1-517-264-3944, slhanson@adrian.edu; Wendell Duffield, wendell.duffield@nau.edu.

Cost: US\$280; includes lunches, lodging, transportation, and a copy *Volcanoes of Northern Arizona* by Wendell Duffield.

The San Francisco Volcanic Field in northern Arizona hosts over 600 volcanoes ranging in age from 6 Ma to <1000 yr. The more recent activity occurred in the eastern portion of the field-building Sunset Crater cinder cone and Merriam Crater, the Sproul, and two unnamed cinder cones. Sunset Crater produced Strombolian eruptions and two lava flows. One, or several, of the older vents, ~20 km ESE of Sunset Crater, produced the Grand Falls flow that dammed the Little Colorado River and created Grand Falls. This two-day trip will explore the eruptive products as well as the physiographic and cultural effects of these eruptions. Field locations at Sunset Crater will include the eruptive products from the Strombolian eruption, the Bonito lava flow, hornitos, squeeze-ups, and related fissure deposits. Grand Falls locations will include the lava dam at Grand Falls, flows in the Colorado River channel, and an older lava dam just north of Grand Falls.

10. **Late Paleozoic and Early Mesozoic Continental Sedimentary Rocks of Virgin River Gorge to Zion National Park and Vicinity.** Sat., 22 March (1 day). Larry Middleton, Northern Arizona University, +1-928-523-2429, larry.middleton@nau.edu; Ronald Blakey, Northern Arizona University, +1-928-523-2470, Ron.Blakey@nau.edu.

Cost US\$95; includes lunch, snacks, transportation, and a guidebook. Trip begins and ends at UNLV.

This trip focusses primarily on outstanding exposures of fluvial and eolian Permian, Triassic, and Jurassic strata between Las Vegas and Zion National Park, southwestern Utah. The first stops will be along the Virgin River Gorge where the Permian Supai Group, Hermit–Queantowep (coastal/fluvial), and arid coastline deposits of the Torowep and Kaibab formations are extremely well exposed. The majority of the trip will be spent examining Mesozoic fluvial and eolian systems. In particular, participants will examine outcrops exhibiting a myriad of eolian features, including stratification styles, soft-sediment deformation, and dune-interdune interactions in the Jurassic Navajo Sandstone, which is spectacularly exposed along the cliffs that characterize Zion National Park.

11. **Spirit Mountain Batholith and Secret Pass Volcanic Center: Magmatism in the Uppermost Crust, Colorado River Extensional Corridor, Nevada-Arizona.** Sat.–Sun., 22–23 March (2 days). Nicholas Lang, University of Tennessee–Knoxville, +1-865-974-6008, nlang1@utk.edu; B.J. Walker, Oregon State University, +1-541-737-1201, walkerb@science.oregonstate.edu; Lily Claiborne, Vanderbilt University, +1-615-322-2140, lily.e.lowery@vanderbilt.edu; Rick Hazlett, Pomona College, +1-909-621-8675, rwh04747@pomona.edu; Calvin F. Miller, Vanderbilt University, +1-615-322-2232, calvin.miller@vanderbilt.edu.

Cost: \$US210.

We will examine spectacular cross-sectional views of a Miocene batholithic complex and coeval eruptive center in southeast Nevada and northwest Arizona, respectively, emphasizing the storage, transport, fractionation, and eruption processes at a range of depths exposed by extension-related tilting. The shallow to mid-crustal Spirit Mountain batholith reveals evidence for multiple replenishment and rejuvenation over a 2-m.y. period, with extensive coarse

## Joint Meeting

cumulate granites and leucogranite (high-silica rhyolites) sheets, mafic-felsic mingling and mixing, and a major dike swarm. The roots of the possibly related Secret Pass Canyon volcanic center comprise a large, very shallow, composite laccolith and smaller dikes, sills, and a volcanic neck, with intriguing field relationships with the volcanic sequence that it intrudes and underlies. The sequence includes volcanogenic sediments, ignimbrites, domes, and block-and-ash flow deposits.

12. **Using the Earth-System approach for K–12 Curriculum—Exploring Lake Mead on the Forever Earth Boat.** Sat., 20 March (1 day). Kim Johnson, UNLV, +1-702-895-1134, kimberly.johnson@unlv.edu. **CANCELLED.**
13. **Devonian Carbonate Platform of Eastern Nevada: Facies, Surfaces, Cycles, Sequences, Reefs, and Catastrophic Alamo Impact Breccia.** Sat.–Mon., 20–22 March (3 days). John E. Warme, Colorado School of Mines, +1-303-273-3816, jwarne@mines.edu; Jared Morrow, San Diego State University; Charles Sandberg, U.S. Geological Survey–Denver.

Cost: US\$294; includes lunch for three days and dinner on day 1. Leaves UNLV at 5 p.m. on Friday, 19 March, and ends at UNLV on Monday evening, 22 March.

This excursion is based in Alamo, Nevada, ~150 km (100 mi) north of Las Vegas. Our emphasis will be on platform lithostratigraphy but will include overviews of the conodont biostratigraphy that is crucial for understanding regional correlations and chronostratigraphy. We will complete traverses in several local ranges and study the Lower Devonian Sevy Dolostone, the thin Oxyoke Canyon Sandstone, the transition to the Middle Devonian Simonson Dolostone, and the limestones of the recently named Fox Mountain Formation, and then examine in more detail the Upper Devonian Guilmette and West Range formations. Of special interest is the stratigraphically anomalous Alamo Breccia that represents the middle Member of the Guilmette. This spectacular catastrophic megabreccia, 50–100 m (165–330 ft) thick, may be the best exposed and exhibited proven bolide impact breccia on Earth. It contains intervals generated by the seismic shock, ejecta curtain, tsunami surge, and backwash of a major impact whose central crater has yet to be found or recognized.

### SHORT COURSE

**Using GPS Data to Study Crustal Deformation, Earthquakes, and Volcanism: A Workshop for College Faculty.** Shelley E. Olds, UNAVCO, +1-303-381-7496, olds@unavco.org; Susan C. Eriksson, UNAVCO, +1-303-381-7466, eriksson@unavco.org. Sponsored by UNAVCO with support from the National Science Foundation and NASA. Limited to 25 participants; course registration information is online at [http://unavco.org/edu\\_outreach/shortcourses.html](http://unavco.org/edu_outreach/shortcourses.html).

This course is geared toward faculty at two- and four-year institutions who teach general science education and introductory or lower level geoscience courses in which plate tectonics is a topic. Faculty will be introduced to place-based, data-rich educational materials about GPS and plate tectonics to use in their classrooms, receive an introduction to high-precision GPS, and have the opportunity to discuss pedagogical strategies for classroom implementation. Anticipated topics include recent advances in researching slow earthquakes in Cascadia, movement along the San Andreas fault, and monitoring volcano deformation. Although individuals with GPS experience are welcome, knowledge of GPS is not required. Participants should bring a laptop

computer, preferably with wireless internet capability. Those without access to a lap top computer should contact Shelly Olds.

### MEETING AND SPECIAL EVENTS

**Icebreaker Reception: Tues., 18 March, 5–7p.m.**

**Annual Business Meeting, Rocky Mountain Section, GSA:** Wed., 19 March, 5–7 p.m.

**Annual Business Meeting, Cordilleran Section, GSA:** Thurs., 20 March, 5–7 p.m.

### OPPORTUNITIES FOR STUDENTS

#### Volunteering

The local committee and officers of GSA's Cordilleran and Rocky Mountain Sections extend the opportunity for free registration to a limited number of students. We rely on student volunteers to help meetings run smoothly, and we are pleased to offer student volunteers free registration for the meeting in return for ~6 hours of volunteer work. **Deadline for volunteering: 1 February 2008.** Contact Rod Metcalf, rod.metcalf@unlv.edu, for more information.

#### Awards

Awards will be given for best student oral (undergraduate or graduate) and poster (undergraduate only) presentations. To be eligible, students must be lead authors and presenters and should clearly identify their abstracts as student work.

#### Travel Grants

Travel grants will be available for a limited number of students presenting papers (oral or poster) at the meeting. Only students who are currently enrolled and are members of the relevant section may apply for support, and students must be registered for the meeting before applying online. **Application deadline: 11 February 2008.** For more information, see the GSA Web site or contact either the Cordilleran Section, secretary Joan Fryxell, +1-909-880-5311, jfryxell@csusb.edu, or the Rocky Mountain Section secretary, Kenneth E. Kolm, +1-303-231-9115 ext. 110, kenneth.kolm@arcadis-us.com.

### MENTOR PROGRAMS

These mentor programs are sponsored by the GSA Foundation and include free meals for all participants. **Questions?** Contact Jennifer Nocerino, jnocerino@geosociety.org, +1-303-357-1036.

**Roy J. Shlemon Mentor Program in Applied Geoscience:** Thurs.–Fri., 20–21 March, 11:30 a.m.–1 p.m.

**The John Mann Mentors in Applied Hydrogeology Program:** Thurs., 20 March, 5–6:30 p.m.

### SPOUSE AND GUEST ACTIVITIES

Red Rock Canyon National Conservation Area, Lake Mead National Recreation Area, Hoover Dam, Valley of Fire State Park, and Spring Mountains Ranch State Park are all within an hour's drive of UNLV, and Death Valley National Park, Zion National Park, and the Mojave National Preserve are within a few hours' drive. For those interested in the more "traditional" Las Vegas experience, the Las Vegas Strip is but minutes from campus and offers shows and entertainment, shopping, and art galleries.