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North American coral recovery after the end-Triassic mass extinction, New York Canyon, Nevada, USA

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SCIENCE

Cover: Looking across New York Canyon as seen from Ferguson Hill in west-central Nevada, USA. See related article, p. 4–9.

GROUNDWORK

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GSA News

Cover inset photo courtesy of Visit Baltimore.

North American coral recovery after the end-Triassic mass extinction, New York Canyon, Nevada, USA

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ABSTRACT

A Triassic-Jurassic (T/J) mass extinction boundary is well represented stratigraphically in west-central Nevada, USA, near New York Canyon, where the Gabbs and Sunrise Formations contain a continuous depositional section from the Luning Embayment. The well-exposed marine sediments at the T/J section have been extensively studied and reveal a sedimentological and paleontological record of intense environmental change and biotic turnover, which has been compared globally. Unlike the former Tethys region, Early Jurassic scleractinian corals surviving the end-Triassic mass extinction are not well-represented in the Americas. Here we illustrate corals of Early Sinemurian age from Nevada located at three horizons above the T/J boundary. These well-preserved corals represent one of the earliest Jurassic appearances in North America and the earliest in the United States. Their co-occurrence with bivalves, gastropods, and ammonites adds additional faunal elements to the study. The corals are exclusively solitary and occur in profusion packed within beds. They all belong to the family Stylophyllidae, known to have been extinction resistant. These post-extinction corals support the Hispanic Corridor hypothesis and provide new data on biotic recovery following the end-Triassic mass extinction.

INTRODUCTION

Mass extinction events punctuate the evolution of marine environments, and recovery biotas paved the way for major biotic changes. Understanding the responses of marine organisms in the post-extinction recovery phase is paramount to gaining insight into the dynamics of these changes, many of which brought sweeping biotic reorganizations. One of the five biggest mass extinctions was that of the end-Triassic, which was quickly followed by phases of recovery in the Early Jurassic. The earliest Jurassic witnessed the loss of conodonts, severe reductions in ammonoids, and reductions in brachiopods, bivalves, gastropods, and foraminifers. Reef ecosystems nearly collapsed with a reduction in deposition of $CaCO_3$. Extensive volcanism in the Central Atlantic Magmatic Province and release of gas hydrates and other greenhouse gases escalated CO_2 and led to ocean acidification of the end-Triassic (Hautmann et al., 2008).

Reef-building scleractinian corals and spinctozoid sponges experienced severe setbacks after the Late Triassic reef optimum (Stanley, 2003; Flügel, 2002). Although coral recovery began soon after the extinction (Lathuilière and Marchal, 2009), their diversity was low (Fig. 1). Compared to other calcified biotas, reef-building corals and sponges experienced proportionately greater losses (corals, 96.1%; sponges 91.4%), possibly related to their reduced physiological control of calcification with respect to aragonite saturation (Hautmann et al., 2008). Most reports of Early Jurassic corals come from tropical to subtropical regions of the former Tethys, now

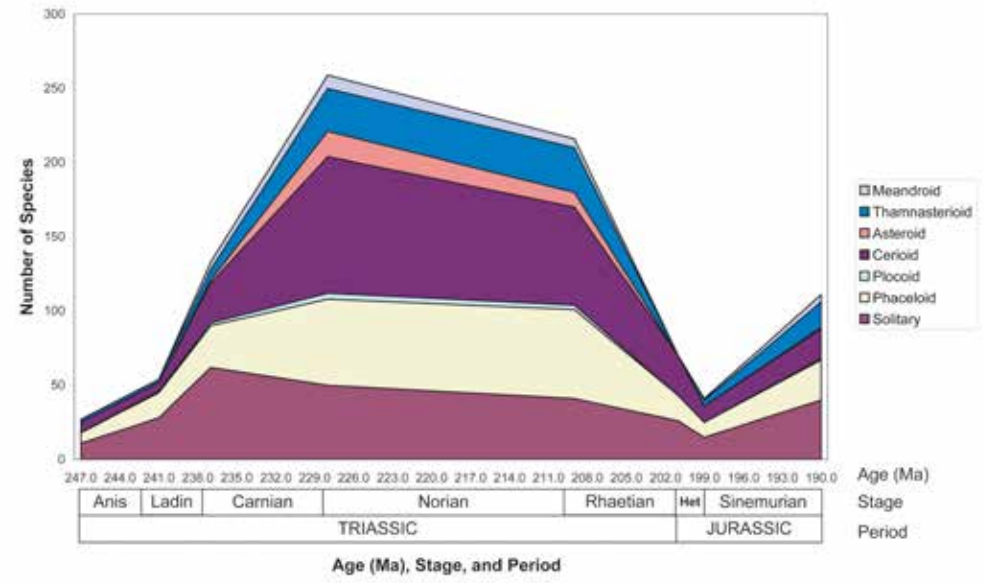

Figure 1. Reef diversity through time plotted by highest to lowest corallite integration levels. Information derived from Paleobiology Database; figure from Shepherd, 2013. Het—Hettangian.

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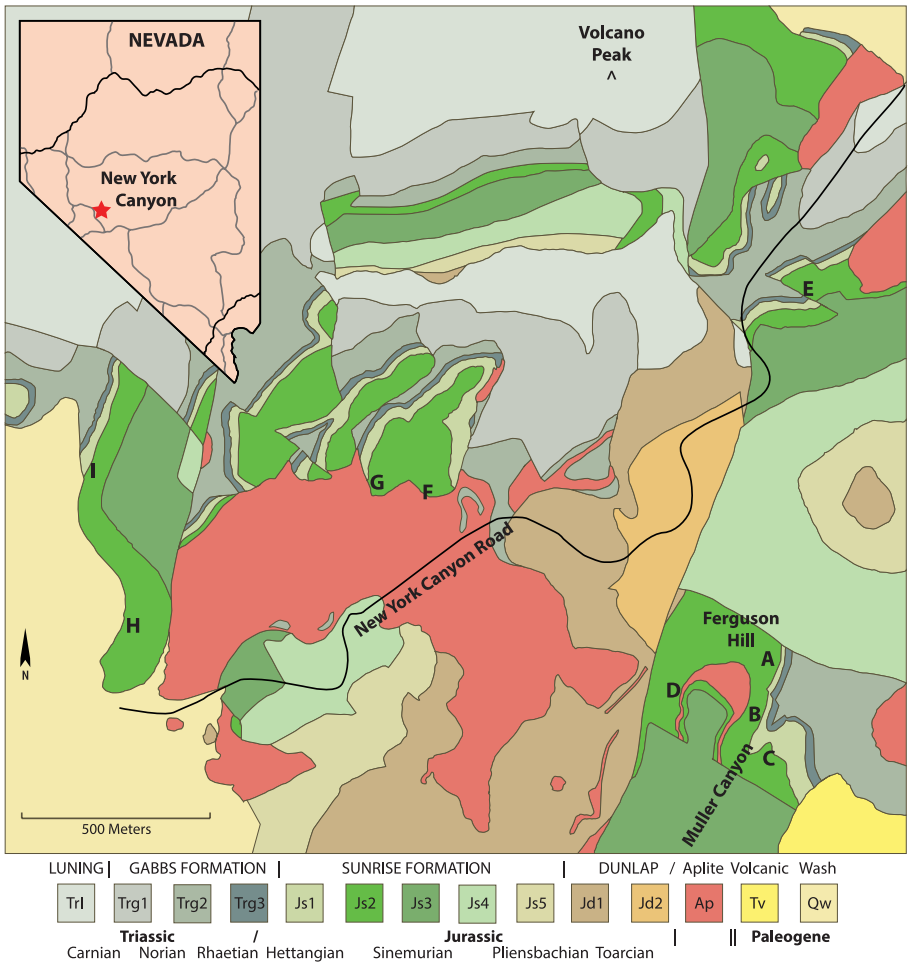

Figure 2. Geologic map of New York Canyon, Nevada, USA. The Involutum Zone coral-collecting sites labeled A–I are located in the upper layers of the Js2 unit. Map modified from Ferguson and Muller, 1949.

comprising central Eurasia and Morocco (Lathuilière and Marchal, 2009). Jurassic examples from the Americas are rare, while Triassic corals are relatively common (Stanley, 1997).

Because Early Jurassic corals from North America are so rare, new occurrences are vital to understanding biotic responses in the post–mass extinction interval. Here we make a preliminary report of the earliest Jurassic corals from the USA and some of the earliest in North America. These examples occur at New York Canyon in west-central Nevada's Sunrise Formation (Fig. 2). The site has attracted international attention because it is among the best documented T/J sections (Lucas et al., 2007). The coral occurrences in this section are near the T/J boundary, making the Nevada site ideal for understanding the dynamics of coral recovery and comparing them with the Tethys.

GEOLOGIC SETTING AND BIOCHRONOLOGY OF NEW YORK CANYON

The Gabbs and Sunrise Formations at New York Canyon were first described by Muller and Ferguson (1936) and have become an international reference section for the T/J boundary. In New York Canyon, the Lower Jurassic Sunrise Formation and underlying Upper Triassic Gabbs Formation represent coherent and conformable alternating siltstone and limestone marine sequences deposited in the shallow portion of the Luning Embayment. Investigations on the stratigraphy (Taylor et al., 1983; Hallam and Wignall, 2000), the biochronology (Guex, 1995; Taylor et al., 2001), and carbon isotopes (Guex et al., 2004; Ward et al., 2007; Porter et al., 2014) have established the Ferguson Hill section as a relatively complete marine sequence spanning the Upper Triassic to Lower Jurassic boundary (Guex et al., 1997; McRoberts et al., 2007; Lucas et al., 2007; Ritterbush et al., 2014).

Early Jurassic corals forming the basis of this report were collected from nine sites in the Ferguson Hill Member of the Sunrise Formation (in the vicinity of New York Canyon, Fig. 2) including the Involutum Zone Type Section (Taylor et al., 2001) and the Ferguson Hill section, just above the T/J boundary (Fig. 3). All locations are in the Early Sinemurian Involutum Zone, a Cordilleran ammonite zone correlated with the upper Bucklandi subzone to lower Semicostatum zone of northwestern Europe (Taylor et al., 2001).

The Involutum Zone at New York Canyon corresponds to the 15-m-thick, thin-to-medium bedded limestone and siltstone superjacent to the more thickly bedded dark gray-to-black chert-rich limestone (Taylor et al., 1983). The base of the New York Canyon Involutum Zone is well-demarcated by bioclastic limestone overlaying more resistant, darker siliciclastic limestone beds (Taylor et al., 2001) and is very pronounced at Ferguson Hill. The Involutum Zone occurs in the upper beds of the Js2 unit (Fig. 2).

Corals in the New York Canyon area are biostratigraphically constrained by ammonites in three horizons measured above the

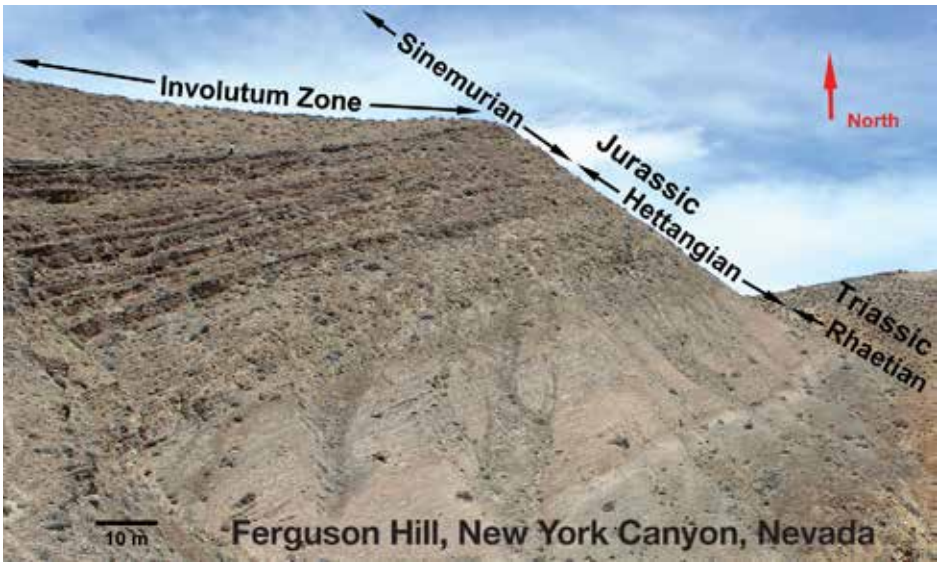

Figure 3. East side of Ferguson Hill, New York Canyon, Nevada. Coral-bearing Involutum Zone is visible at the top of the photo where resistant darker siliceous limestone beds are overlain by primarily non-resistant light brown siltstone beds 40 m above the T/J boundary.

base of the Involutum Zone. The first corals are at 4 m in the *Coroniceras fergusoni* horizon. The next corals occur at 10–12 m in the Volcanoense Subzone, and lastly at 13–15 m in the Mullerense Subzone (Taylor et al., 2001). The most abundant coral-bearing outcrops are on top of Ferguson Hill at N 38°29.237′; W 118°5.033′ and the first ridge southeast of the Involutum Zone Type Section at N 38°29.478′; W 118°5.669′. Co-occurring with the corals is *Weyla alata*, an endemic Hettangian to Pliensbachian bivalve of eastern Panthalassa (Damborenea and González-León, 1997). Corals at New York Canyon were first recorded by Muller and Ferguson (1936) and subsequently recognized by current researchers (Guex, personal commun., Sept. 2014; Caruthers, personal commun. Aug. 2014; Ritterbush et al., 2014). Unfortunately, no taxonomic determinations have been published pertaining to the corals.

Hundreds of solitary corals were collected. Genera identified are *Stylophyllopsis*, *Protostylophyllum*, and *Haimeicyclus* (Fig. 4); all belong to the family Stylophyllidae. They are enclosed in fine-grained, poorly sorted siliciclastic limestone with abundant coated and micritized molluscan bioclasts. Most coral calices are infilled with peloids, indicating a shallow, well-lit, energetic marine environment. While a few corals occur in life positions, many appear overturned and reworked (Fig. 5). The early Sinemurian stylophyllids at New York Canyon are unique in being solitary, with gregarious associations. The coral larvae were likely fixosessile, attaching either to small grains or shell fragments. They also show distinctive expansions and constrictions, expressed both internally and externally on the epithecal wall (Fig. 4). This indicates polyp rejuvenation, likely as an ecological avoidance to smothering by frequent, perhaps cyclic influxes of exogenous sediment. Such cyclic rejuvenescence is well known among solitary rugose (Berkowski, 2012) and modern corals (Chevalier and Beauvais, 1987). Corals at New York Canyon were capable of surviving smothering by both

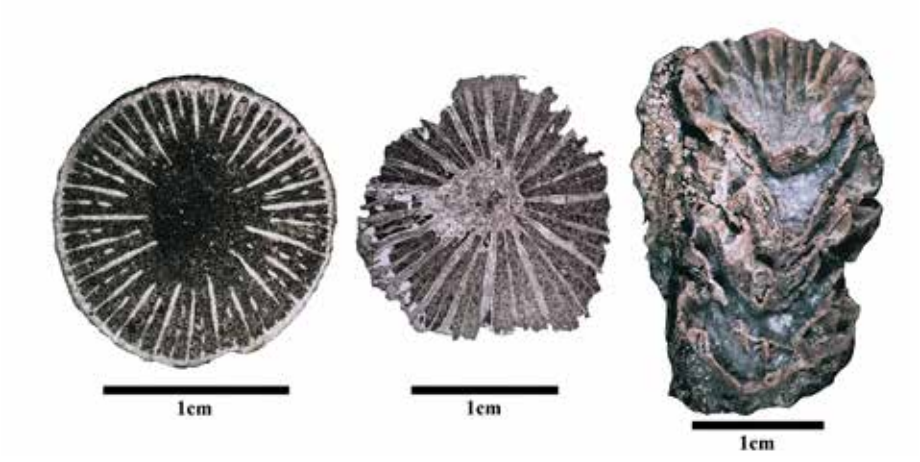

Figure 4. Cross-sectional views of coral from the Ferguson Hill Member of the Sunrise Formation. *Haimeicyclus* (left; specimen no. UMPC14687), *Protostylophyllum* (middle; specimen no. UMPC14688). A weathered specimen of *Stylophyllopsis* (right; specimen no. UMPC14689) displays a series of expansions and constrictions of the corallite indicating high sedimentation rates.

Figure 5. In-situ corals from the Ferguson Hill Member displaying reworked and life positions. Scale bar: 1 cm. Specimen no. UMPC14690.

sediment rejection and polyp regeneration. The lack of colonial corals is unusual and might indicate that these solitary taxa were better adapted at sediment rejection or that they were ahermatypic and, like many living examples, utilized a simple growth form.

JURASSIC RECOVERY AMONG CORALS

Many marine faunas underwent an Early Jurassic post-extinction recovery including corals. Earliest Jurassic (Hettangian) corals occur in mostly low diversity associations in the former Tethys region and appear absent in North America. Sinemurian coral deposits are known in reefs of British Columbia, Canada (Stanley and Beauvais, 1994), and Sonora, Mexico (González-León, et al., 2005). Sinemurian patch reefs also come from Peru (Wells, 1953). Non–reef building Hettangian to Sinemurian corals also occur in Peru (Senowbari-Daryan and Stanley, 1994) and Chile (Prinz, 1991). The Early Jurassic corals of the Americas are mostly holdover taxa from the Triassic.

Tethyan reef recovery started in the Hettangian (Kiessling et al., 2009; Gretz et al., 2013) but coral diversity was low. From the standpoint of changes in taxonomic composition, Tethyan corals show a recovery within the post-extinction survival interval (Beauvais, 1989). Their taxonomic composition reveals dominantly Triassic holdover taxa during the earliest Hettangian to Sinemurian intervals with increasingly new taxa into the Pliensbachian. By the Toarcian, an entirely new Jurassic coral assemblage evolved with few Triassic holdovers (Beauvais, 1986). From the standpoint of coral and reef diversity, it was not until the Middle Jurassic that the ecosystem was fully recovered (Stanley, 1997). By that time most Triassic holdovers were extinct.

Corals of the family Stylophyllidae (including New York Canyon) survived the end-Triassic extinction in the Tethys and diversified during the Early Jurassic (Melnikova and Roniewicz, 2012). This group is represented by solitary and phaceloid corals, which flourished briefly in the post-extinction aftermath. The branching *Phacelostylophyllum rugosum*, for example, was the reef builder in western Canada and Chile, while another *Phacelostylophyllum* species dominated the Early Jurassic reef in Peru (Stanley and Beauvais, 1994). In the Tethys, identical or closely related stylophyllids likewise constructed the two known earliest Jurassic patch reefs (Kiessling et al., 2009; Gretz et al., 2013). *Stylophyllopsis, Protostylophyllum*, and *Haimeicyclus* at New York Canyon reveal a strong taxonomic connection with Tethyan taxa. New York Canyon corals such as *Protostylophyllum* also reveal close affinities with Upper Triassic Tethyan species of the same genus (Roniewicz and Michalík, 2002).

Compared to the Tethys, precious little is known about American corals after the end-Triassic event. In west-central Nevada, Upper Triassic corals are well documented from the Luning and Osobb Formations (Roniewicz and Stanley, 2013). The Triassic corals of Nevada reveal strong North American endemism but strangely lack any representatives of the stylophyllids that are so pervasive in the Triassic Tethys. The cosmopolitan pattern of the Early Jurassic New York Canyon stylophyllid corals compared with those of the Tethys, along with the endemic pattern of the Late Triassic corals of Nevada, provide paleobiogeographic support for the Hispanic Corridor (Smith, 1983). The Hispanic Corridor was a narrow, embryonic Atlantic seaway hypothesized to have opened in Pliensbachian time, creating a shortcut connection between the Tethys and eastern Panthalassa (Aberhan, 2001). The New York Canyon corals indicate the existence of this seaway earlier in the Sinemurian, supporting the postulates of Sha (2002).

DISCUSSION AND CONCLUSIONS

The collapse of marine ecosystems at the end-Triassic is linked to ocean acidification, and a biocalcification crisis accounts for the scarcity of corals and reefs in the Early Jurassic (Martindale et al., 2012). The geographic proliferation of Late Triassic reefs through the Tethys is in stark contrast to their Early Jurassic reduction (Fig. 6). The Early Jurassic reef eclipse is revealed by only two rare examples, those in southern France (Kiessling et al., 2009) and Scotland (Gretz et al., 2013). This is the effect predicted for modern reefs under ocean acidification models projected 35–60 years from today (Hoegh-Guldberg et al., 2007). In Early Jurassic deposits of the Tethys, stylophyllid corals were common (Beauvais, 1976), along with cerioid *Septastrea* and *Astrocoenia*. Melnikova and Roniewicz (2012) reported Early Jurassic corals from the Pamir Mountains (Hettangian-Sinemurian) and noted how stylophyllids pass through the Triassic briefly proliferating during Early Jurassic time. A late Sinemurian coral reef reported from an outboard oceanic terrane in western Canada (Stanley and McRoberts, 1993) was constructed by large colonies of the stylophyllid *Phacelostylophyllum* (Stanley and Beauvais, 1994). A comprehensive database of Triassic and Jurassic Tethyan corals (Lathuilière and Marchal, 2009; Roniewicz and Morycowa, 1993) shows the survival pattern.

The New York Canyon corals offer additional information on recovery in eastern Panthalassa along the craton of North America. Paleogeographically, the New York Canyon corals show a strong connection with Tethys but in contrast are exclusively solitary and exclusively stylophyllid taxa. Hettangian corals are unknown from North America, so for the present, the New York Canyon site may be the earliest North American Jurassic example. Analysis of these corals fills a neglected but important part of the T/J recovery phase in North America, while lending support for an earlier opening of the Hispanic Corridor.

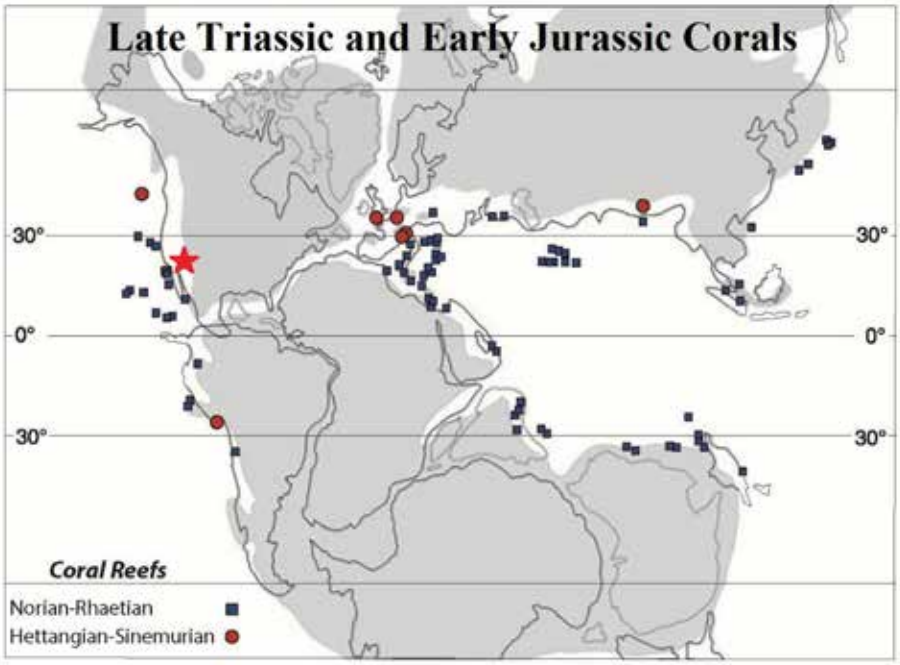

Figure 6. Paleogeographical map of Pangea (gray) showing reefs of the Late Triassic (blue boxes) and the Early Jurassic (red circles). The star represents Ferguson Hill Member corals. Data derived from the Palaeoreef database. Map modified from Lathuilière and Marchal, 2009.

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Manuscript received 6 Mar. 2015; accepted 9 July 2015.

1-4 NOVEMBER
GSA 2015
Baltimore, Maryland, USA

Registration

You still have time to register for GSA 2015! You can do so online at **community.geosociety.org/gsa2015/registration** throughout the meeting or at the on-site registration desk at the Baltimore Convention Center. **Badges** will be available at the registration desk starting at 7 a.m. on Saturday, 31 Oct. **Cancellation deadline:** 5 Oct.

STANDARD/ONSITE REGISTRATION FEES (in U.S. dollars)

	ONE DAY	FULL MEETING
Professional member	$265	$445
Professional member 70+	$190	$350
Professional non-member	$325	$560
Student/early-career professional member	$85	$155
Student non-member	$110	$195
High-school student	n/a	$40
K–12 professional	n/a	$65
Field Trip or Short Course only	$40	n/a
Guest or spouse	n/a	$90
Low income country*	50%	50%

*Participants from countries classified as "Low or Lower Middle Income Economies" by the World Bank need only pay 50% of the category fee for full meeting or one day registration. Online registration is not available for "Low or Lower Middle Income Economy" registrants. Please fill out a hardcopy version of the registration form and mail it to GSA, P.O. Box 9140, 3300 Penrose Place, Boulder, CO, 80301-9140, USA.

Continuing Education Credits (CEUs)

With credits available for technical sessions, short courses, and field trips, the Annual Meeting offers an excellent opportunity to earn CEUs toward your general continuing education requirements for your employer or K–12 school. After the meeting, contact William Cox at wcox@geosociety.org for a meeting evaluation form; return the form, and you will receive your CEU certificate within two weeks via post.

Special Requirements

GSA strives to create a pleasant and rewarding experience for every attendee. Let us know in advance of the meeting if you have needs that require further attention, either when you register or by contacting meetings@geosociety.org in advance of the meeting.

SPEAKING OF BADGES...

Show Your Badge Baltimore!

Baltimore's Show Your Badge Baltimore Program is bursting with unexpected restaurants and attractions all around town, and you are eligible for exclusive discounts! Just show your badge at the participating establishments to receive a special promotion or discount. For more information, to make reservations, or to plan your itinerary, stop by the Convention Concierge at the Baltimore Convention Center, call +1-877-Baltimore, or visit the Baltimore Visitor Center Inner Harbor at 401 Light Street. Note: GSA recommends that you remove your badge when you are outside of the convention center for your safety and security.

Travel & Transportation

Are You Ready to Go?

International Visitors: Double check that your **passport** is up to date and valid for your dates of travel; make sure you have your **visa** (if it's required; look here: http://travel.state.gov/content/visas/english/visit/visitor.html); and print GSA's **letter of invitation** at http://rock.geosociety.org/forms/visa_form.asp and be sure to bring it along with your other travel documents.

Have you booked your flight? Southwest Airlines is GSA's official conference airline, and discounted pricing can be booked at https://www.swabiz.com/flight/search-flight.html?cid=99343650.

Taking the Train? Amtrak is offering discounted fares! Please be sure to refer to **Convention Fare Code X70W-928** when making your reservation.

Driving to the meeting and need a place to park? We've got you covered with Parking Panda, https://www.parkingpanda.com/gsa-baltimore-parking?ref=gsa.

Find these links and more travel information at **community.geosociety.org/gsa2015/attendeeinfo/travel.**

Accommodations

Hotel Critical Dates

22 Oct.: All changes, cancellations, and name substitutions must be finalized through Visit Baltimore/GSA Housing by this date. At this time the hotel(s) are still holding the rooms in the GSA block under The Geological Society of America. The hotels will download their room lists on this date.

23 Oct.: Beginning on this date, you must contact the hotel directly for all changes, cancellations, and new reservations. The hotel(s) will now have individual names on each of the reservations in the GSA room block. Visit Baltimore Housing Services/GSA Housing Bureau will continue to assist you in finding a hotel.

Please continue to check our website for updates on hotel availability. We can provide you with an up-to-date list of hotels that have availability and give you a rate range. If you still have questions about hotel reservations, contact Becky Sundeen at GSA, +1-303-357-1041.

How does GSA protect my room reservation?

GSA signs contracts with each hotel in the official GSA room block. Each hotel agrees to provide a room for each reservation made through Visit Baltimore/GSA Housing Bureau. In the event that the hotel is unable to honor reservations, the hotel must make the following arrangements:

1. Provide you with alternative accommodations at a comparable hotel, first using hotels that are part of the GSA block;
2. Pay the first night's room and tax at the comparable hotel AND provide an amenity and note of apology from the hotel's general manager upon your return to the original hotel;
3. Pay the transportation costs to the comparable hotel as well as the return to the hotel the following day;
4. Pay transportation costs for two round trips per day to and from the comparable hotel and the convention center.

Your responsibility is to arrive on your scheduled arrival date. Double-check the arrival date on your hotel reservation to make sure it's correct. If you do not check in on the date scheduled, the hotel will release your room and you will be charged one night's room fee plus tax. If you have travel delays and cannot arrive as scheduled, contact the hotel staff directly to let them know of the change.

Childcare by KiddieCorp

The youngest attendees can enjoy the meeting while you are in sessions by participating in the KiddieCorp childcare program. The program is open to children six months to 12 years for only US$9 per hour per child (two hour min.). Register online through the GSA website.

Visit the Exhibit Hall and the GSA Headquarters Booth

The Exhibit Hall opens at 2 p.m. on Sunday and closes at the end of the Exhibits Opening Reception, which runs from 5:30 to 7 p.m. Please join us then, and check your badges for a free drink ticket!

Plan to visit the GSA Headquarters Booth throughout the meeting for exciting activities, presentations, giveaways, and displays.

Book signing: Simon Winchester will be on-hand on Sunday, 5:45–7 p.m., to sign copies of his newly released book, *Pacific*, as well as *The Map That Changed the World*, both of which will be available for purchase (brought to you by GSA's Geology and Society Division).

View a newly rediscovered, high-quality facsimile, pristine **first edition of William Smith's 1815 Geological Map of England and Wales** from the Geological Society of London's Library. This will only be available to view at certain times during the meeting—check at the headquarters booth for details.

1-4 NOVEMBER
GSA 2015
Baltimore, Maryland, USA

Joseph Thomas Pardee (1871–1960)

Pardee **Keynote Symposia**

Featured Speakers

Hugh S. Torrens

Pardee Keynote Symposium P1, **"Celebrating the Genius of William 'Strata' Smith: Bicentennial Anniversary of Smith's Revolutionary Map"**

Baltimore Convention Center, Room 327/328/329, Sunday, 9:05 a.m.

Hugh S. Torrens, Professor Emeritus of History of Science and Technology at Keele University, is, thanks to the work of the late Joan Eyles which he inherited, an authority on William Smith. Through decades of painstaking research, Torrens reconstructed the early mapping endeavors of Smith and uncovered personal vignettes from Smith's life that captured public attention. With more than 200 books, papers, and articles to his credit, Torrens' research has also encompassed the life and accomplishments of Mary Anning, early research in dinosaurs, and paleontological studies.

James Balog

Pardee Keynote Symposium P2, **"Savor the Cryosphere"**

Baltimore Convention Center, Room 327/328/329, Monday, 3:05 p.m.

For 35 years, photographer James Balog has broken new conceptual and artistic ground on one of the most important issues of our era: human modification of our planet's natural systems. He and his Extreme Ice Survey team are featured in the 2012 internationally acclaimed, Emmy®-award–winning documentary *Chasing Ice* and in the 2009 PBS/NOVA special, "Extreme Ice." Balog has a graduate degree in geology from Boston College and in geomorphology from the Institute of Arctic and Alpine Research (INSTAAR), University of Colorado, Boulder. James Balog is also Monday's "Feed Your Brain" speaker (12:15–1:15 p.m.).

Doug Erwin

Pardee Keynote Symposium P3, **"Earth-Life Systems at the Dawn of Animals"**

Baltimore Convention Center, Room 327/328/329, Tuesday, 11:30 a.m..

Doug Erwin is a paleobiologist at the National Museum of Natural History where he is currently working on aspects of evolutionary novelty and innovation. He and coauthor Jim Valentine recently published *The Cambrian Explosion*, a comprehensive study of the Ediacaran-Cambrian diversification of animals. His talk title is "Biological Drivers and Geological Controls on the Ediacaran-Cambrian Diversification of Animals."

Taylor Perron

Pardee Keynote Symposium P5, **"Appalachian Geomorphology"**

Baltimore Convention Center, Room 327/328/329, Wednesday, 9:15 a.m.

Taylor Perron's research focuses on the physical processes that create landscapes, both on Earth and on other planets and moons. His group's efforts currently follow three themes: the development of uniform patterns in landscapes, and the interpretation of these patterns as records of the geologic past; the influence of climate on erosion and landscape evolution; and the role of fluids in shaping landscapes on Mars and Titan (Saturn's largest moon).

Note: Pardee Keynote Symposium P4, **"Similar Information, Different Results: Fracking from State to State"**

Baltimore Convention Center, Room 327/328/329, Tuesday, 1:30 to 5:30 p.m.

Convened by R. Laurence Davis and Christopher P. Carlson, this symposium will feature a panel discussion with time for Q&A after talks by geologists and policy makers who will outline their state's policies regarding hydraulic fracturing.

Special **Earthquake Session**

Nepal (Gorkha) Earthquake

Mon., 2 Nov., 8 a.m.– noon, Baltimore Convention Center, Room 345/346.

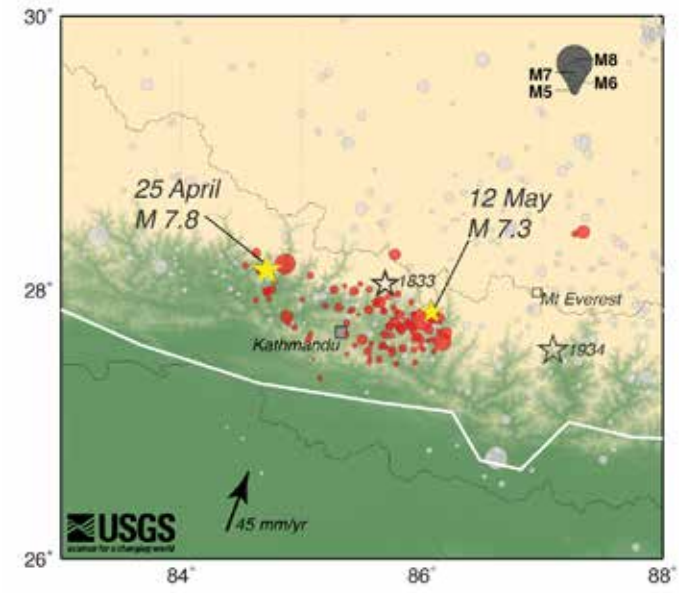
Conveners: Anke M. Friedrich; Elizabeth J. Catlos.

Cosponsored by GSA; GSA Geology and Society Division; GSA Geophysics Division; GSA Quaternary Geology and Geomorphology Division; GSA Structural Geology and Tectonics Division; GSA International.

School collapse in Kathmandu; photo taken 25 Apr. 2015 by Anne Sanquini.

This session has been organized in response to the devastating M_W 7.8 earthquake in the Nepal Himalayas on 25 April 2015 and subsequent catastrophic mass movements and aftershocks. The goal is to provide a forum for those studying the earthquake to disseminate and gain information from diverse fields and to develop realistic and meaningful paths forward in terms of earthquake forecasting in the Himalayan region. A number of invited, internationally recognized geoscience and hazard researchers from diverse fields will address what is known about the event and its aftermath. Please schedule time to attend this session. You'll learn about the role this earthquake plays in transforming geoscientists' understanding of the dynamics of India-Asia collision and best-practices forward to minimize destruction and fatalities during inevitable future earthquakes in the region.

School collapse in Kathmandu; photo taken 25 Apr. 2015 by Anne Sanquini.



Map courtesy USGS: http://www.usgs.gov/blogs/features/usgs_top_story/magnitude-7-8-earthquake-in-nepal/.

FEED YOUR BRAIN
THE GEOLOGICAL SOCIETY OF AMERICA®

LUNCHTIME ENLIGHTENMENT

Bring your lunch!

Baltimore Convention Center, Room 327/328/329

Mon.–Wed., 2–4 Nov., 12:15–1:15 p.m.

Grab your lunch at a nearby convention center vendor and enjoy a little *lunchtime enlightenment* during GSA's **Feed Your Brain** series.

Monday

James Balog, Founder & President, Earth Vision Institute & Extreme Ice Survey: "The Art & Science of Chasing Ice." See the August issue of *GSA Today* for talk highlights.

Tuesday

Marcia McNutt, Editor-in-Chief of *Science* and former USGS director: 2015 Michel T. Halbouty Lecturer & GSA Geology & Society Division Distinguished Lecturer: "Deepwater Horizons: Lessons Learned for Better Disaster Preparedness." See the September issue of *GSA Today* for talk highlights.

Wednesday

Ellen Stofan, NASA Chief Scientist: "Science at NASA: Exploring Planets in This Solar System and Beyond" (see highlights below).

Science at NASA: Exploring Planets in This Solar System and Beyond

Ellen Stofan, *NASA Chief Scientist*

Wednesday, 4 Nov., 12:15–1:15 p.m.

Ellen Stofan was appointed NASA chief scientist in 2013, serving as principal advisor to the NASA Administrator on the agency's science programs and science-related strategic planning and investments. Her research has focused on the geology of Venus, Mars, Titan, and Earth. Stofan is an associate member of the Cassini Radar Team, a co-investigator on the Mars Express Mission's MARSIS sounder, and was honorary professor in the Department of Earth Sciences at University College London. She was principal investigator on the Titan Mare Explorer, a proposed mission to send a floating lander to a sea on Titan.

Talk highlights: From the most recent results from Mars and Pluto to the latest detection of exoplanets, NASA spacecraft results are changing the way we think about how planets evolve and their potential for habitability. The 22 spacecraft in orbit around Earth are monitoring the planet to document and quantify how it is changing. Efforts to expand citizen science at NASA will bring the scientific process and the excitement of discovery to an ever broader, more diverse, and global audience.

The Geological Society of America®

GEOCAREERS

Events

WORKSHOP

The Pathways to a Successful Career: Building Value

Sat., 31 Oct. 1–4 p.m., Hilton, Holiday Ballroom 6

Showcase your potential value to employers and build marketing tools to help you succeed. This workshop features industry professionals who will offer tips and suggestions for navigating their company hiring process. Sign up on your meeting registration form or call GSA Sales & Service, +1-800-443-4472, to add the workshop.

CAREER PANELS

Geology in Industry Career Pathways Luncheon

Sun., 1 Nov., 11:30 a.m.–1 p.m., Baltimore Convention Center (BCC), Ballroom IV

Company representatives will offer advice about preparing for a career in industry and comment on the prospects for current and future job opportunities with their companies.

Geology in Government Career Pathways Luncheon

Mon., 2 Nov., 11:30 a.m.–1 p.m., BCC, Ballroom IV

A panel of representatives from a variety of government agencies will offer advice about preparing for a career in government and comment on job opportunities with their agencies.

The Paleontological Society Mentors in Paleontology Careers Luncheon

Mon., 2 Nov., noon–1 p.m., Hilton, Key Ballroom 9-10

This student luncheon features a panel of mentors representing a variety of colleges, universities, museums, and government agencies. They will offer advice about preparing for a career in paleontology and comment on current and future job opportunities.

NETWORKING

Women in Geology Career Pathways Reception

Sun., 1 Nov., 5–6:30 p.m., BCC, Ballroom III

Featured speaker: Dr. France Córdova, Director of the National Science Foundation

This informal gathering begins with remarks from a few key women speakers who will address issues faced by women in geology. A reception follows, providing time for networking, sharing ideas, and getting to know other women geoscientists.

Student Networking Luncheon

Tues., 3 Nov., 11:30 a.m.–1 p.m., BCC, Ballroom III

This light luncheon provides an opportunity for students and early career scientists to network with more than 40 geoscience professionals. These mentors will answer questions, offer advice about career plans, and comment on job opportunities within their fields.

EMPLOYMENT

Résumé Clinic

Sun., 1 Nov., 9 a.m.–5 p.m., BCC, Exhibit Hall

Plan to sign-up on-site for a private consultation with a geoscience professional to review your résumé and discuss strategies to better market yourself to potential employers.

Interview Service at the Annual Meeting

Mon., 2 Nov., 9 a.m.–6 p.m.
Tues., 3 Nov., 9 a.m.–1 p.m.
BCC, Exhibit Hall

Candidates: Check out the online Job Board (www.geosociety.org/classiads) to connect with employers who are recruiting at the Baltimore meeting.

Employers: If you plan to recruit and interview at the GSA Annual Meeting, make sure you've purchased your booth space (see the online form at www.geosociety.org/careers/interviewService.htm). Space is sold on a first-come, first-served basis.

GeoCareers in Industry

Students: Interact one-on-one with company representatives and learn how you can build a career in industry. Corporate sponsors that are scheduled to attend include Anadarko, Chevron, ExxonMobil, Newmont Mining, S.S. Papadopulos, and more. Sign up for one or more of the events below on your meeting registration form or call GSA Sales & Service, +1-800-443-4472, to add one or more of these events:

Research Poster Session
Sun., 1 Nov., 9–11 a.m., BCC, Exhibit Hall

Company Info Session
Sun., 1 Nov., 1:30–4 p.m., BCC, Exhibit Hall

Evening Reception *Invitation Only*
Sun., 1 Nov., 4:30–5:30 p.m., BCC, Camden Lobby

BRIDGING TWO CONTINENTS

A joint meeting between the Geological Society of China and the Geological Society of America held in conjunction with the GSA 2015 Annual Meeting

THE GEOLOGICAL SOCIETY OF AMERICA®

You are invited to participate in the *Bridging Two Continents* portion of the GSA 2015 meeting in Baltimore. This "meeting within a meeting" will be held on Sunday and Monday, 1–2 November, at the Baltimore Convention Center. Topical Sessions T1–T8 are part of the *Bridging Two Continents* meeting and are open to all GSA attendees. Nearly 160 abstracts have been accepted for these sessions.

An additional highlight of this meeting will be the ticketed luncheon on Monday, featuring a keynote address by James Hansen, "Ice Melt, Sea-Level Rise & Superstorms: Finding a Realistic Pathway to Clean Energy and Stable Climate." ***Purchase your ticket today!***

James Hansen

Bridging Two Continents Luncheon with Featured Keynote Speaker James Hansen

Ice Melt, Sea-Level Rise & Superstorms: Finding a Realistic Pathway to Clean Energy and Stable Climate

Mon., 2 Nov., noon–1:30 p.m.

This luncheon is open to any attendee who purchases a ticket (US$50), and thanks to a generous contribution, the first 25 students who want to attend can register for US$25 each.

Speaker James Hansen retired as director of the NASA Goddard Institute for Space Studies in 2013. He now serves as an adjunct professor at Columbia University's Earth Institute, where he directs the "Climate Science, Awareness and Solutions" program. His talk will cover the current understanding of the human-made climate change that is now under way and the most important implications of that change for humanity and other species. The talk will also evaluate the changes in the global energy pathway required to stabilize climate and the economically realistic pathways to achieving carbon-free energy soon enough to avoid disastrous consequences for young people. Hansen notes that the present situation constitutes a global crisis that calls for international scientific and engineering cooperation, most particularly between China and the United States.

THE GEOLOGICAL SOCIETY OF AMERICA®

SCIENCE EDITOR OPENINGS FOR 2017

GSA is soliciting applications and nominations for science co-editors for the journals *Geology* and *Lithosphere* with four-year terms beginning 1 January 2017. *Geology* has been ranked by the Journal Citation Reports (JCR) as the #1 geology journal for the ninth year in a row, and up-and-coming *Lithosphere*'s impact factor has increased 4 out of the 5 years it has been ranked by the JCR.

POSITIONS AVAILABLE

The research interests listed would best complement those of the continuing editors. Note that candidates should not feel they must have expertise in *every* area listed; however, editors may need to handle papers outside of their main disciplines.

Geology ▸ position 1

Geology ▸ position 2

Lithosphere ▸ 1 position

GEOLOGY (position 1) geomorphology/surface processes, neotectonics, tectonophysics, geodynamics, planetary geology, volcanology

GEOLOGY (position 2) seismology, structural geology, tectonics, numerical modeling of earth processes, microstructure, rock mechanics, geofluids, planetary geology

LITHOSPHERE deformation, geodynamics, geophysics, paleomagnetism, Precambrian geology, structural geology, tectonics, neotectonics, tectonophysics, geochronology

A SUCCESSFUL EDITOR WILL HAVE

- a broad interest and experience in geosciences, including familiarity with new trends;
- international recognition and familiarity with many geoscientists and their work;
- a progressive attitude and a willingness to take risks and encourage innovation;
- experience with online manuscript systems and the ability to make timely decisions; and
- a sense of perspective and humor.

INTERESTED?

- Please submit a curriculum vitae and a letter describing why you are suited for the position to Jeanette Hammann, jhammann@geosociety.org.
- To nominate another, submit a nomination letter and the person's written permission and CV.

Editors work out of their current locations at work or at home. The positions are considered voluntary, but GSA provides an annual stipend and funds for office expenses.

DEADLINE Nominations or applications received by 15 February 2016 will be given first consideration.

FUTURE OPENINGS (terms begin January 2018): One position each for *GSA Bulletin*, *Geology*, *Geosphere*, and *GSA Today*

CALL FOR NOMINATIONS

2016 GSA Awards & Medals

Penrose Medal

The Penrose Medal was established in 1927 by R.A.F. Penrose Jr. to be awarded in recognition of eminent research in pure geology, for outstanding original contributions, or for achievements that mark a major advance in the science of geology. This award is made only at the discretion of the GSA Council, and nominees may or may not be members of the Society. Penrose's sole objective was to encourage original work in purely scientific geology, which is interpreted as applying to all scientific disciplines represented by GSA. Scientific achievements should be considered rather than contributions in teaching, administration, or service. Mid-career scientists who have already made exceptional contributions should be given full consideration for the award.

Day Medal

The Arthur L. Day Medal was established in 1948 through a donation by Arthur L. Day, Founding Director of the Geophysical Laboratory of the Carnegie Institution of Washington. It is awarded annually, or less frequently at the discretion of the Council, to recognize outstanding distinction in the application of physics and chemistry to the solution of geologic problems, with no restriction to the particular field of geologic research. It was Dr. Day's wish to provide an award to recognize outstanding achievement in research and to inspire further effort, rather than to reward a distinguished career, and so it has been the long-standing practice of the Society to award this medal to geoscientists actively pursuing a research career.

Young Scientist Award (Donath Medal)

The Young Scientist Award was established in 1988 to be awarded to a young scientist (35 years or younger throughout the year in which the award is to be presented—*for 2016, only those candidates born* ***on or after 1 Jan. 1981*** *are eligible*) for outstanding achievement in contributing to geologic knowledge through original research that marks a major advance in the earth sciences. The award consists of a gold medal (the Donath Medal) and an honorarium.

How to Nominate

To ensure thorough consideration by the respective committees, please follow these nomination instructions carefully; additional information supplied will not enhance the nomination. For each candidate please submit the following:

1. **Nomination form:** Please go to **https://rock.geosociety.org/forms/Awardform.asp** to submit the form online.
2. **Supporting documents,** to be submitted as e-mail attachments or via post; for Penrose, Day, and Donath, the following supporting documents are required:
   - Curriculum vitae;
   - Summary (300 words or fewer) of the scientific contributions to geology that qualify the candidate for the award;
   - Selected bibliography of no more than 20 titles (for the Donath Medal, only 10 titles are required); and
   - Letters of support from each of five GSA Fellows or members ***in addition*** to the person making the nomination. **For the Day Medal only:** letters from five scientists with at least three of those being from GSA Fellows or members and up to two from fellows or members of the Mineralogical Society of America, Geochemical Society, or American Geophysical Union.

The deadline for receipt of all GSA medal, award, and recognition nominations is 1 Feb. 2016.

CALL FOR NOMINATIONS

2016 GSA Awards & Medals

Geologic Mapping Award in Honor of Florence Bascom

The Geologic Mapping Award was approved by GSA Council in October 2013, and the first award was presented in 2015. This award acknowledges contributions in published high-quality geologic mapping that led the recipient to publish significant new scientific discoveries, to bring about greater understanding of fundamental geologic processes and concepts, and to contribute to the application of new knowledge to societal needs and opportunities in such areas as mineral resources, water resources, and the environment.

The recipient will have authored high-quality geologic maps, cross sections, and summary reports that have received scientific acclaim and are available to both peers and the public, through federal or state agencies or major scientific societies. In evaluating the merits of nominees for this award, scientific achievements should be considered rather than contributions in teaching, administration, or service. Nominees do not need to be members of the GSA, and they may be from any nation.

Selection criteria: (A) excellence of the nominee's published geologic maps; (B) clear record of a greater understanding of fundamental geologic processes and/or concepts, and high-quality publication of same, emerging directly from the meritorious quality of the geologic mapping; and (C) peer acclaim of the practical usefulness of the geologic mapping and the new discoveries that emerged from the mapping.

How to Nominate

1. **Nomination form:** Please go to **https://rock.geosociety.org/forms/Awardform.asp** to submit the form online.
2. **Supporting documents,** to be submitted as e-mail attachments or via post:
   - Curriculum vitae;
   - Letter of nomination (300 words or fewer) addressing the evaluation criteria;
   - Selected bibliography of geologic maps (20 titles or fewer);
   - Selected bibliography of peer-reviewed publications (20 titles or fewer);
   - PDFs or web-site links to several key geologic maps authored by the nominee
   - Letters of support from three scientists with at least two from GSA Fellows or members and one from a member of another professional geoscience organization. Diverse supporters (i.e., including individuals who are not currently/recently associated with the nominee's institution) are strongly encouraged.

Randolph W. "Bill" and Cecile T. Bromery Award for Minorities

The Bromery Award should be given to any minority, preferably African Americans, who qualifies under at least one of these two categories:

1. Nominee has made significant contributions to research in the geological sciences, as exemplified by one or more of the following:
   - Publications that have had a measurable impact on the geosciences;
   - Outstanding original contributions or achievements that mark a major advance in the geosciences; and/or
   - Outstanding lifetime career that demonstrates leadership in geoscience research.
2. Nominee has been instrumental in opening the geoscience field to other minorities, as exemplified by one or more of the following:
   - Demonstrable contributions in teaching or mentoring that have enhanced the professional growth of minority geoscientists;
   - Outstanding lifetime career service in a role that has highlighted the contributions of minorities in advancing the geosciences; and/or
   - Authorship of educational materials of high scientific quality that have enjoyed widespread use and acclaim among educators or the general public.

How to Nominate

1. **Nomination form:** Please go to **https://rock.geosociety.org/forms/Awardform.asp** to submit the form online.
2. **Supporting documents,** to be submitted as e-mail attachments or via post:
   - Curriculum vitae;
   - Letter of nomination (300 words or fewer);
   - Letters of support from three scientists with at least two from GSA Fellows or members and one from a member of another professional geoscience organization; and
   - Optional selected bibliography of no more than 10 titles.

The deadline for receipt of all GSA medal, award, and recognition nominations is 1 Feb. 2016.

CALL FOR NOMINATIONS

2016 GSA Awards & Medals

Doris M. Curtis Outstanding Woman in Science Award

The Doris M. Curtis Outstanding Woman in Science Award recognizes a woman who has had a major impact on the field of the geosciences based on her Ph.D. research. The generous support of the Doris M. Curtis Memorial Fund makes this award possible. GSA's 103rd president, Doris Curtis pioneered many new directions for geology, not the least of which was her tenure as GSA president after an unbroken chain of 102 men. Causes dear to her were women, public awareness, minorities, and education. Women are eligible for this award the first three years following their Ph.D. degree.

How to Nominate

1. **Nomination form:** Please go to **https://rock.geosociety.org/forms/Awardform.asp** to submit the form online.
2. **Supporting documents,** to be submitted as e-mail attachments or via post:
   - Curriculum vitae including dissertation title and abstract;
   - Letter of nomination that clearly states how the Ph.D. research has impacted the geosciences in a major way;
   - Letters of support from three scientists with at least two from GSA Fellows or members and one from a member of another professional geoscience organization; and
   - Selected bibliography of no more than 10 titles.

GSA Distinguished Service Award

GSA Council established the GSA Distinguished Service Award in 1988 to recognize individuals for their exceptional service to the Society. GSA members, Fellows, associates, and employees may be nominated for consideration, and any GSA member or employee may submit a nomination for the award. GSA's Executive Committee will select the awardees, and GSA Council must ratify all selections. Awards may be made annually, or less frequently, at the discretion of Council.

How to Nominate

1. **Nomination form:** Please go to **https://rock.geosociety.org/forms/Awardform.asp** to submit the form online.
2. **Supporting documents,** to be submitted as e-mail attachments or via post:
   - Curriculum vitae;
   - Letter of nomination (300 words or fewer);
   - Brief biographical sketch that clearly demonstrates the applicability of the selection criteria; and
   - Optional selected bibliography of no more than 10 titles.

GSA Public Service Award

GSA Council established the GSA Public Service Award in 1998 in honor of Eugene and Carolyn Shoemaker. This annual award recognizes contributions that have materially enhanced the public's understanding of the earth sciences or have significantly served decision makers in the application of scientific and technical information to public affairs and earth-science–related public policy. This may be accomplished by individual achievement in

- Authorship of education materials of high scientific quality that have enjoyed widespread use and acclaim among educators or the general public;
- Acclaimed presentations (books and other publications, mass and electronic media, or public presentations, including lectures) that have expanded public awareness of the earth sciences;
- Authorship of technical publications that have significantly advanced scientific concepts or techniques applicable to the resolution of earth-resource or environmental issues of public concern; and/or
- Other individual accomplishments that have advanced the earth sciences in the public interest.

The award will normally go to a GSA member of any nation, with exceptions approved by Council, and may be presented posthumously to a descendant of the awardee.

How to Nominate

1. **Nomination form:** Please go to **https://rock.geosociety.org/forms/Awardform.asp** to submit the form online.
2. **Supporting documents,** to be submitted as e-mail attachments or via post:
   - Curriculum vitae;
   - Letter of nomination (300 words or fewer);
   - Brief biographical sketch that clearly demonstrates the applicability of the selection criteria; and
   - Selected bibliography of no more than 10 titles.

The deadline for receipt of all GSA medal, award, and recognition nominations is 1 Feb. 2016.

CALL FOR NOMINATIONS

2016 GSA Awards & Medals

Honorary Fellowship

Established by the GSA Council in 1909, Honorary Fellowship may be bestowed on individuals who have made outstanding and internationally recognized contributions to geoscience, or in rare circumstances, provided notable service to the Society. In practice, nearly all candidates are non–North Americans who live and work outside of North America. The awardee does not need to be a GSA member to receive the award. No more than two Honorary Fellows will be awarded annually. Honorary Fellows will be recognized during the GSA Annual Meeting and will receive complimentary lifetime membership to the Society.

How to Nominate

1. **Nomination form:** Please go to **https://rock.geosociety.org/forms/Awardform.asp** to submit the form online.
2. **Supporting documents,** to be submitted as e-mail attachments or via post:
   - Curriculum vitae;
   - Letter of nomination (300 words or fewer) that clearly demonstrates the applicability of the selection criteria;
   - Letters of support from three scientists with at least two from GSA Fellows and one from a GSA Fellow or a person of equivalent international stature; and
   - Selected bibliography of no more than 20 titles.

GSA Fellowship

Fellowship is an honor that is bestowed on the best of our profession once per year at the spring GSA Council meeting and is recognized at GSA's Annual Meeting. GSA members are elected to Fellowship in recognition of distinguished contributions to the geosciences. A **GSA Fellow** may support *only two* nominees per election cycle and only **one** as a primary nominator. A **GSA member** who is not a Fellow may not be a *primary* nominator but may be a secondary nominator for no more than **two** nominees per election cycle.

The primary nominator is responsible for collecting the entire nomination packet (including letters of support) and must submit the nomination as one e-mail (with supporting documents as attachments). Letters of support sent separately will not be accepted.

How to Nominate

1. **Nomination form:** Please go to **www.geosociety.org/members/fellow.htm** to submit the form online.
2. **Supporting documents,** to be collected by the primary nominator and submitted as one package as e-mail attachments or via post:
   - Curriculum vitae;
   - Letter of nomination, including a summary of the nominee's significant contributions supporting the selected criteria for election (up to two pages);
   - Supporting letter of nomination from each of the secondary nominators—at least one should be from an organization other than that of the nominee.

Award Notes

Candidates whose names are submitted by the respective award committees to GSA Council but who do not receive an award will remain under consideration by those committees for three years. For those still under consideration, it is recommended that an updated nomination letter be sent to GSA.

All nomination forms and submission instructions can be found online at **www.geosociety.org/awards/.** Nomination forms and instructions may also be obtained from GSA Grants and Awards, P.O. Box 9140, 3300 Penrose Place, Boulder, CO 80301-9140, USA, +1-303-357-1060, awards@geosociety.org.

The deadline for receipt of all GSA medal, award, and recognition nominations is 1 Feb. 2016.

CALL FOR NOMINATIONS

2016 GSA Awards & Medals

John C. Frye Environmental Geology Award

Deadline: 31 March 2016

In cooperation with the Association of American State Geologists (AASG), GSA makes an annual award for the best paper on environmental geology published either by GSA or by one of the state geological surveys.

Anyone can nominate a paper as long as it is selected from a GSA or state geological survey publication and published during the preceding three full calendar years. The nomination letter must include a paragraph stating the importance of the paper. Up to three letters from users of the publication can be included to support the nomination.

Each nominated paper will be judged on its uniqueness or significance as a model of its type of work and its overall worthiness for the award. The paper must (1) establish an environmental problem or need; (2) provide substantive information on the basic geology or geologic process pertinent to the problem; (3) relate the geology to the problem or need; (4) suggest solutions or provide appropriate land-use recommendations based on the geology; (5) present the information in a manner that is understandable and directly usable by geologists; and (6) address the environmental need or resolve the problem. It is preferred that the paper be directly applicable to informed laypersons (e.g., planners, engineers).

Please send your nominations to GSA Grants and Awards, P.O. Box 9140, Boulder, CO 80301-9140, USA. For more information, please visit **www.stategeologists.org/awards_honors.php.**

In Memoriam

The Society notes with regret the deaths of the following members (notifications received between 1 May 2015 and 31 July 2015).

Theodore Arnow
Salt Lake City, Utah, USA
Date of death: 18 Dec. 2014

Frank M. Byers Jr.
Longmont, Colorado, USA
Date of death: 12 July 2015

William A. Cobban
Canon City, Colorado, USA
Date of death: 21 Apr. 2015

John C. Crowell
Santa Barbara, California, USA
Date of death: 13 May 2015

William Richard Dickinson
Past GSA President, 1994
Tucson, Arizona, USA
Date of death: 20 July 2015

William C. Edmund
Houston, Texas, USA
Date of death: 19 Sept. 2014

Mary Anne Fillipone
Victoria, British Columbia, Canada
Date of death: 12 Dec. 2014

George L. Freeland
Key Biscayne, Florida, USA
Date of death: 17 Apr. 2014

Donn S. Gorsline
Los Angeles, California, USA
Date of death: 27 May 2015

Ralph C. Heath
Raleigh, North Carolina, USA
Date of death: 12 Jan. 2015

Edward Jonas
Austin, Texas, USA
Date of death: 1 Jan. 2014

Darryl Edwards Kuhns
Reno, Nevada, USA
GSA notified: 6 May 2015

Fred H. Kulhawy
Ithaca, New York, USA
Date of death: 12 May 2015

Hans Peter Laubscher
Riehen, Switzerland
Date of death: 2 July 2015

William N. Laval
Clarkston, Washington, USA
Date of death: 22 Apr. 2015

Janis D. Treworgy
Grafton, Illinois, USA
Date of death: 7 Apr. 2015

GSA would also like to recognize the passing of the following individual who has impacted our science:

David M. Raup
First president of the Paleontological Society
Date of death: 9 July 2015

To honor a friend or colleague with a GSA memorial, please go to **www.geosociety.org/pubs/memorials/mmlGuid.htm** to learn how. Contact the GSA Foundation, **www.gsafweb.org,** if you would like to contribute to the memorial fund.

CALL FOR NOMINATIONS

2016 AGI Awards

AGI Medal in Memory of Ian Campbell

The AGI Medal in Memory of Ian Campbell recognizes singular performance in and contribution to the profession of geology. Candidates are measured against the distinguished career of Ian Campbell, whose service to the profession touched virtually every facet of the geosciences. Campbell was a most uncommon man of remarkable accomplishment and widespread influence, and in his career as a geologist, educator, administrator, and public servant, he was noted for his candor and integrity.

AGI Marcus Milling Legendary Geoscientist Medal

The Marcus Milling Legendary Geoscientist Medal is given to a recipient with consistent contributions of high-quality scientific achievements and service to the earth sciences having lasting, historic value; who has been recognized for accomplishments in field(s) of expertise by professional societies, universities, or other organizations; and is a senior scientist nearing completion or has completed full-time regular employment. Prior to 2007, it was called the AGI Legendary Geoscientist Award.

To submit nominations for these and other awards, go to **www.agiweb.org/direct/awards.html.**

2016 National Awards

GSA members are encouraged to nominate colleagues for the following:

The **William T. Pecora Award,** sponsored jointly by NASA and the U.S. Dept. of the Interior, recognizes outstanding contributions by individuals or groups toward understanding Earth by means of remote sensing. The award recognizes the work of those in the scientific and technical community as well as those involved in the practical application of remote sensing. Consideration will be given to sustained or single contributions of major importance to the art and/or science of understanding Earth through observations from space. Learn more at **http://remotesensing.usgs.gov/pecora.php.**

The **National Medal of Science** is awarded by the President of the United States to individuals "deserving of special recognition by reason of their outstanding contributions to knowledge in the physical, biological, mathematical, engineering, or social and behavioral sciences." The award committee gives special attention to younger U.S. scientists and engineers who may now be reaching a point at which their contributions merit recognition, as well as to outstanding women and minority scientists. Learn more at **www.nsf.gov/od/nms/medal.jsp.**

The **Alan T. Waterman Award** is presented annually by the National Science Foundation (NSF) and the National Science Board to an outstanding young researcher in any field of science or engineering supported by the NSF. Candidates must be U.S. citizens or permanent residents 35 years of age or younger OR not more than five years beyond receipt of a Ph.D. by 31 Dec. of the year in which they are nominated. Candidates should have completed sufficient scientific or engineering research to have demonstrated outstanding capability and exceptional promise for significant future achievement through personal accomplishments. The Waterman Award complements the Vannevar Bush Award; both are designed to encourage individuals to seek the highest levels of achievement in science, engineering, and service to humanity. Learn more at **www.nsf.gov/od/waterman/waterman.jsp.**

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www.geosociety.org/members

Eastward Migrating Tubbidites, Magallanes Foreland Basin, Chile; Photo by Adam Schwester


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Membership

Preliminary Announcement and Call for Papers

SOUTHEASTERN SECTION

65th Annual Meeting of the Southeastern Section, GSA
Columbia, South Carolina, USA
31 March–01 April 2016

www.geosociety.org/sections/se/2016mtg/

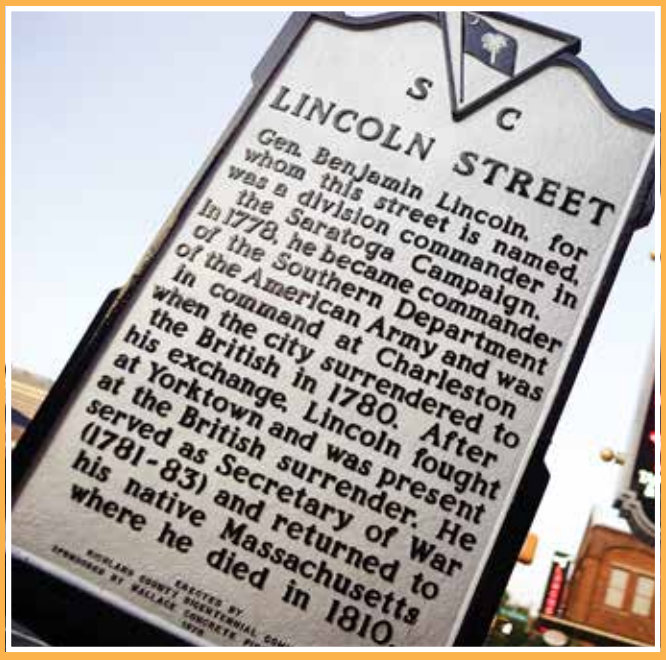

Photo courtesy of Columbia Metropolitan Convention & Visitors Bureau.

Ready to Rock Your World?

Centrally located within the southeastern U.S., and sitting astride the Fall Line separating the Piedmont and the Coastal Plain, Columbia, South Carolina, welcomes GSA's Southeastern Section for another great meeting. With a technical program and associated field trips spanning everything from new developments in resource exploration and potential to geohazards to trends in education, there is sure to be something for everyone.

CALL FOR PAPERS

Abstract deadline: 15 December 2015

Submit abstracts online at **www.geosociety.org/Sections/se/2016mtg/.** The submission fee is US$15 for students and US$20 for all others. If you cannot submit an abstract online, please contact Heather Clark, +1-303-357-1018, hclark@geosociety.org.

Symposium

S1. **Evolving Perspectives on Piedmont Geology: Terrane Studies, Structural Analyses, New Mapping, and Complementary Studies.**

Theme Sessions

T1. **Gold Exploration in South Carolina.** Ken Gillon, Romarco Inc., kgillon@romarco.com; James Berry, Romarco Inc., jberry@romarco.com; James Kellogg, Univ. of South Carolina, kellogg@sc.edu.

T2. **New Insights on Crustal Structure and Geologic Evolution of the Southeastern US Continental Margin.** Susie Boote, sboote@geol.sc.edu; James H. Knapp, Univ. of South Carolina, knapp@geol.sc.edu.

T3. **Surface Water–Groundwater Interactions and Biogeochemical Processes in the Coastal Zone.** Alicia Wilson, Univ. of South Carolina, awilson@geol.sc.edu; Tim Callahan, College of Charleston, callahant@cofc.edu.

T4. **Groundwater Availability in the Atlantic Coastal Plain.** Bruce Campbell, USGS, bcampbel@usgs.gov; Joe Gellici, South Carolina Dept. of Natural Resources, gellicij@dnr.sc.gov.

T5. **Paleolimnological Reconstructions: New Insights from the Tried and True to the Unique and New.** Nathan M. Rabideaux, nmrabideaux@gmail.com; Chris Tidwell, Georgia State Univ., ctidwell1@student.gsu.edu; Alex Simpson, Georgia State Univ., asimpson676@gmail.com.

T6. **Current Studies in Sedimentology and Stratigraphy.** Andrew Leier, Univ. of South Carolina, aleier@geol.sc.edu.

T7. **Geohazards along the East Coast of the U.S.** Robert Weiss, Virginia Tech, weiszr@vt.edu.

T8. **Issues in Environmental and Climate Education.** Pamela J.W. Gore; Georgia Perimeter College, pamela.gore@gpc.edu; William Witherspoon, georgiarocks.us, bill@georgiarocks.us.

T9. **Evolution Teaching Practices and Data-Rich Research.** Frank Forcino, Western Carolina Univ., flforcino@email.wcu.edu; Rachel Salter, North Dakota State Univ., rlsalter1@catamount.wcu.edu.

T10. **Ecohydrology.** Jeff Wilcox, Univ. of North Carolina Asheville, jwilcox@unca.edu.

T11. **Large Datasets and Interactive Visualizations in Undergraduate Research.** Steven Whitmeyer, James Madison Univ., whitmesj@jmu.edu; Jeffrey Ryan, Univ. of South Florida, ryan@mail.usf.edu.

T12. **Coastal Processes and Geologic Framework: Insights from Geological and Geophysical Surveys across the Continental Margin.** Jenna C. Hill, Coastal Carolina Univ., jchill@coastal.edu; Richard F. Viso, Coastal Carolina Univ., rviso@coastal.edu.

T13. **Synergistic Paleontology: The FOSSIL Project and Amateur Contributions to the Field.** Eleanor Gardner, Florida Museum of Natural History, egardner@flmnh.ufl.edu; Bruce MacFadden, Florida Museum of Natural History, bmacfadd@flmnh.ufl.edu; Linda McCall, North Carolina Fossil Club, lndmccall02@yahoo.com; Chuck Ferrara, Southwest Florida Fossil Society, ferrara_307@hotmail.com; Lisa Lundgren, Univ. of Florida, lisa.lundgren@ufl.edu.

T14. **Fossil Vertebrates of the Southeastern United States.** Kathlyn M. Smith, Georgia Southern Univ., ksmith@georgiasouthern.edu; Alexander K. Hastings, Virginia Museum of Natural

History, acherontisuchus@gmail.com; Jenny McGuire, Georgia Institute of Technology, jmcguire@gatech.edu.

T15. **Barrier Island Geology along the Southeast U.S. Coast: Contrasting Recent Change with Long-Term Evolution.** Antonio B. Rodriguez, Univ. of North Carolina Chapel Hill, abrodrig@email.unc.edu; Ethan J. Theuerkauf, Univ. of North Carolina Chapel Hill, ejtheu@email.unc.edu.

T16. **Estuarine and Intertidal Sedimentary Processes and Environments as Geologic Archives of Coastal Change.**

T17. **Geology of the Southeastern Atlantic Continental Margin: A Poster Session with Cores, Rock Samples, and Coffee (Posters).** Kathleen M. Farrell, North Carolina Geological Survey, kathleen.farrell@ncdenr.gov; Will Doar, South Carolina Geological Survey, doarw@dnr.sc.gov; Joe Gellici, South Carolina Dept. of Natural Resources, gellicij@dnr.sc.gov.

T18. **Coastal Resiliency, Storm-Damage Reduction, Navigation, and Other Applied Geological Studies or Projects Focused on the Land-Sea Transition.** Katie Luciano, South Carolina Geological Survey, lucianok@dnr.sc.gov; J.P. Walsh, East Carolina Univ./Univ. of North Carolina Coastal Studies Institute, walshj@ecu.edu.

T19. **Quaternary Eolian Systems of the Southeastern United States.** Christopher Swezey, USGS, cswezey@usgs.gov; Rich Whittecar, Old Dominion Univ., rwhittec@odu.edu.

T20. **Undergraduate Research (Posters).** Lee Phillips, Univ. of North Carolina Greensboro, plphilli@uncg.edu.

FIELD TRIPS

Deep Time in the Congaree: An Educator Field Workshop. David C. Shelley, Congaree National Park, david_shelley@nps.gov; William Witherspoon, bill@georgiarocks.us.

Floodplain Geohydrology of Congaree National Park. David C. Shelley, Congaree National Park, david_shelley@nps.gov; Timothy J. Callahan, College of Charleston, callahant@cofc.edu; Scott Werts, Winthrop Univ., wertss@winthrop.edu.

Eocene Marine Strata, Pleistocene River Deposits, and Pleistocene Fissure Fills in the Giant Cement Quarry, Holly Hill, South Carolina. Dave Cicimurri, South Carolina State Museum, dave.cicimurri@scmuseum.org.

Fossils of the Cretaceous Pee Dee Formation. Lee Cone, The Special Friends of the Aurora Fossil Museum, lcone@windstream.net; Eleanor Gardner, Florida Museum of Natural History, egardner@flmnh.ufl.edu; Linda McCall, North Carolina Fossil Club, lndmccall02@yahoo.com; Chuck Ferrara, Southwest Florida Fossil Society, ferrara_307@yahoo.com.

Geology and Geomorphology of the Carolina Sandhills, Chesterfield County, South Carolina. Christopher S. Swezey, USGS, cswezey@usgs.gov; G. Richard Whittecar, Old Dominion Univ., rwhittec@odu.edu; Bradley A. Fitzwater, Old Dominion Univ., bfitz007@odu.edu.

Field Trip to Haile Gold Mine. James Berry, Romarco Inc., jberry@romarco.com.

ACCOMMODATIONS

Blocks of rooms have been reserved at the Hyatt Place Columbia, located at 819 Gervais Street, Columbia, SC 29201, USA, +1-803-978-2013, and the Hampton Inn Columbia, located at 822 Gervais Street, Columbia, SC 29201, USA, +1-803-231-2000. Both venues are located in The Vista, a short walking distance to the Columbia Convention Center. To make your reservations, please call the hotels and be sure to mention you are attending the GSA Southeastern Section meeting.

LOCAL COMMITTEE

General Chair: Venkat Lakshmi, vlakshmi@geol.sc.edu

Technical Program Chair: Jim Knapp, knapp@geol.sc.edu

Field Trip Chair: Will Doar, doarw@dnr.sc.gov

Undergraduate Volunteer Chair: Michael Bizimis, mbizimis@geol.sc.edu

Photo courtesy of Columbia Metropolitan Convention & Visitors Bureau.

Preliminary Announcement and Call for Papers

CORDILLERAN SECTION

112th Annual Meeting of the Cordilleran Section, GSA
Ontario, California, USA
4–6 April 2016

www.geosociety.org/sections/cord/2016mtg/

Ontario lies ~60 km from the Pacific coast in the "Inland Empire" of the greater Los Angeles basin, and is bounded by the San Gabriel, San Bernardino, and Santa Ana Mountains. The San Andreas fault is 25 km to the northeast, and other iconic geologic sites, such as the Mojave Desert, Joshua Tree National Park, Peninsular Ranges, and Salton Trough, are 1–3 hours away. The Inland Empire is home to a multicultural population of 4.2 million people, underscoring the societal relevance of the geosciences, especially as California and the West continue to deal with unprecedented drought, while at the same time facing a growing El Niño that may create record rains. We are holding the meeting in early April to allow more students to attend than usual, and the diverse set of field trips will treat participants to fantastic geology while temperatures are in the 70s–80s, and the desert areas will be in glorious bloom.

CALL FOR PAPERS

Abstract deadline: 5 January 2016

Submit abstracts online at **www.geosociety.org/Sections/cord/2016mtg/.** The submission fee is US$15 for students and US$20 for all others. If you cannot submit an abstract online, please contact Heather Clark, +1-303-357-1018, hclark@geosociety.org.

Theme Sessions

T1. **Neotectonics and Magmatism in Death Valley and Southwestern Basin and Range.** Jim Calzia, USGS, jcalzia@usgs.gov; J.R. Knott, California State Univ. Fullerton, jknott@fullerton.edu.

T2. **Magma Sources to Volcanoes—Exploring Processes, Volumes, Storage, and Interconnectivity in Continental Arcs.** Vali Memeti, California State Univ. Fullerton, vmemeti@fullerton.edu; Robinson Cecil, California State Univ. Northridge, robinson.cecil@csun.edu; Adam Ianno, Univ. of Texas at El Paso; Ana María Martínez Ardila.

T3. **Causes and Consequences of Magmatic and Tectonic Tempos in Continental and Oceanic Arcs.** Scott Paterson, Univ. of Southern California, paterson@usc.edu; Barbara Ratschbacher, Univ. of Southern California, barbara.ratschbacher@usc.edu; Joshua Schwartz, California State Univ. Northridge; joshua.schwartz@csun.edu; Ben Clausen, Loma Linda Univ., bclausen@llu.edu.

T4. **Deconvoluting the Triassic and Jurassic Arcs.** Jason Price, Caltech, jprice@caltech.edu; Claire Bucholz, Caltech, cbucholz@mit.edu; Jade Star Lackey, Pomona College, jadestar.lackey@pomona.edu.

T5. **Insights into the Late Cenozoic Evolution of Crustal Blocks in Southern California from New Geologic, Geophysical, and Geomorphic Data.** Victoria Langenheim, USGS, zulanger@usgs.gov; Robert Powell, USGS, rpowell@usgs.gov; Jonathan Matti, USGS, jmatti@usgs.gov; Gary Fuis, USGS, fuis@usgs.gov.

T6. **Integrated Volcanic Systems: Coupling and Feedbacks between Volcanic, Sedimentary, Geomorphic, Climatic, and Environmental Processes.** Benjamin S. Murphy, Oregon State Univ., murphybe@onid.oregonstate.edu; Nicole E. Moore, Oregon State Univ., mooreni@geo.oregonstate.edu.

T7. **Hydrogeology of Complex Geologic Settings.** Matt Becker, California State Univ. Long Beach, matt.becker@csulb.edu; Thomas M. Seckington, California Dept. of Toxic Substances Control, tom.seckington@dtcs.ca.gov.

T8. **Hydrogeological Impacts of Urbanization.** Barry Hibbs, California State Univ. Los Angeles, bhibbs@exchange.calstatela.edu; W. Richard Laton, California State Univ. Fullerton, wlaton@fullerton.edu.

T9. **Eco-Hydrogeology/Contaminant Hydrogeology.** M. Hassan Rezaie-Boroon, California State Univ. Los Angeles, mrezaie@exchange.calstatela.edu; Andre Ellis, California State Univ. Los Angeles, aellis3@calstatela.edu.

T10. **Unraveling Structural Complexity along the San Andreas Fault Zone, Southern California: Using Geochronology in Conjunction with Geologic and Geomorphic Mapping.** Shannon Mahan, USGS, smahan@usgs.gov; Robert Powell, USGS, rpowell@usgs.gov; Katherine Kendrick, USGS, kendrick@usgs.gov.

T11. **Investigating Environmental Changes using the Coastal and Marine Sedimentary Record.** Joseph Carlin, California State Univ. Fullerton, jcarlin@fullerton.edu; Alex Simms, Univ. of California Santa Barbara, asimms@geol.ucsb.edu.

T12. **Paleontology and Paleoecology of Western North America.** Nicole Bonuso, California State Univ. Fullerton, nbonuso@fullerton.edu; Adam Woods, California State Univ. Fullerton, awoods@fullerton.edu.

T13. **In the Spotlight: Paleontology and the Public.** Alton C. Dooley, Jr., Western Science Center, adooley@westerncentermuseum.org; Gabriel Santos, Raymond M. Alf Museum of Paleontology, gpsantos@csu.fullerton.edu.

T14. **Undergraduate Research Posters.** Mark Boryta, Mount San Antonio College, mboryta@mtsac.edu; David Mrofka, Mount San Antonio College, dmrofka@mtsac.edu.

FIELD TRIPS

Trip registration opens in January 2016. For additional information, please contact Field Trip Chair Brian Kraatz at bkraatz@westernu.edu.

Late Cretaceous to Neogene Assembly and Disaggregation of the Southern Sierra Nevada Region. Alan Chapman, Macalester College, chapman@macalester.edu; Jason Saleeby, California Institute of Technology, jason@gps.caltech.edu; David Wood, djwd@swbell.net.

Motherlode of the Miocene: The Barstow Fossil Beds. Kathleen Spring, Univ. of California Riverside/USGS, kspringer@usgs.gov; Eric Scott, San Bernardino County Museum, escott@sbcm.sbcounty.gov.

Arc Magmatism, Tectonics and Tempos in Mesozoic Arc Crustal Sections of the Peninsular and Transverse Ranges, Southern California. Scott R. Paterson, Univ. of Southern California, paterson@usc.edu; Adam Ianno, Juniata College, adam.ianno@gmail.com; Valbone Memeti, California State Univ. Fullerton, vmemeti@fullerton.edu; Ben Clausen.

Stratigraphy and Paleontology of the Palos Verdes Peninsula. Austin Hendy, Natural History Museum of Los Angeles County, ahendy@nhm.org; Jann Vendetti, Natural History Museum of Los Angeles County, jvendett@nhm.org; Lindsey Groves, Natural History Museum of Los Angeles County, lgroves@nhm.org; Howell Thomas, Natural History Museum of Los Angeles County, hthomas@nhm.org; Jorge Velez-Juarbe, Natural History Museum of Los Angeles County, jvelezjuar@nhm.org.

Large Earthquakes and Rates of Slip on the San Jacinto–San Andreas Fault System. Doug Yule, California State Univ. Northridge, doug.yule@csun.edu; Sally McGill, California State Univ. San Bernardino, smcgill@csusb.edu; Nate Onderdonk, California State Univ. Long Beach, nate.onderdonk@csulb.edu.

Mesozoic Invertebrate Paleontology. Jere Lipps, Cooper Center, California State Univ. Fullerton, jlipps@exchange.fullerton.edu.

Geology of Some Major Industrial Mineral Deposits in the Mojave Desert Area, Southern California. Howard Brown, Howard Brown Geological Consulting LLC, hjbjm@aol.com; Dinah Shumway, Terramins Inc., terramins@gmail.com.

Soils. Matthew Ballmer, Natural Resources Conservation Services, matthew.ballmer@usda.gov; Randy Riddle, Natural Resources Conservation Services, randy.riddle@usda.gov; Theresa Kunch, Natural Resources Conservation Services, theresa.kunch@ca.usda.gov.

Fibrous Minerals and Soils. Doug Merkler, Natural Resources Conservation Services, doug.merkler@nv.usda.gov; Matthew Ballmer, Natural Resources Conservation Services, matthew.ballmer@usda.gov.

Vertebrate Paleontology of Death Valley National Park, California. Torrey Nyborg, Loma Linda Univ., tnyborg06g@llu.edu.

Neogene Sedimentation, Volcanic Activity, and Faulting in the Coyote Mountains, Salton Trough, California. Ann Bykerk-Kauffman, California State Univ. Chico, abykerk-kauffman@csuchico.edu; Michael Parker, California State Univ. Chico, michaelpparker@sbcglobal.net; Amy Gentry, California State Univ. Chico, kitsune556@gmail.com; David Teimoorian, California State Univ. Chico, davidteimoorian@gmail.com.

REGISTRATION

Early registration deadline: 29 Feb. 2016
Cancellation deadline: 7 Mar. 2016

Registration opens in January 2016. For further information or if you need special accommodations, please contact Conference Chair Jade Star Lackey, jadestar.lackey@pomona.edu.

ACCOMMODATIONS

Hotel registration deadline: 14 March 2016

A block of rooms has been reserved at the DoubleTree by Hilton at 222 N Vineyard Ave., Ontario, California 91764, USA—just a two-minute walk from the Ontario Convention Center. The meeting rate is US$129 per night plus tax for single and double occupancy. Reservations should be made by calling the DoubleTree directly at +1-909-418-4873 (local). Attendees should reference the group code of "Geological Society of America."

LOCAL COMMITTEE

Conference Chair: Jade Star Lackey, Pomona College, JadeStar.Lackey@pomona.edu

Field Trip Chair: Brian Kraatz, Western Univ. of Health Sciences, bkraatz@westernu.edu

Technical Program Co-Chairs: Colin Robins, Claremont McKenna, Pitzer, and Scripps Colleges, crobins@kecksci.claremont.edu; Robert Gaines, Pomona College, robert.gaines@pomona.edu

Exhibits and Sponsorship: Joan Fryxell, CSU San Bernardino, jfryxell@csusb.edu

Student Volunteer: Hilary Lackey, Mount San Antonio College, hlackey@mtsac.edu

Preliminary Announcement and Call for Papers

NORTH-CENTRAL SECTION

50th Annual Meeting of North-Central Section, GSA
Champaign, Illinois, USA
18–19 April 2016

www.geosociety.org/Sections/nc/2016mtg/

The Illinois Prairie. Photograph by Dan Kirk.

1967–2016—Celebrating 50 Years of Geoscience in the Mid-Continent

The 50th Annual Meeting of GSA's North-Central Section will take place at the I-Hotel and Conference Center on the campus of the University of Illinois at Urbana-Champaign, USA. This location offers the amenities of a diverse university community and convenient access to the local flair of arts, entertainment, food, and drink. Cultural opportunities abound in the Urbana-Champaign area, and abundant locally owned restaurants dish up a wide diversity of cuisines. Willard Airport provides ready access to air transportation, and Amtrak rail serves Urbana-Champaign. In celebration of the 50th year of North-Central Section meetings, we look forward to presentations and posters that highlight advancements in the geosciences since 1967, review developments and current or emerging research issues in the various geoscience disciplines, and explore emerging research techniques or technologies. Presentations and posters to honor people whose research resulted in significant advances are especially welcome.

CALL FOR PAPERS

Abstract deadline: 26 January 2016

Submit abstracts online at **www.geosociety.org/Sections/nc/2016mtg/.** The submission fee is US$10 for students and US$15 for all others. If you cannot submit an abstract online, please contact Heather Clark, +1-303-357-1018, hclark@geosociety.org.

In addition to the following Theme Sessions, we are soliciting abstracts for general discipline sessions. Please direct questions on these sessions to the technical program co-chairs: Hue-Hwa Hwang and Dave Larson, NCGSA16-tech@isgs.illinois.edu.

Symposium

S1. **Janis Treworgy Memorial Symposium.** David H. Voorhees, Waubonsee Community College, dvoorhees@waubonsee.edu.

Theme Sessions

T1. **50 Years of Geoscience in the Mid-Continent—Celebrating Scientists and Their Legacy of Basic and Applied Research.** David R. Larson, Illinois State Geological Survey, drlarson@illinois.edu.

T2. **Reefs and Shallow Seas: Advances in High-Resolution Stratigraphy and Paleontology in Silurian-Ordovician Rocks of North America.** Donald G. Mikulic, Illinois State Geological Survey, mikulic@illinois.edu.

T3. **Sedimentology and Stratigraphic Framework of the Cambro-Ordovician Transition.** Yaghoob Lasemi, Illinois State Geological Survey, ylasemi@illinois.edu.

T4. **Black Shale and Associated Strata: Sedimentology, Stratigraphy, and Paleontology.** Joseph T. Hannibal, Cleveland Museum of Natural History, jhannibal@cmnh.org.

T5. **Mississippi Valley–Type and Other Mineral Deposits of the Midwestern USA.** F. Brett Denny, Illinois State Geological Survey, fdenny@illinois.edu; Liliana Lefticariu, Southern Illinois Univ., lefticar@siu.edu; Martin Appold, Univ. of Missouri, appoldm@missouri.edu.

T6. **Next-Generation Sedimentary Systems Geobiology.** Bruce W. Fouke, Univ. of Illinois at Urbana-Champaign, fouke@illinois.edu.

T7. **Peeling the Onion: Building on a Century and a Half of Geologic Research in the Illinois Basin.** Charles Monson, Illinois State Geological Survey, cmonson@illinois.edu; Nathan D. Webb, Illinois State Geological Survey, ndwebb2@illinois.edu.

T8. **Shoreline Behavior, Paralic Architecture, and Lake-Level Change in the Great Lakes.** Todd A. Thompson, Indiana Geological Survey, tthomps@indiana.edu; John W. Johnston, Univ. of Waterloo, jwjohnston@uwaterloo.edu; Erin P. Argyilan, Indiana Univ. Northwest, eargyila@iun.edu.

T9. **Climate and Ice Sheets—Records and Analysis during the Last Deglaciation of Central North America.** Thomas V. Lowell, Univ. of Cincinnati, thomas.lowell@uc.edu; B. Brandon Curry, Illinois State Geological Survey, b-curry@illinois.edu.

T10. **Geologic Mapping of Quaternary Deposits.** Kevin A. Kincare, USGS, kkincare@usgs.gov; Richard C. Berg, Illinois State Geological Survey, rberg@illinois.edu; Marni Karaffa, Indiana Geological Survey, karaffam@indiana.edu.

T11. **Quaternary Time Machine: Methods and Analyses of Soils and Sediments to Reveal Secrets of Past Environments.** Maija Sipola, Albion College, msipola@albion.edu; Kat Rocheford, Paul Smith's College, kat-rocheford@uiowa.edu.

T12. **Limnogeology and Paleoclimatology—Investigating Past Environments and Reconstructing Past Climates (Posters).** Melinda Higley, Univ. of Illinois at Urbana-Champaign, mchigley@illinois.edu; Jessica Conroy, Univ. of Illinois at Urbana-Champaign, jconro@illinois.edu; Dana Labotka, Illinois State Geological Survey, dlabotka@illinois.edu; B. Brandon Curry, Illinois State Geological Survey, b-curry@illinois.edu.

T13. **Glacial Meltwater Discharge Events of the Last Deglaciation in the Great Lake Region: Climate and Timing.** Hong Wang, Illinois State Geological Survey, hongwang@illinois.edu; Timothy G. Fisher, Univ. of Toledo, timothy.fisher@utoledo.edu; B. Brandon Curry, Illinois State Geological Survey, b-curry@illinois.edu.

T14. **Quaternary Chronology Conundrums: Approximating and Assessing Event Ages.** B. Brandon Curry, Illinois State Geological Survey, b-curry@illinois.edu; Thomas V. Lowell, Univ. of Cincinnati, thomas.lowell@uc.edu; Henry M. Loope, Indiana Geological Survey, hloope@indiana.edu.

T15. **Advances in Geologic Carbon Sequestration.** Edward Mehnert, Illinois State Geological Survey, emehnert@illinois.edu; James Damico, Illinois State Geological Survey, jdamico@illinois.edu; Hongbo Shao, Illinois State Geological Survey, hbshao@illinois.edu.

T16. **Anthropogenic Impacts on Soil, Water, and Air.** Liliana Lefticariu, Southern Illinois Univ. Carbondale, lefticar@siu.edu; Melissa Lenczewski, Northern Illinois Univ., lenczewski@niu.edu.

T17. **Geomorphology, Hydrology, and Critical Zone Processes in the Anthropocene.** Alison Anders, Univ. of Illinois at Urbana-Champaign, amanders@illinois.edu; Arthur Bettis, Univ. of Iowa, art-bettis@uiowa.edu.

T18. **Innovations in Environmental Assessment and Remediation—Brownfields and Redevelopment and the Impacts of Urbanization.** Patricia Bryan, Bryan Environmental Consultants, Inc., pbryan@bryanenv.com; Christopher J. Stohr, Illinois State Geological Survey, cstohr@illinois.edu; Andrew J. Stumpf, Illinois State Geological Survey, astumpf@illinois.edu.

T19. **Characterization of Karst of the Midwestern U.S.: Problems with Unstable Ground and Groundwater Quality.** Samuel V. Panno, Illinois State Geological Survey, s-panno@illinois.edu; Walton R. Kelly, Illinois State Water Survey, wkelly@illinois.edu.

T20. **Characterizing Water-Quality Changes through Continuous Monitoring.** Kelly Warner, USGS, klwarner@usgs.gov; Amy Gahala, USGS, agahala@usgs.gov.

T21. **Anthropogenic Impacts on Groundwater Quantity and Quality: From Field Data to Numerical Analyses.** Daniel Abrams, Illinois State Water Survey, dbabrams@illinois.edu; Henk Haitjema, Indiana Univ., haitjema@indiana.edu.

T22. **Geophysical Methods with Applications to Hydrogeology.** David Hart, Wisconsin Geological and Natural History Survey, djhart@wisc.edu; Kisa E. Mwakanyamale, Illinois State Geological Survey, kemwaks@illinois.edu.

T23. **The Geological Consequences of River Flood Magnitude: Ancient and Modern Examples.** Andrew C. Phillips, Illinois State Geological Survey, aphillps@illinois.edu; Jim Best, Univ. of Illinois at Urbana-Champaign, jimbest@illinois.edu.

T24. **Advances in River and Floodplain Morphodynamics: Physical, Ecological, and Human Processes.** Jessica Zinger, Univ. of Illinois at Urbana-Champaign, zinger1@illinois.edu; Quinn W. Lewis, Univ. of Illinois at Urbana-Champaign, qlewis2@illinois.edu.

T25. **Applied Geology: Environmental, Engineering, Hydrogeology, Geotechnical, and Applied Geophysics.** Terry R. West, Purdue Univ., trwest@purdue.edu.

T26. **Women and Geology: Who Are We, Where Have We Come From, and Where Are We Going?** Beth A. Johnson, Univ. of Wisconsin–Fox Valley, beth.a.johnson@uwc.edu.

T27. **Geoscience Outreach—50 Years of Innovation.** Lisa Anderson, Michigan State Univ. Extension, venner@mchsi.com; Peter Voice, Western Michigan Univ., peter.voice@wmich.edu.

T28. **Undergraduate Research (Posters).** Robert D. Shuster, Univ. of Nebraska–Omaha, rshuster@unomaha.edu.

T29. **Undergraduate Research: Multidisciplinary Geologic Systems.** Samuel Smidt, Michigan State Univ., smidtsam@msu.edu; Charles Carrigan, Olivet Nazarene Univ., ccarriga@olivet.edu.

T30. **The Contribution of Taphonomy for Understanding the Fossil Record.** Thomas A. Hegna, Western Illinois Univ., ta-hegna@wiu.edu.

T31. **Magmatic Processes of the Midwestern Proterozoic: Mid-Continent Rift to St. Francois Mountains.** Craig Lundstrom, Univ. of Illinois at Urbana-Champaign, lundstro@uiuc.edu.

T32. **Structure, Geophysics, and Tectonics of the Midcontinent, from Precambrian to Present.** Stephen Marshak, Univ. of Illinois at Urbana-Champaign, smarshak@illinois.edu; Seth Stein, Northwestern Univ., seth@earth.northwestern.edu.

T33. **Multidisciplinary Research Techniques in Geoarchaeology—Human Interaction with the Landscape.** Kristin M. Hedman, Illinois State Archaeological Survey, khedman@illinois.edu; Shane K. Butler, Illinois State Geological Survey, sbutler4@illinois.edu.

FIELD TRIPS

For additional information, please contact the field trip co-chairs: Zak Lasemi, zlasemi@illinois.edu, and Scott Elrick, elrick@illinois.edu.

19 ka–13 ka Glacial Meltwater Discharge Archives in the Middle Illinois River Valley: Climate and Timing Implications. Hong

Wang, Illinois State Geological Survey, hongwang@illinois.edu; Andrew J. Stumpf, Illinois State Geological Survey, astumpf@illinois.edu; B. Brandon Curry, Illinois State Geological Survey, b-curry@illinois.edu; Timothy G. Fisher, Univ. of Toledo, timothy.fisher@utoledo.edu.

The Grover Gravel, St. Louis County, Missouri: Evidence for a Complex History, Volcanic Eruptions, and Early Glaciations. Charles W. Rovey, Missouri State Univ., charlesrovey@missouristate.edu; Mike Siemens, Missouri State Geological Survey, mike.siemens@dnr.mo.gov; Greg Balco, Berkeley Geochronology Center, balcs@bgc.org.

Braided Rivers and Other Cambrian Environments of Southeastern Missouri: Sizing up Depositional Systems from Pore Scale to Regional Scale. Jim Best, University of Illinois, jimbest@illinois.edu; David Dominic, Wright State University, david.dominic@wright.edu; Robert Ritzi, Wright State University, robert.ritzi@wright.edu; Charles Monson, Illinois State Geological Survey, cmonson@illinois.edu; Nathan Webb, Illinois State Geological Survey, ndwebb2@illinois.edu.

Silurian Chronostratigraphy of Northeastern Illinois. Donald G. Mikulic, Illinois State Geological Survey, mikulic@illinois.edu; Joanne Kluessendorf, Weis Earth Science Museum, joanne.kluessendorf@uwc.edu.

Illinois Basin–Decatur Project (IBDP): A Large-Scale CO_2 Sequestration Project in a Deep Saline Reservoir. Edward Mehnert, Illinois State Geological Survey, emehnert@illinois.edu; Hongbo Shao, Illinois State Geological Survey, hbshao@illinois.edu.

Fluorite Deposits within the Illinois–Kentucky Fluorspar District and How They Relate to the Hicks Dome Cryptoexplosive Feature. F. Brett Denny, Illinois State Geological Survey, fdenny@illinois.edu; Joe Devera, Illinois State Geological Survey, j-devera@illinois.edu; Mary Seid, Illinois State Geological Survey, maryseid@illinois.edu; Mike Lewsader, Illinois State Geological Survey, lewsader@illinois.edu.

Project-Based Field Trips to the Starved Rock Area for Geoscience Educators. Kristin Huysken, Indiana Univ. Northwest, khuysken@iun.edu; Erin P. Argyilan, Indiana Univ. Northwest, eargyila@iun.edu; Robert Votaw, Indiana Univ. Northwest, cpvotaw@gmail.com.

Quaternary Geology of the Upper Sangamon River Basin: Glacial, Post-Glacial, and Post-Settlement History. David A. Grimley, Illinois State Geological Survey, dgrimley@illinois.edu; Alison Anders, Univ. of Illinois at Urbana-Champaign, amanders@illinois.edu; Andrew J. Stumpf, Illinois State Geological Survey, astumpf@illinois.edu.

The Quaternary Geology of the Chicago Metropolitan Area: The Chicago Outlet, Valparaiso Moraine, Lake Michigan Lobe Chronology Revisited, and Kankakee Torrent Story. B. Brandon Curry, Illinois State Geological Survey, b-curry@illinois.edu; Oliver J. Caron, Illinois State Geological Survey, caron@illinois.edu.

Case Histories of Geology Applied to Remediation of Contaminated Brownfields in South Suburban Chicago. Patricia Bryan, Bryan Environmental Consultants, Inc., pbryan@bryanenv.com; Christopher J. Stohr, Illinois State Geological Survey, cstohr@illinois.edu; Andrew J. Stumpf, Illinois State Geological Survey, astumpf@illinois.edu.

ACCOMMODATIONS

Rooms have been reserved at two locations: (1) The I-Hotel and Conference Center, 1900 South First Street, Champaign, Illinois 61820, USA, +1-217-819-5000. Rate: US$139 plus tax. Use the code "AGSA16" online (http://stayatthei.com/) by 25 March 2016, to make your reservation. The I-Hotel directly adjoins the Conference Center. (2) The Hawthorn Suites (www.hawthorn.com), 101 Trade Center Drive, Champaign, Illinois 61820, USA, +1-217-398-3400. Rates: US$80 (king) and US$90 (double) plus tax. Please call to request the group rate and reference the meeting name and dates. The Hawthorn Suites is located about three-quarters of a mile from the I-Hotel and Conference Center.

LOCAL COMMITTEE

General Chair: Steve Brown, steebrow@illinois.edu

Chair Assistant: Tammy Montgomery, tmntgmry@illinois.edu

Vice-Chair: Yu-Feng Forrest Lin, yflin@illinois.edu

Technical Program Co-Chairs: Hue-Hwa Hwang and Dave Larson, NCGSA16-tech@isgs.illinois.edu

Field Trip Co-Chairs: Scott Elrick and Zak Lasemi, NCGSA16-trip@isgs.illinois.edu

Exhibits: Renaé Strawbridge, NCGSA16-Exhibits@isgs.illinois.edu

Sponsorship: Dana Labotka, NCGSA16-Sponsors@isgs.illinois.edu

Student Programs and Volunteers: Shane Butler, NCGSA16-Students@isgs.illinois.edu

Audiovisual: Mark Yacucci, yacucci@illinois.edu

Special Events, Workshops, and Short Courses: Charles Monson, cmonson@illinois.edu

Local Logistics: Kathy Henry, kmhenry@illinois.edu

Graphics: Dee Lund, dlund@illinois.edu

Other: Joan Crockett, jcrocket@illinois.edu; Laura Keefer, lkeefer@illinois.edu

Photo by Bret Webster.

Meet Us in the Social Media–Sphere

Twitter: https://twitter.com/geosociety

Meeting hashtag #GSA2015

Facebook: https://www.facebook.com/GSA.1888

LinkedIn: https://www.linkedin.com/company/geological-society-of-america

GSA's Connected Community: community.geosociety.org

FUTURE

GSA ANNUAL MEETINGS

2016
Denver, Colorado, USA
(25–28 Sept.)

2017
Seattle, Washington, USA
(22–25 Oct.)

2018
Indianapolis, Indiana, USA
(4–7 Nov.)

2019
Denver, Colorado, USA
(13–16 Oct.)

2020
Montréal, Québec, Canada
(25–28 Oct.)

2021
Portland, Oregon, USA
(10–13 Oct.)

2022
Denver, Colorado, USA
(9–12 Oct.)

2023
Pittsburgh, Pennsylvania, USA
(15–18 Oct.)

Denver skyline.

Geoscience Jobs & Opportunities

Ads (or cancellations) must reach the GSA advertising office no later than the first of the month, one month prior to the issue in which they are to be published. Contact advertising@geosociety.org, +1.800.472.1988 ext. 1053, or +1.303.357.1053. All correspondence must include complete contact information, including e-mail and mailing addresses. To estimate cost, count 54 characters per line, including punctuation and spaces. Actual cost may differ if you use capitals, boldface type, or special characters. Rates are in U.S. dollars.

Classification	Per Line for 1st month	Per line each addt'l month (same ad)
Positions Open	$9.15	$8.90
Fellowship Opportunities	$9.15	$8.90
Opportunities for Students		
First 25 lines	$0.00	$5.00
Additional lines	$5.00	$5.00

Positions Open

TWO ASSISTANT PROFESSOR POSITIONS IN GEOPHYSICS CONOCOPHILLIPS SCHOOL OF GEOLOGY AND GEOPHYSICS THE UNIVERSITY OF OKLAHOMA

The University of Oklahoma invites applications for two tenure-track positions in Geophysics at the Assistant Professor rank. One position is in General Geophysics and the second in Applied Geophysics. We seek dynamic colleagues who will teach and supervise geophysics students at all levels, while conducting an aggressive, independent, externally funded research in their field of expertise. The successful candidate should hold a Ph.D., have a demonstrated research record, and an interest in teaching undergraduates and mentoring graduate students.

The **general geophysics** applicant should have research interest in fundamental geophysics endeavors that include, but not limited to, geodynamics, potential fields, geodesy, numerical modeling, geomechanics or seismology.

The **applied geophysics** applicant should have research interest in collection of geophysical data and the interpretation of the subsurface for energy, groundwater, mineral, and geothermal exploration. Interest in reservoir characterization and industry experience are welcome.

The ConocoPhillips School of Geology and Geophysics has a large, vibrant faculty with a broad range of research activities and strong ties to the petroleum industry. The student body includes about 200 undergraduates and more than 100 M.S. and Ph.D. students. The Mewbourne College of Earth & Energy possesses extensive software and computing labs with PC and Linux platforms networked to our own dedicated cluster within the OU supercomputer center (OSCER). The College hosts numerous industrial consortia, a research institute focused on seismic monitoring, and a field campus in Colorado for field courses in geology and geophysics. The geophysics group conducts multiple, externally funded, research, and maintains a comprehensive pool of geophysical equipment including GPR, seismic (active and passive), magnetic, and gravity instruments, as well as extensive rock physics characterization laboratories. Through collaboration with industry, we have a suite of 3D seismic and microseismic data volumes that are used for teaching, algorithm calibration, seismic geomorphological analysis, crustal imaging, and a range of open source software for lithospheric-scale research. Information about the School and College can be found at mcee.ou.edu.

Review of applications will begin September 30, 2015, and on-campus interviews will start later. The search will continue until the positions are filled. The preferred starting date is January 15, 2016, with optional starting date of August 15, 2016. Applicants can apply online at jobs.ou.edu and search listings for the requisition number: 23147 for General Geophysics or 23148 for Applied Geophysics. Applicants should submit a complete vita/resume, statement of research and teaching interests, and a list of five references who can be contacted, including phone numbers, e-mail addresses, and mailing addresses. Questions or information requests may be addressed to Geophysics Search, at (405) 325-3253, or ougeophysicssearchchair@ou.edu.

The University of Oklahoma (OU) is a Carnegie-R1 comprehensive public research university known for excellence in teaching, research, and community engagement, serving the educational, cultural, economic and health-care needs of the state, region, and nation. OU enrolls over 30,000 students and has more than 2,700 full-time faculty members in 21 colleges. In 2014, OU became the first public institution ever to rank #1 nationally in the recruitment of National Merit Scholars, with 311 scholars. The 277-acre Research Campus of OU in Norman was named the No. 1 research campus in the nation by the Association of Research Parks in 2013. Norman is a culturally rich and vibrant town with outstanding schools, amenities, and a low cost of living, and it is a perennial contender on "best place to live" rankings. For more information, visit www.ou.edu/content/dam/provost/documents/facultyflipbook.pdf and www.ou.edu/publicaffairs/oufacts.html.

The University of Oklahoma is an Affirmative Action, Equal Opportunity Employer. Women and minorities are encouraged to apply. Protected veterans and individuals with disabilities are encouraged to apply.

TENURE-TRACK POSITION IN SEDIMENTOLOGY OR GEOPHYSICS TEXAS TECH UNIVERSITY

The Dept. of Geosciences at Texas Tech University seeks applicants for a tenure-track, assistant professor position in either sedimentology or geophysics to start Fall 2016. A Ph.D. in an Earth Science or closely related discipline at time of appointment is required.

We seek a dynamic researcher and teacher who uses innovative field, laboratory and/or modeling approaches in either targeted area. For sedimentology, we seek candidates with expertise in sandstone, mudstone or carbonate sedimentary systems. For geophysics, we seek candidates with a specialty in seismology or CSEM/MT methods. The geophysics candidate's main area of research should be in imaging and interpreting crust and lithospheric features and whose interests include the basin scale. A letter of application including contact information for three references, vita, and short statements of research and teaching philosophies can be uploaded at www.texastech.edu/careers/ requisition #5155BR.

We seek candidates with strong records of scholarship who have the proven capacity or the clear potential to bring externally sponsored research to Texas Tech University. The department (www.geosciences.ttu.edu) has active research specialties in geology, geophysics, geochemistry, geography, and atmospheric science. We have ~400 undergraduate majors and ~85 graduate students. Texas Tech is located in Lubbock on the edge of the Permian Basin. The region appreciates the social and economic importance of geoscience research due to the importance of petroleum and groundwater resources to the national economy. Teaching duties include graduate and undergraduate courses in the candidate's specialty. Service to the department, university, and discipline is expected.

As an Equal Employment Opportunity/Affirmative Action employer, Texas Tech University is dedicated to the goal of building a culturally diverse faculty committed to teaching and working in a multicultural environment. We encourage applications from qualified candidates who can contribute, through research, teaching, and service, to the diversity and excellence of the academic community at Texas Tech University. The university welcomes applications from minorities, women, veterans, persons with disabilities, and dual-career couples. Evaluation of candidates will begin November 11, 2015 and continue until the position is filled. Department representatives will be available to discuss the position at the GSA Annual Meeting (1–4 November) in Baltimore, Maryland. Questions should be sent to Dr. Jeff Lee, Search Committee Chair: jeff.lee@ttu.edu.

ASSISTANT PROFESSOR OF GEOLOGY (SURFICIAL GEOLOGY) NORTHLAND COLLEGE ASHLAND, WISCONSIN

Northland College is seeking a dedicated educator for a tenure-track Assistant Professor position in the general area of surficial geology. The successful candidate will teach six courses per year, including Physical Geology, Landforms, Hydrology, Senior Capstone Research/Senior Seminar, and two other courses, one of which will be a field or other intensive experiential course during the College's May Term. A Ph.D. in geology is required (conferred by August 2016). Review of applications will begin on December 1, 2015, and the position will begin in late August 2016. For more information, go to www.northland.edu/jobs.

TENURE-TRACK ASSISTANT (OR ASSOCIATE) PROFESSOR SEDIMENTARY GEOLOGY SAN FRANCISCO STATE UNIVERSITY

The San Francisco State University Dept. of Earth & Climate Sciences seeks applicants for a tenure-track Assistant (or Associate) Professor position in Sedimentary Geology beginning August 2016. Ph.D. in earth sciences or related discipline required. Salary commensurate with qualifications. Position description available at http://tornado.sfsu.edu/PositionAn-

nouncement/TenureTrackSedimentology2015.pdf.

SF State serves a diverse student body with a mission to promote scholarship, diversity, instructional excellence and intellectual accomplishment. Faculty are expected to be effective teachers, demonstrate professional achievement and growth through research, publications and/or creative activities, and engage in service to the campus and community. Application review begins November 13, 2015, continues until filled.

Submit letter of interest, CV, statements of research and teaching interests, and contact information of three references to AcademicJobsOnline.org. For questions, contact: Dr. Leonard Sklar: leonard@sfsu.edu.

TENURE-TRACK POSITION
ENVIRONMENTAL/ENGINEERING GEOLOGY
CSU SAN BERNARDINO

The Dept. of Geological Sciences at California State University, San Bernardino, invites applicants for a tenure-track position at the Assistant Professor level in environmental/engineering geology with expertise in one or more of the following: soils, applied geophysics, surficial geohazards, and rock mechanics. Prior work experience in environmental/engineering geology and ability to train students for careers in these fields will be viewed favorably, as will expertise in water-related issues, and ability to combine geologic field methods with complementary laboratory approaches. Teaching responsibilities could include undergraduate and/or graduate courses in applied geophysics, engineering geology, soils, applied geologic mapping, surficial geologic hazards, environmental geology and/or other elective courses in the candidate's field of specialization, as well as general education courses in introductory geology and integrative earth sciences (e.g., climate change, energy, natural disasters). The appointee will be expected to advise undergraduate students, and to supervise senior research projects in geology and graduate student theses in the Earth and Environmental Sciences M.S. program. The successful candidate will be expected to demonstrate excellence in teaching, to develop an externally funded research program involving student participation, and to participate in service activities. A Ph.D. in Geology is strongly preferred at the time of application, however strong ABD candidates who will have completed their degree by the time of appointment may be considered. Salary is dependent on qualifications and experience. Generous medical, dental, and vision benefits and support for moving expenses are available.

Applicants should submit a cover letter, a curriculum vitae, undergraduate and graduate transcripts (official transcripts will be required pending an offer), statements of research/professional accomplishments and goals, and teaching philosophy and strategies, together with the names and complete contact information of at least three references. Review of the applications will begin November 9, 2015, and will continue until position is filled; the position will start in September 2016. To apply please visit https://www.governmentjobs.com/jobs/1219103/instructional-faculty-environmental-engineering-geology/agency/csusb/apply. For more information about the Dept. of Geological Sciences, see http://geology.csusb.edu. Inquiries may be directed to Sally McGill (smcgill@csusb.edu).

We will have a booth at the GeoCareers Interview Service at the GSA meeting. Please contact Joan Fryxell (jfryxell@csusb.edu) for more information.

ASSISTANT OR ASSOCIATE PROFESSOR
IN PETROLEUM GEOCHEMISTRY
CONOCOPHILLIPS SCHOOL OF
GEOLOGY AND GEOPHYSICS
THE UNIVERSITY OF OKLAHOMA

The University of Oklahoma invites applications for a tenure-track position in Petroleum Geochemistry at the assistant or associate professor level. The ConocoPhillips School of Geology and Geophysics has a long and distinguished history in Petroleum Geochemistry. We are seeking a creative, dynamic person to help us move forward into new and exciting areas of petroleum geochemical research, in particular, with respect to biomarker and stable isotope studies, and an effective teacher who will educate students so they can move into successful careers. The successful applicant will hold a Ph.D., have an academic background in the geosciences, develop an externally funded research program, and teach undergraduate courses in geology in addition to graduate-level courses in petroleum geochemistry.

The ConocoPhillips School of Geology and Geophysics is housed in the Sarkeys Energy Center. The Petroleum Geochemistry research facilities include wet chemistry laboratories for sample preparation and experimentation, all of which are equipped with fume hoods, chemical and solvent storage facilities, microbalances, ovens, water purification facilities, etc. Instrumentation is state of the art, including 7 gas chromatographs, gas chromatography/mass spectrometry instruments (a Thermo TSQ 8000 GC/MS/MS and two 5975 MSD systems), pyrolysis/gas chromatography instrumentation and high performance liquid chromatographic equipment. Our stable isotope laboratories are equipped with conventional facilities for the off-line combustion, isolation, and purification of gases for stable isotope analysis. The laboratory houses 5 stable isotope ratio mass spectrometers, including a Thermo Delta V Plus, a MAT 252, a MAT 253, a Delta Plus XL and a Delta E for bulk and compound specific stable isotope analyses of organic and inorganic materials via dual inlet and in continuous flow modes using elemental analyzers and gas chromatographs interfaced to the instruments. Information about the School and College, the facilities and the entities that it houses can be found at www.mcee.ou.edu.

Review of applications will begin October 1, 2015. The search will continue until the position is filled. The anticipated start date for the position is August 15, 2016. Applicants can apply online at jobs.ou.edu and search listings for the requisition number: 23149. Applicants will be required to submit a vita/resume, statement of research and teaching interests, and a list of five references who can be contacted, including telephone numbers, e-mail addresses, and mailing addresses. Questions or information requests should be addressed to the Chair of the Petroleum

Geochemistry Search Committee, at (405) 325-3253 or ougeochemistrysearchchair@ou.edu.

The University of Oklahoma (OU) is a Carnegie-R1 comprehensive public research university known for excellence in teaching, research, and community engagement, serving the educational, cultural, economic and health-care needs of the state, region, and nation from three campuses: Norman, Health Sciences Center in Oklahoma City and the Schusterman Center in Tulsa. OU enrolls over 30,000 students and has more than 2700 full-time faculty members in 21 colleges. In 2014, OU became the first public institution ever to rank #1 nationally in the recruitment of National Merit Scholars, with 311 scholars. The 277-acre Research Campus in Norman was named the No. 1 research campus in the nation by the Association of Research Parks in 2013. Norman is a culturally rich and vibrant town located just outside Oklahoma City. With outstanding schools, amenities, and a low cost of living, Norman is a perennial contender on "best place to live" rankings. Visit www.ou.edu/content/dam/provost/documents/facultyflipbook.pdf and www.ou.edu/publicaffairs/oufacts.html for more information.

The University of Oklahoma is an Affirmative Action, Equal Opportunity Employer. Women and minorities are encouraged to apply. Protected veterans and individuals with disabilities are encouraged to apply.

EARTH SURFACE PROCESSES
DARTMOUTH COLLEGE

The Dept. of Earth Sciences at Dartmouth College invites applications for a junior rank tenure-track position in the general area of Earth Surface Processes. We especially welcome applications from candidates with research interests in the generation, transport and deposition of sediments and related contaminants in hill slope and stream channel environments, potentially with additional research interests in the biological mediation of physical processes and forms. Particular attention will be given to candidates who combine a focus on understanding fundamental processes with state-of-the-art laboratory and/or field research programs that complement and contribute to ongoing research activities in the department as well as in Dartmouth's Dept. of Biological Sciences, Dept. of Geography, and the Thayer School of Engineering. The successful candidate will continue Dartmouth's strong traditions in graduate and undergraduate research and teaching. Teaching responsibilities consist of three courses spread over three of four ten-week terms.

The Dept. of Earth Sciences is home to 11 tenured and tenure-track faculty members in the School of Arts and Sciences, and enjoys strong Ph.D. and M.S. programs and outstanding undergraduate majors. To create an atmosphere supportive of research, Dartmouth College offers new faculty members grants for research-related expenses, a quarter of sabbatical leave for each three academic years in residence, and flexible scheduling of teaching responsibilities.

Dartmouth College, a member of the Ivy League, is located in Hanover, New Hampshire (on the Vermont border). Dartmouth has a beautiful, historic campus located in a scenic area on the Connecticut River. Recreational opportunities abound all year round. To learn more about Dartmouth College and the Dept. of Earth Sciences, visit www.dartmouth.edu/~earthsci.

To submit an application, send curriculum vitae, statements of teaching and research interests and objectives, reprints or preprints of up to three of your most significant publications, and the name, address (including street address), e-mail address, and fax/phone numbers of at least three references to http://apply.interfolio.com/30984.

Applications received by November 11, 2015, will receive first consideration. The appointment will be effective July 1, 2016.

With an even distribution of male and female students and over a quarter of the undergraduate student population members of minority groups, Dartmouth is committed to diversity and encourages applications from women and minorities. Dartmouth College is an equal opportunity and affirmative action employer.

ASSISTANT PROFESSOR OF EARTH AND ATMOSPHERIC SCIENCES (HYDROGEOLOGY/GROUNDWATER MODELING)
UNIVERSITY OF NEBRASKA–LINCOLN

Applications are invited for a tenure track position as Assistant Professor in the Dept. of Earth and Atmospheric Sciences at the University of Nebraska–Lincoln. The successful candidate will be expected to participate in teaching and curricular development of undergraduate and graduate courses, to advise and direct graduate students, and to develop a rigorous research program that is supported by external funding. It is expected that the research program will focus on the responses of groundwater systems to climate change. Ability to contribute to multidisciplinary water and climate research efforts within Dept. of Earth & Atmospheric Sciences and across the university will be considered as an advantage. The candidate should demonstrate strong potential for research and teaching and must hold a Ph.D. in Geology, Hydrogeology, or a related field at the time of appointment.

The Dept. of Earth and Atmospheric Sciences offers B.S. degrees in Geology and Meteorology-Climatology, as well as M.S. and Ph.D. degrees in Earth and Atmospheric Sciences. Primary research areas within the geological sciences include hydrogeological sciences, sedimentary geology, paleontology and paleobiology, petroleum geosciences, and geobiology. Research in atmospheric sciences is focused on meteorological hazards, climate change, and remote sensing. Additional information about our department can be found on our website: http://eas.unl.edu.

To apply, go to http://employment.unl.edu, requisition # F_150187 and complete the "faculty/administrative form." Applicants must attach a cover letter, curriculum vitae, statements of research and teaching interests, and contact information for at least three references via the above website. We will begin to review applications on October 31, 2015, but the position will remain open until it is filled.

The University of Nebraska is committed to a pluralistic campus community through affirmative action, equal opportunity, work-life balance, and dual careers. See www.unl.edu/equity/notice-nondiscrimination.

For further information, contact Dr. Richard Kettler, Search Committee Chair by email, phone, or mail: rkettler1@unl.edu, 1-402-472-0882; Dept. of Earth & Atmospheric Sciences, University of Nebraska–Lincoln, 214 Bessey Hall, Lincoln, NE 68588-0340.

TENURE-TRACK FACULTY POSITION IN GEOLOGY, ILLINOIS STATE UNIVERSITY

The Dept. of Geography-Geology at Illinois State University invites applications for a tenure-track position in **Hydrogeology/Water Science** at the **Assistant Professor** level. The preferred starting date is August 16, 2016. A Ph.D. in Geology or closely related field is preferred, but ABD candidates who will finish before the time of appointment will be considered.

The department seeks a candidate who possesses research and teaching interests that emphasize practical applications of Hydrogeology through field, laboratory, and/or computational skills. Specialties may include, but are not limited to, environmental geophysics, vadose zone processes, flow in fractured media, hydrogeology of energy-related activities, water supply and sustainability, and/or contaminant and solute transport. Candidates must be able to demonstrate oral proficiency in the English language as a requirement for this position, as mandated by state law.

Successful candidates will be integrated scholars with a strong commitment to teaching and mentoring student research at the M.S. and undergraduate levels. Primary teaching responsibilities will include graduate, advanced undergraduate, and general education courses. The successful candidate will be expected to maintain an externally funded and internationally visible research program. Potential collaborative interactions exist within the department and with various state agencies (e.g., Illinois State Geological Survey, Illinois State Water Survey, and Illinois EPA). The potential for a significant startup package exists.

Illinois State University is a research-intensive university with an annual enrollment of approximately 22,000 students. To build a diverse workforce, Illinois State University encourages applications from individuals with disabilities, minorities, females, and veterans. Equal Opportunity Employer. The university is located in the Bloomington-Normal metropolitan area of central Illinois with a population of approximately 150,000. The Dept. of Geography-Geology offers B.S./B.A. degrees in Geography, a B.S. degree in Geology, and an M.S. degree in Hydrogeology.

To ensure full consideration, please attach an online faculty application along with a letter of application, curriculum vitae, statement of teaching philosophy, statement of research plans, contact information for three references (name, telephone, and email), and all college and university transcripts to posting number 0707449 at www.IllinoisState.edu/jobs. Screening of applications begins November 13, 2015, and will continue until the position is filled. Inquiries about the application process should be

directed to Dr. Eric Peterson (ewpeter@ilstu.edu, 309-438-7865). Additional information about the department and the community can be found at http://geo.illinoisstate.edu/.

FACULTY, TENURE-TRACK STRUCTURAL GEOLOGY/IGNEOUS AND METAMORPHIC PETROLOGY SALEM STATE UNIVERSITY

The geological sciences department at Salem State University seeks applicants for a tenure track position beginning September 2016. The ideal candidate is a field geologist with expertise in structural geology and a secondary focus on igneous and metamorphic petrology who is committed to undergraduate teaching and research. Teaching assignments will include: Structural Geology for majors, summer field course in Montana, introductory general education courses in the geosciences and serving as senior thesis advisor.

To view full posting and apply, please visit salemstate.edu/jobs. Please apply online and attach curriculum vitae, cover letter, and transcripts. Completed application materials submitted by October 15, 2015, will receive full consideration. **Selected candidates will be met at the 2015 GSA Annual Meeting in Baltimore**. Salem State University is an equal opportunity/affirmative action employer. Persons of color, women, and persons with disabilities are strongly urged to apply.

TENURE-TRACK APPLIED GEOSCIENCE BAYLOR UNIVERSITY

Baylor University is a private Christian university and a nationally ranked research institution, consistently listed with highest honors among *The Chronicle of Higher Education*'s "Great Colleges to Work For." Chartered in 1845 by the Republic of Texas through the efforts of Baptist pioneers, Baylor is the oldest continuously operating university in Texas. The university provides a vibrant campus community for over 15,000 students from all 50 states and more than 80 countries by blending interdisciplinary research with an international reputation for educational excellence and a faculty commitment to teaching and scholarship. Baylor is actively recruiting new faculty with a strong commitment to the classroom and an equally strong commitment to discovering new knowledge as we pursue our bold vision, *Pro Futuris.*

Baylor seeks to fill the following tenure-track Assistant Professor faculty position within the Dept. of Geology with specialization in Geophysics, Stratigraphy or Structural Geology, beginning in August 2016. Candidates should possess an earned doctorate in geophysics or geology at the time of appointment. Preference will be given to a candidate with a strong background in pure or applied research who works with subsurface data (e.g., seismic, potential field, well log, rock property, fluid production, or combinations of these data types). The successful candidate should have the potential to attract external funds and to build a strong research program that involves both undergraduate and graduate (M.S. and Ph.D.) students. We seek an individual with a strong commitment to excellence in teaching at the graduate and undergraduate levels. **Application Process:** Send letter of interest, including statement of teaching and research interests, curriculum vitae, official transcripts, and the names and contact information for three references to Dr. Jay Pulliam, Chair, Search Committee, Dept. of Geology, Baylor University, One Bear Place #97354, Waco, TX 76798-7354 (Tel: 254-710-2361; e-mail: appliedgeosci2016@baylor.edu). Applications will be reviewed beginning in September 2015 and applications will be accepted until the position is filled.

Baylor University is a private not-for-profit university affiliated with the Baptist General Convention of Texas. As an Affirmative Action/Equal Opportunity employer, Baylor is committed to compliance with all applicable anti-discrimination laws, including those regarding age, race, color, sex, national origin, marital status, pregnancy status, military service, genetic information, and disability. As a religious educational institution, Baylor is lawfully permitted to consider an applicant's religion as a selection criterion. Baylor encourages women, minorities, veterans, and individuals with disabilities to apply.

MULTIPLE TENURE-TRACK FACULTY POSITIONS, DEPARTMENT OF GEOLOGICAL SCIENCES CALIFORNIA STATE UNIVERSITY FULLERTON

The Dept. of Geological Sciences at California State University Fullerton (http://geology.fullerton.edu/) invites applications for two tenure-track, Assistant Professor positions beginning August 2016. The successful candidates will: (1) be expected to develop active, field-based, externally funded research programs involving undergraduate and Master's level graduate students; (2) be committed to excellence in teaching at the undergraduate and Master's levels; and (3) have the ability to communicate effectively with an ethnically and culturally diverse campus community.

Structural Geology: Successful candidate must display evidence of a field-based research program in structural geology. Primary teaching responsibilities will be structural geology, geologic field methods, and field camp. The successful candidate may also teach introductory-level and upper-level/graduate courses in the candidate's area of specialization. For a complete position description, information on the CSUF Dept. of Geological Sciences, and application procedures, see http://hr.fullerton.edu/diversity/job-openings/ft/8082BR_structural_geologist.asp.

Basin Analysis/Petroleum Geology: Successful candidate must display evidence of a research program in basin analysis and/or petroleum geology. Preference will be given to candidates that incorporate field studies. Exceptional candidates may be considered at the Associate Professor level. Primary teaching responsibilities may include upper-level classes such as petroleum geology, basin analysis, and geophysics, as well as introductory-level Earth science and field courses. Preference will be given to candidates with an interest in teaching field methods and field camp. For a complete position description, information on the CSUF Dept. of Geological Sciences, and application procedures, see: http://hr.fullerton.edu/diversity/job-openings/ft/8083BR_basin_analysis_petroleum_geology.asp.

Applications for both positions will be accepted until the position is filled. To ensure full consideration, submit all application materials by November 16, 2015. California State University Fullerton celebrates all forms of diversity and is deeply committed to fostering an inclusive environment within which students, staff, administrators and faculty thrive. EEO employer.

ASSISTANT PROFESSOR SEDIMENTARY GEOLOGY/PALEOCLIMATE OCCIDENTAL COLLEGE

The Dept. of Geology at Occidental College invites applications for an Assistant Professor in sedimentary geology with a research focus in paleoclimate, paleoenvironmental change, and/or fluvial-coastal processes. Occidental is a nationally ranked liberal arts college recognized for its diverse student body and outstanding undergraduate research program. We seek a colleague who values undergraduate teaching and can sustain an active research program involving undergraduates. In addition to courses related to specialty, the successful candidate will contribute to teaching introductory geology, support the Environmental Science concentration, engage undergraduates in research, and mentor students through completion of senior theses.

Applications should include a statement of teaching and research interests in the context of a liberal arts college. Candidates should specifically address their ability to (1) teach in a socioeconomically, ethnically, and culturally diverse environment, and (2) engage students in an ongoing research program. Submit statement, curriculum vitae, 1–3 significant publications, and contact information for three referees to Dr. Margi Rusmore, Search Committee Chair, at geosearch1@oxy.edu. Members of underrepresented groups are especially encouraged to apply. Review of applications will begin October 15, 2015, and will continue until the search closes on December 22, 2015. **Search committee members will meet interested candidates at the GSA and AGU meetings; email the committee to make arrangements.**

TWO POSITIONS STRATIGRAPHY/SEDIMENTOLOGY AND GEOMORPHOLOGY/CLIMATOLOGY DENISON UNIVERSITY

Denison University invites applications for two tenure track positions in the Dept. of Geosciences, to begin in August 2016. We seek broadly trained scientists engaged in the study of (1) Sedimentology and/or Stratigraphy, and (2) Geomorphology and/or Climatology. We welcome candidates that combine these specialties in innovative ways, and are willing to consider joint applications. Successful candidates should demonstrate potential to be outstanding teachers, active scholars, and contributors to the continued growth of the Department and College. Candidates must have a Ph.D. at the time of appointment.

We seek colleagues who are committed to teaching excellence in the liberal arts tradition, are field-based, have broad interests beyond their individual specialties, and will provide a balance of

classroom, field, and laboratory experiences for our students. Candidates must have the desire and ability to teach courses at all levels of the curriculum. The typical teaching load is three lab courses per year. In addition, successful candidates are expected to maintain vibrant and productive research programs that actively incorporate undergraduate students.

Denison University is a highly selective, private residential liberal arts college enrolling approximately 2100 undergraduate students from across the country and around the world. The college is located in the village of Granville, Ohio, 25 miles east of Columbus. For more information about Denison, visit our website at www.denison.edu.

All application materials will be handled electronically at https://employment.denison.edu. (Please clearly indicate the desired position.) Applications must include: (1) a letter of application addressing the position requirements listed above; (2) a current curriculum vita; (3) academic transcripts of undergraduate and graduate course work (unofficial acceptable); (4) a statement of teaching philosophy and experience; and (5) a statement of your research program in a liberal arts context. In addition, please include the contact information for three persons who know your teaching and scholarship well, who will then be requested to upload reference letters. Completed application materials submitted by October 15, 2015, will receive full consideration, and evaluation will continue until the position is filled. For those attending, we plan to meet with selected candidates at the 2015 GSA Annual Meeting in Baltimore, Maryland.

To achieve our mission as a liberal arts college, we continually strive to foster a diverse campus community, which recognizes the value of all persons regardless of religion, race, ethnicity, gender, sexual orientation, disability, or socioeconomic background. For additional information and resources about diversity at Denison, please see our Diversity Guide at http://denison.edu/forms/diversity-guide. Denison University is an Affirmative Action, Equal Opportunity Employer.

ASSISTANT/ASSOCIATE PROFESSOR
WATERSHED ANALYSIS
MONTANA STATE UNIVERSITY

The Land Resources and Environmental Sciences Department, Montana State University, Bozeman, http://landresources.montana.edu, is seeking a talented and enthusiastic individual to undertake a tenure-track, fiscal-year faculty position (63% research/27% teaching/10% service) in watershed analysis. Details of the position are available at http://www.montana.edu/jobs/faculty. Screening will begin January 15, 2016, until an adequate applicant pool has been established.

Fellowship Opportunities

WIESS POST-DOCTORAL
RESEARCH FELLOWSHIP
DEPARTMENT OF EARTH SCIENCE
RICE UNIVERSITY

The Dept. of Earth Science at Rice University is launching a Wiess Post-Doctoral Research Fellowship competition in the broad fields of Earth, atmospheric, and planetary sciences. Interested candidates should have recently completed their Ph.D. or are expected to complete their Ph.D. by September 2016. The appointment of the fellow is expected to begin anytime between July and December 2016.

The principal selection criteria for the fellow are scientific excellence and a clearly expressed research plan to address questions at the forefront of Earth science, broadly defined. Applicants are expected to propose their own research ideas, but are encouraged to consider the current spectrum of research activities in the department and to communicate with one or more members of the faculty (http://earthscience.rice.edu/).

The research fellowship will be supported by the Dept. of Earth Science for two years pending satisfactory progress in their first year. The fellowship covers an annual stipend of $60,000 and includes an annual research allowance of $3,500.

Candidates are required to submit:

(1) A cover letter addressed to the search committee chair;
(2) A research proposal of no more than 3 single spaced pages excluding references;
(3) A current CV;
(4) A list of publications; and
(5) A list of four referees with full contact details.

All documents should be submitted as a single .pdf file to the chair of the fellowship search committee (esci-postdoc@rice.edu). The application deadline is November 1, 2015. The highest ranked candidates will be invited to visit Rice in early 2016, and the decision of the award will be announced March 1, 2016.

Equal Opportunity Employer--Females/Minorities/Veterans/Disabled/Sexual Orientation/Gender Identity.

Notice of GSA
Council Meetings

GSA 2015 ANNUAL MEETING & EXPOSITION
BALTIMORE, MARYLAND, USA

Two meetings of GSA's Council will be held at the Hilton Baltimore during the meeting.

DAY 1: Sat., 31 Oct., 8 a.m.–noon, Holiday Ballroom 4 (2nd floor)

DAY 2: Wed., 4 Nov., 8 a.m.–noon, Johnson Room (1st Floor)

All GSA members are invited to attend the open portions of these meetings.

THE GEOLOGICAL SOCIETY OF AMERICA®

GROUNDWORK
Furthering the Influence of Earth Science

Introductory geology: Is there a common language?

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INTRODUCTION

Geologic terms provide a common language for communicating geoscience concepts. Because introductory geoscience students can learn only a limited number of these terms, questions arise about which terms are essential to learn and if there is agreement between geoscientists on these terms.

Students are frequently exposed to terms through their textbooks, and previous studies have examined vocabulary in texts, although not college-level geology textbooks. In a high school earth science textbook, Groves (1995) found a rate of 4.45 scientific terms per page. Zechmeister and Zechmeister (2000) compared ten college-level introductory psychology textbooks and counted 2,505 unique terms in the glossaries, with <3% of terms common to all ten glossaries.

An extensive use of geologic terms in introductory textbooks may lead to difficulties in learning. The limited working-memory capacity of most novices results in the ability to attend to only a small amount of new information while reading, which decreases text comprehension (Sweller et al., 1998; Cain et al., 2004). If students are using their mental capabilities to comprehend unknown terms, their cognitive systems could become overloaded, and deep cognitive processing may not happen. Students may use geologic terms without fully understanding their underlying concepts (Libarkin and Kurdziel, 2006; Kortz and Murray, 2009; Clark et al., 2011). In addition, students have less facility than experts in extracting the relevant information and seeing the big picture (e.g., Caillies et al., 2002; Patrick et al., 2005). Therefore, students may focus on small details, such as geologic terms, instead of using those terms to construct a holistic conceptual understanding. Students may then have an illusion of deep understanding because they can recognize vocabulary words (Graesser and Forsyth, 2013).

Extensively incorporating terms may lead to unintended consequences. For example, an emphasis on learning terms may contribute to the misconception that science is a finished body of knowledge requiring abundant memorization (Groves, 1995). In addition, introducing large numbers of terms may lead to the emphasis on a breadth instead of a depth of knowledge, contrary to what has been recommended by education reformers (Bransford et al., 2000; Earth Science Literacy Initiative, 2009; Next Generation Science Standards, 2014).

Since the copious use of terminology potentially affects student learning, and limiting terminology requires knowing which terms are most valued by geologists, we analyzed terms in college-level introductory geology textbooks. In particular, we analyzed glossary terms, comparing whether a common vocabulary exists between the textbooks.

METHODS

We tabulated glossary terms in 16 introductory physical geology textbooks. Minor variations in terms (e.g., "P-wave" and "P wave") between textbooks were combined into a common term that was used during analysis. One author compiled terms, and the other author confirmed the list.

RESULTS

Textbooks written by the same authors (e.g., essentials and full versions) used a fairly consistent language, so we present the analysis of only the full versions of ten textbooks. We note, however, that one "essentials" textbook (Marshak, 2009) had more terms in the glossary (1,435) than the "full" version (1,301 terms; Marshak, 2008).

We identified 2,776 individual, unique terms in the ten full-version textbooks, averaging 678 terms per book glossary (Table 1). To verify that the glossary terms matched the bolded words in textbooks, we crosschecked 10% of the glossary words and bolded words in a subset of three textbooks and found that 96.8% of bolded words ($n = 210$) were in the glossary, and 93.6% of glossary terms ($n = 203$) were bolded. Italicized words increased the total number of words emphasized in the text by 1.5 times, although they were not included in our analysis because they were predominantly not in the glossary.

There was minimal overlap in glossary terms between the textbooks. Only 44 terms (1.6% of the unique terms) were common to all ten textbooks. Examples of these 44 terms are abrasion, barrier island, epicenter, igneous rock, joint, mantle, plate tectonics, and volcano. Only 16.4% of terms are in five or more textbooks, and over half of terms (55.3%) were unique to individual textbooks. Examples of the 39.5% of terms unique to Marshak (2008) include dormant volcano, olistotrome, sabkah, snotite, and topsoil, whereas examples of the 8.5% of terms unique to Murck et al. (2010) include fractionation, kingdom, and seismic discontinuity. Unique terms may be used in other textbooks, but if they were not in the glossary, they were not included in this study.

GSA Today, v. 25, no. 10, doi: 10.1130/GSATG236GW.1.

Table 1. Number of glossary terms in full-version introductory geology textbooks and percentage of those terms that are unique to each textbook.*

Textbook number#	1	2	3	4	5	6	7	8	9	10
Number of glossary terms	1301	976	884	762	578	519	519	494	486	259
Percent unique to the textbook	39.5	29.6	20.5	14.0	17.1	14.1	12.1	26.3	11.5	8.5

*The sum of terms across the 10 books is 6,778, with 2,776 unique terms.
#1—Marshak (2008); 2—Reynolds et al. (2010); 3—Plummer et al. (2011); 4—Tarbuck and Lutgens (2008); 5—Grotzinger and Jordan (2010); 6—Smith and Pun (2010); 7—Chernicoff and Whitney (2007); 8—Fletcher (2011); 9—Monroe et al. (2007); 10—Murck et al. (2010).

DISCUSSION

This study presents a lower limit on the vocabulary necessary for students to understand textbooks, because italicized and non-technical terms with specific geologic implications were not included. Consider this example: "Whenever *slabs* of *continental lithosphere* and *oceanic lithosphere converge*, the *continental plate* being less *dense* remains '*floating*,' while the *denser oceanic lithosphere* sinks into the *asthenosphere*" (Lutgens et al., 2012, p. 31, italics added). This sentence illustrates the potentially overwhelming amount of scientific terminology from which students must extract deeper meaning, which may not happen if they are focused on the terms (Graesser and Forsyth, 2013).

Our findings raise questions about the purpose of introductory textbooks (Bierman et al., 2006). If they are intended to be used as reference books, then extensive glossaries are appropriate. However, if their purpose is to serve as a means for students to deeply learn fundamental concepts, then large glossaries, as identified in this study, likely overwhelm that goal. Can there be a happy medium?

This study lays the groundwork for future work. The minimal overlap between the textbooks studied suggests that the common language of geology is not defined at an introductory level. We would argue that not all of the 44 overlapping terms, such as abrasion and joint, are necessarily essential for students to know, and we hope to start a discussion about which terms (and relatedly, which concepts) should be covered in an introductory course. In addition, because there is necessary jargon, we hope to further the discussion about optimal ways to introduce students to it.

ACKNOWLEDGMENTS

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Call for Applications

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GSA FOUNDATION Update

John W. (Jack) Hess, *GSA Foundation President*

The GSA Foundation is pleased to provide engaging and fun events and informational exhibits during the Annual Meeting. Beginning this year, the Foundation booth will be configured to showcase five GSA programs that are advancing the Society's mission. We invite you to drop by and learn how these programs provide formative experiences for hundreds of geoscience students and early career GSA members. The Foundation staff will also be on hand to answer questions about how you can support GSA programs.

GSA FOUNDATION EVENTS

The **Penrose Guest Hospitality Suite** (by invitation), located in the convention center, will be available to members of the Penrose Circle and Pardee Coterie donor-recognition societies. The suite will offer complimentary refreshments and educational seminars, and it will be staffed by local experts ready to help guests maximize their visit to Baltimore.

The **GSA Foundation Board of Trustees** will hold its semi-annual business meeting on Saturday, 31 Oct., in the Hilton Baltimore. GSA members with an interest in learning about the Foundation are invited to attend.

The **Pardee Coterie Breakfast** (by invitation) on Sunday morning, 1 Nov., provides a hosted buffet for individuals who have included the GSA Foundation in their estate plans through their will, trust, or planned gift. The breakfast will feature an informative presentation about the important role of philanthropy in GSA's future.

The **Senior Fellows & Friends Reception** (by invitation) is the GSA Foundation's signature donor and volunteer appreciation event and will be held in the convention center on Monday evening, 2 Nov. The reception will be an enjoyable time to catch up with colleagues and make new friends.

The **GSA Foundation booth** in the GSA Headquarters area of the exhibit hall will offer attendees a convenient place to relax, and program managers, participants, and volunteers will be gathered in this central location to make it easy to learn about important programs that advance the geosciences.

FEATURED IN THE FOUNDATION BOOTH

The **On To the Future** program welcomes its third cohort to Baltimore. Members of the GSA Diversity in the Geosciences Committee and On To the Future alumni will be on hand to answer questions about this exciting program that helps bring students from underrepresented backgrounds to attend their first annual meeting.

The **GSA Policy Office** in Washington D.C. provides GSA and its membership with leadership in public policy as well as active involvement in public policy decision-making and implementation processes. If you have an interest in public policy and the geosciences, including the GSA-USGS Congressional Science Fellowship and the GSA Science Policy Fellowship, make sure to visit the Policy Office exhibit.

GeoCorps™ America has helped more than 1,000 geoscientists apply their training and knowledge in temporary opportunities in public land agencies like the National Park Service, U.S. Forest Service, and Bureau of Land Management. Several GeoCorps participants will be present to describe their experiences and answer your questions.

GSA Graduate Student Research Grants provide partial support of master's and doctoral thesis research in the geological sciences for graduate students enrolled in universities in the United States, Canada, Mexico, and Central America. In 2015, US$723,570 was awarded to 391 graduate students (50% of the 774 who applied), with an average grant of US$1,851. Visit the Grants and Awards exhibit to learn how to apply for this program.

The **GSA GeoCareers** program offers expert coaching and training during the annual meeting and throughout the year to help students and early-career professionals advance their geoscience careers. It is advisable to visit this booth early in the meeting to add GeoCareers activities to your agenda.

Thank you for your support of GSA, and we look forward to seeing you at the GSA Foundation booth in Baltimore!

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