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The Gulf of Mexico and Canada Basin: Genetic Siblings on Either Side of North America
E.R. Lundin and A.G. Doré

Cover: Bird’s-eye view toward the SSE of the Smoking Hills in the Northwest Passage, Franklin Bay, Canada. Smoke is created by spontaneous combustion of bituminous shales of the Upper Cretaceous Smoking Hills Formation. This organic-rich shale is a source rock for some oil discoveries in the Mackenzie Delta. Photo taken from helicopter on 26 July 2010 courtesy Chrys Tremthanthmon (www.featherlightphotography.co.uk). See related article, p. 4–11.
The Gulf of Mexico and Canada Basin: Genetic Siblings on Either Side of North America

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ABSTRACT

The Gulf of Mexico and Canada Basin are small oceans located in back-arc settings of the Paleo-Pacific Ocean, at the northern and southern tip of the North American craton. Both are pronounced rotational, pie-shaped basins, with their distal ends bounded by major transforms, and both opened by ~70° counter-clockwise rotation of micro-continents away from the craton. While they formed synchronously with elements of the Central and North Atlantic, their oceanic crust never connected with that of the Atlantic. Both oceans were periodically confined, with important implications for the paleo-environment and petroleum system. Their North American affinity resulted in a number of intriguing similarities, such as timing and magnitude of main sediment influx. We argue for a genetic relationship between the geometry and kinematics of these pie-shaped oceans, their provenance to confinement, and their back-arc setting. In contrast to common back-arc basins, the Gulf of Mexico and Canada Basin had spreading ridges oriented nearly orthogonally to the Paleo-Pacific subduction direction. This distinctive high-angle back-arc development may be due to “Wilson Cycle” reactivation of orogenic belts intersecting the Paleo-Pacific margin, and/or to interaction between descending slabs beneath adjacent cratonic masses, and may apply to other examples worldwide, such as the South China Sea.

INTRODUCTION

Back-arc extension occurs adjacent to subduction boundaries and is manifested as small, contained areas of seafloor spreading. Back-arc basins are particularly common around the Pacific Rim but are by no means unique to that area. Their formation is thought to relate to the motion and geometry of the descending subduction slab. Mechanisms whereby extensional forces are communicated to the overriding plate are still under discussion (e.g., Heuret and Lallemand, 2005; Stern and Dickinson, 2010) and include relative backward motion of the upper plate versus the subducting slab, pull (rollback) driven by the negative buoyancy of the subducting lithosphere, and dynamic mantle flow.

While it is usually implicit in such models that the basin axes run parallel to the subduction boundary, it is becoming evident from recent studies (e.g., Stern and Dickinson, 2010) that basins in back-arc settings can also open orthogonally or at a high angle to subduction zones. We argue that this geometry constitutes a new class of basin that forms at the intersection of major continental masses along subduction margins, and that the Gulf of Mexico and Canada Basin are important examples bordering the North American continent. We also show that these confined basins form major sediment sinks that have resulted in large hydrocarbon resources and may have significantly affected global paleoclimate.

The Gulf of Mexico and Canada Basin (Fig. 1) are bordered by rift shoulders and underlain by oceanic crust and/or exhumed mantle, and contain substantial sedimentary fill, predominantly Cenozoic in age. Neither ocean has well-defined magnetic isochrons, but their ages can be deduced from other geologic constraints. Both oceans re-opened Late Paleozoic orogens, the Carboniferous-Permian Ouachita-Marathon orogen and the Carboniferous Innuitian orogen, respectively. Both oceans also opened by high-angle rotation during the Mesozoic. Both oceans hosted major Cenozoic river deltas, with a fill strongly influenced by erosion of the Paleogene Laramide orogen and subsequently of the uplifted Colorado Plateau (e.g., Galloway et al., 2000; Dixon et al., 2008).

Differences also exist—in particular their paleo-latitudes during opening. The Gulf of Mexico opened between the Middle Jurassic and earliest Cretaceous and was located at a subtropical latitude, whereas the Canada Basin opened between Early and Late Cretaceous and was located close to 75° N. This difference is reflected by the presence of evaporites and carbonates in the Gulf of Mexico area, in contrast to siliciclastics in the Canada Basin (e.g., Shimeld et al., 2016). Another difference is the orientation of these oceans, with the Gulf of Mexico’s rift tip located toward the Atlantic and the Canada Basin’s toward the Pacific.

In all aspects, the Gulf of Mexico is the far better understood of the two basins, due to greater ease of access for data acquisition and its long and intensive history of petroleum exploration.

GULF OF MEXICO OPENING

Gulf of Mexico rifting started approximately in the Norian (228.4–209.5 Ma), marked by poorly dated red beds and volcanics of the Eagle Mills Formation (Moy and Traverse, 1986), approximately synchronous with rifting along the Central Atlantic margin along the U.S. East Coast (Olsen et al., 1996).

Modern interpretations of the continent-ocean boundary (COB) in the Gulf of Mexico range between two end-members. A “wide ocean” interpretation places COBs along the major (~200–300 nT) Houston, Florida, and Campeche magnetic anomalies (Imbert and Philippe, 2005), assumed by analogy with the Central Atlantic East Coast Magnetic Anomaly (ECMA) to represent a magmatic margin (Holbrook et al., 1994; Imbert and Philippe, 2005) (Fig. 2). The alternative “narrower ocean” interpretation places
COBs along the original limits of the Middle Jurassic Louann and Campeche salt bodies (e.g., Pindell and Kennan, 2009) (Fig. 2). These two salt bodies formed a contiguous evaporite basin in the Callovian (166.1–163.5 Ma) (e.g., Salvador, 1991). Although we lean toward the “wide ocean” interpretation, it is important to note that the alternative COB interpretations only influence the crustal type during the early phase of opening, not the kinematics or the resultant back-arc basin geometry.

Like a number of previous workers (e.g., Molina-Garza et al., 1992; Marton and Buffler, 1994; Imbert and Philippe, 2005; Pindell and Kennan, 2009; Kneller and Johnson, 2011; Rowan, 2014) we favor a two-phase opening model for the Gulf of Mexico:

Phase 1 (Fig. 3A): Magma-rich break-up, governed by separation of Gondwanaland and Laurentia, marked by the large positive magnetic anomalies and seaward-dipping reflectors (SDRs), followed by a gradual transition to normal oceanic crust. During this phase, Yucatan was attached to, and moving with, the rest of Gondwanaland, and the Gulf of Mexico opening was only weakly rotational with the Yucatan block sliding along the proto-Florida Escarpment and proto-Tehuantepec transform. The fit between the Houston and Campeche magnetic anomalies, by comparison with the Atlantic ECMA (e.g., Labails et al., 2010), may indicate Early Jurassic opening. This fit also aligns a prominent linear magnetic anomaly crossing Yucatan (Fig. 3) with the similar anomaly marking the Appalachian fold belt front (Steltenpohl et al., 2013).

Phase 2 (Fig. 3B): Pronounced counter-clockwise (CCW) rotation of Yucatan about a pole in the Florida Straits, splitting the once-contiguous Callovian salt basin. Seafloor spreading during this phase is now widely accepted due, for example, to satellite gravity data (Sandwell et al., 2014). These data reveal abandoned spreading axis segments and fracture zones constraining the post-salt kinematics. Paleomagnetic data (e.g., Molina-Garza et al., 1992) indicate that Yucatan rotated 78 ± 11º CCW since the Permian, of which 63º occurred after Middle Jurassic. This rotation is reflected by the fracture zones imaged by satellite gravity data. Spreading termination probably occurred in the Berriasian (145.0–139.4 Ma), based on ODP Leg 77 boreholes in the Florida Strait (Marton and Buffler, 1994). Synchronously with the counter-clockwise rotation of Yucatan, complementary clockwise fan-shaped spreading probably took place in the proto-Caribbean (e.g., Pindell and Kennan, 2009).

The Tehuantepec transform in western Gulf of Mexico (Figs. 2 and 3B) marks the terminal shear to Gulf of Mexico rotational opening, and forms a classic sharp transition between continental and oceanic crust (Román Ramos et al., 2009). Straddling the transform is a thick Cenozoic apron, deformed at the updip end by the Neogene Quetzalcóatl extensional system, which is linked via detachments with the contractional Mexican Ridges fold and thrust belt (e.g., Salomón-Mora et al., 2009).

Regardless of preferred fit and timing, it is clear from refraction surveys that the
Canadian Arctic margin, simultaneously closing the South Anyui Sea, a former arm of the paleo-Pacific Ocean between North America and Eurasia (Figs. 4A and 4B). Differences between modern models mainly relate to the size and nature of crustal domains in the Canada Basin and adjacent Arctic Ocean (oceanic crust, exhumed mantle, and hyperextended continental crust). These interpretations variously utilize gravity inversion of crustal thickness (Alvey et al., 2008), seismic mapping (Nikishin et al., 2014), analysis of seismic refraction velocities (Chian et al., 2016), and integration of all of these techniques with gravity and magnetic data (e.g., Gaina et al., 2011). While the different approaches affect the interpreted location of the distal transform, the kinematic solution with a counter-clockwise rotational opening of the Canada Basin is similar. The rift tip of the Canada Basin rotation was located in the Mackenzie Delta area, while the distal transform ran along the proto-North Barents and Kara Sea margin, either tracking the Alpha Ridge (Doré et al., 2016; see also Figs. 4A and 4B) or the Lomonosov Ridge (Grantz et al., 1979; Evangelatos and Mosher, 2016). The rifted margins of the North American craton and the Alaska-Chukotka terrane made up the lateral boundaries. Recent models show that this rotation was succeeded by a Late Cretaceous phase of spreading, orthogonal to the previous direction, forming the Makarov-Podvodnikov Basin, which thus interposes between the Early Cretaceous Canada Basin and the Cenozoic Eurasia Basin (Fig. 1) (cf. Doré et al., 2016; Whittaker and Ady, 2015; Nikishin et al., 2014).

Termination of Canada Basin seafloor spreading is not well constrained. The Canada Basin has a distinct abandoned spreading axis, revealed by gravity data, and a few weak linear magnetic anomalies on either side of the ridge (Doré et al., 2016; Chian et al., 2016; Mosher et al., 2016). We interpret these magnetic anomalies as isochrons formed shortly after the Cretaceous magnetic quiet period (i.e., after 83.5 Ma), indicating that spreading ended at ca. 80 Ma (Fig. 4B). The amount of rotation is supported by paleomagnetic data from the Alaska margin (Halgedahl and Jarrard, 1987), and the resulting reconstruction is supported by detrital zircon data from the conjugate margins (Gottlieb et al., 2014).

**Figure 2.** USGS magnetic data of Gulf of Mexico. GoM—Gulf of Mexico; COB—continent-ocean boundary; CMA—Campeche magnetic anomaly; FMA—Florida magnetic anomaly; HMA—Houston magnetic anomaly; CI—Chicxulub impact; ECMA—East Coast magnetic anomaly; TT—Tehuantepec transform. Lower Cretaceous carbonate platform after Winker and Buffer (1985). Large arrow illustrates the post-160 Ma rotational opening.
GULF OF MEXICO BASIN CONFINEMENT

The Gulf of Mexico’s evaporite basin must represent confinement from the world’s oceans. The evaporites are mainly halite, and their age is constrained by overlying and underlying strata to approximately Callovian (e.g., Salvador, 1991; Marton and Buffler, 1994). Overlying the evaporites are eolian sands of the Norphlet Formation, in turn overlain by Kimmeridgian Smackover carbonate source rocks, followed by the Buckner Anhydrite. The basin-wide marine Tithonian (152.1–145.0 Ma) source rock (e.g., Cole et al., 2001; Holguín-Quíñones et al., 2005) was deposited next.

Evaporite deposition over oceanic crust was suggested by Marton and Buffler (1994) and Imbert and Philippe (2005), and indirectly implied by the mapping of oceanic crust under much of the northern Gulf of Mexico by Kneller and Johnson (2011). A magma-poor early development of the Gulf of Mexico (as proposed by e.g., Kneller and Johnson, 2011; Rowan, 2014) means that the evaporites must have formed on exhumed mantle and/or hyper-extended crust. For all of these models, the basin floor must inevitably have subsided to great depths at the time of evaporation based on the general principles of isostasy (cf. Karner et al., 2012; Mohn et al., 2015). For the basin to have remained shallow (e.g., Marton and Buffler, 1994; Rowan, 2014), an unknown mechanism would be required. It thus seems more likely that the evaporites formed significantly below global base level by drawdown, analogously to the Mediterranean and Red Sea during the Messinian (7.25–5.83 Ma) crisis (e.g., Imbert and Philippe, 2005; Ryan, 2008), with rapid flooding rather than rapid basin deepening governing the deposition of the succeeding Smackover Formation (e.g., Heydari et al., 1997). Horbury et al. (2003) describe rapid base-level changes during the Late Jurassic, of magnitudes not readily explained by eustatic changes, and attribute these to tectonic forcing. In addition to possible breaching and rapid influx of water to the Gulf of Mexico during the Kimmeridgian, the basin-wide Tithonian source rock is a candidate for deposition during rapid influx of sea water into a confined (silled) basin, possibly analogous to the organic-rich sediments formed in the confined Holocene Black Sea (cf. Arthur and Sageman, 2004). Given the geometry of the Gulf of Mexico back-arc basin, it appears reasonable that tectonic forcing could cause both periodic closing and breaching of marine connections. The alternative, rapid whole-scale basin subsidence/uplift or eustatic sea-level changes, appears more difficult to explain.

Renewed confinement and drawdown of the Gulf of Mexico has been proposed during the Paleocene-Eocene (66.0–33.9 Ma), related to docking of Cuba and closing off of the Gulf of Mexico’s Atlantic connection in the Florida Strait (Rosenfeld and Pindell, 2002). Support for this interpretation includes major canyon cutting, karstification, sequence boundaries unrelated to worldwide eustatic changes, and coal beds immediately underlain and overlain by bathyal sediments (Rosenfeld and Blickwede, 2006; Cossey et al., 2016).

CANADA BASIN CONFINEMENT

The Arctic Ocean (Canada Basin, Makarov-Podvodnikov Basin, and Eurasia Basin) was periodically cut off from, or poorly connected to, the world’s oceans until the middle Miocene (ca. 17.5 Ma) opening of the Arctic Gateway along the Fram Strait (Jakobsson et al., 2007).
Early Cretaceous confinement events include the organic-rich Barremian Pebble Shale and Gamma Ray Zone of the Hue Shale, which were deposited immediately following Canada Basin break-up. These source rocks are observed to become richer toward the Canada Basin (Bird and Houseknecht, 2011). In the Late Cretaceous, the Arctic Ocean connected with the North American Western Interior Seaway (Arthur and Sageman, 2004), but significant local restriction is indicated by the organic-rich shales of the Smoking Hills, Boundary Creek, and Kanguk Formations, which constitute important source rocks (e.g., Houseknecht and Bird, 2011).

An indisputable period of basin confinement is marked by the early Eocene Azolla event (ca. 50 Ma) discovered by the Arctic Coring Expedition (e.g., Backman and Moran, 2009). During this interval, the Arctic Ocean was a very large isolated freshwater tract with prolific growth of the freshwater fern Azolla. Bujak and Bujak (2014) write that, at this time, the Arctic Ocean was an isolated, silled basin analogous to today’s Black Sea. Paleogene organic-rich shales near the North Pole reported by Stein (2007), and the Aklak, Taglu, Richards, and Kugmalit Paleogene prodelta source rock intervals in the Mackenzie Delta (e.g., Brooks, 1986), also suggest clastic input into a confined basin with episodic water stratification and anoxia.

**DISCUSSION**

Empirical similarities between the Gulf of Mexico and the Canada Basin suggest a causal relationship and a similar mechanism of formation. These similarities are as follows:

1. The overall geometry of the basins, characterized by a triangular shape and high angle of rotation (~70°);
2. Their location in a back-arc setting relative to the subducting paleo-Pacific;
3. Their resultant spreading ridges trending almost normal to the arc, i.e., approximately in the subduction direction, albeit with the rift tips and opposing transform margins reversed for the two basins (Fig. 1); and
4. Their position at the intersection, along the paleo-Pacific margin, of North America with other major Pangean cratonic masses to the north (Siberia) and south (South America).
As indicated in the introduction to this paper, mechanisms for back-arc basin formation mainly imply extensional basin formation parallel to the subduction zone, and do not readily explain the development of highly oblique to orthogonal back-arc basins such as the Gulf of Mexico or Canada Basin. Elsewhere on the globe, both the Tyrrenhian Basin in the Mediterranean and the South China Sea appear analogous to Gulf of Mexico and Canada Basin, in that they are triangular and occupy back-arc settings with spreading approximately orthogonal to the prevailing subduction. Both of these spreading cells are thought by some workers to relate to continental collision. Tyrrenhian Basin spreading has been related to indentation of Africa into Eurasia (Faccenna et al., 1996), while the South China Sea has been related to extension tectonics from India’s indentation into Eurasia (e.g., Tapponnier et al., 1986). However, an indentation mechanism of this type is not available to explain the formation of either the Gulf of Mexico or Canada Basin.

A general explanation for the formation of high-angle back-arc basins may be a manifestation of the Wilson Cycle; in this case, the reactivation of weak Paleozoic Panagean suture zones in a back-arc stress regime, where these sutures intersect the paleo-Pacific margin. Notably, both the Inniutian fold belt of Arctic Canada (essentially a continuation of the Caledonian fold belt; e.g., Ohta et al., 1989) and the Urals-Novaya Zemlya-Taimyr fold belt of Russia (e.g., Puchkov, 2013) intersected the paleo-Pacific where the Canada Basin later developed (Fig. 4A). To the south, the Gulf of Mexico formed where the Suwanne and Appalachian-Ouachita-Marathon sutures converged on the Pacific margin (e.g., Parker, 2014; Thomas, 2006). In the Mesozoic, these unusual basins then occupied the space between subduction zones from adjacent continental masses, and their formation may therefore also relate to interaction between adjacent descending slabs. Testing the viability of such speculative mechanisms requires further study, including modeling of lithosphere-mantle dynamics.

The tendency toward restriction in both basins was predisposed by their mode of formation and resulting geometries. Simple rules of plate tectonics require that the amount of extension is reduced toward the rotation pole (e.g., Cox and Hart, 1986), and likewise so would subsidence governed by crustal thinning (e.g., McKenzie, 1978). Beyond the rift tip there is no extension, and subsidence should not be expected. The tip of the Gulf of Mexico’s oceanic crust never connected with the oceanic crust of the Atlantic, while the transform boundary at the distal end was separated from the Pacific by continental terranes and a major volcanic arc (e.g., Dickinson and Lawton, 2001). Pacific seawater did not reach the Gulf of Mexico until the Middle Jurassic, while connection with the Atlantic was only achieved in the late Jurassic (Salvador, 1987). Breaching of the rift tip in the Florida Strait (Schlager et al., 1984) generated the incursion that flooded the eolian Nophlet Formation, causing the rapid sea-level rise associated with deposition of the Smackover source rock (Heydari et al., 1997). The lateral boundaries to the pie-shaped ocean, the rifted margin of North American and the Yucatan microcontinent grade into thick continental crust, which remain elevated to this day. The pie-shaped oceanic Gulf of Mexico, graded into thick continental crust in all directions, and marine connections with the world ocean appear to have been sensitive to tectonic forcing, especially during the Late Jurassic (Horbury et al., 2003).

Similarly, the Canada Basin rift tip in the Mackenzie Delta area was located in the Cordillera hinterland and never connected with the Pacific. The lateral boundaries of the Canada Basin, the North American craton, and the Alaska-Chukotka terrane represent thick continental crust that has remained elevated, and the transform margin was located against Eurasian continental crust. Connection via the Western Interior Seaway to the Gulf of Mexico in the Late Cretaceous was governed by the Cordilleran foreland basin flexuring (e.g., Jordan, 1981), but even this connection was prone to periodic confinement during the Cenomanian-Turonian (100.5–89.8 Ma) (Arthur and Sageman, 2004). Deep ventilation between the Arctic Ocean and the Atlantic was not initiated until middle Miocene time, when the Arctic Gateway in the Fram Strait opened (Jakobsson et al., 2007), as a consequence of oblique opening along the De Geer Transform (e.g., Doré et al., 2016).

Thus, the first-order characteristics shared by the Gulf of Mexico and Canada Basin siblings have been critical in the geological history of the North American continent, and to its prolific petroleum resources. Both basins were confined for much of their early history with obvious implications for organic-rich deposits, and, in the case of the Canada Basin, with possible major implications for global climate via the early Eocene Azolla bloom, which may have tipped Earth’s climate from the Cretaceous and Paleocene “Super Greenhouse” into the “Ice House” climate that remains today (e.g., Moran et al., 2006; Bujak, 2007; Bujak and Bujak, 2014). In the Cenozoic, both basins formed massive depositional sinks for Laramide erosion products at either end of the continent and housed the two great North American deltas (the Mississippi and Mackenzie).

In conclusion, we propose that both the Gulf of Mexico and Canada Basin reopened Late Paleozoic sutures between major continents, these sutures intersecting the paleo-Pacific margin at a high angle. Such small, highly rotational oceans, opening at a high angle to the subduction direction in back-arc settings (Fig. 5) could therefore constitute a lesser-known manifestation of the Wilson Cycle. This mode of formation may provide an alternative mechanism for development of other Pacific rim ocean basins, such as the South China Sea and possibly the Weddell Sea of Antarctica. Because their geometry governs periodic confinement, and has influenced global climate as well as source and reservoir rock distribution, there is significant environmental and economic incentive to understanding the genesis and common factors of these basins.

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• Rip Rapp Award: Nominations due 15 February; send materials to mandel@ku.edu. George “Rip” Rapp Jr. was one of the founding members of this Division and generously established an award fund with the GSA Foundation. Nominations should include a biographical sketch, a statement of outstanding achievements, and a selected bibliography of the nominee.
• Richard Hay Student Paper/Poster Award: Nominations due 20 September; send materials to gsa.agd@gmail.com. Richard Hay had a distinguished career in sedimentary geology, mineralogy, and archaeological geology. The award is in the form of a travel grant for a student (undergraduate or graduate) presenting a paper or poster at GSA’s annual meeting. The grant is competitive and is awarded based on the evaluation of the scientific merit of the research topic and the clarity of an expanded abstract prepared by a student for presentation in the Division’s technical session.
• Claude C. Albritton, Jr., Award: Nominations due 5 March; send materials to gsa.agd@gmail.com. This fund (managed by the GSA Foundation) provides research scholarships and fellowships for graduate students in archaeology or the earth sciences. Recipients have interest in (1) achieving a master’s or Ph.D. degree in earth sciences or archaeology; (2) applying earth-science methods to archaeological research; and (3) a career in teaching and academic research. Monetary awards are given in support of thesis or dissertation research, with emphasis on field and/or laboratory work. The Division also invites contributions to this award fund.

ENERGY GEOLOGY DIVISION
www.uky.edu/KGS/coal/GSA/awards.htm
Gilbert H. Cady Award: Nominations due 28 February; send materials to Brett Valentine at bvalenti@vt.edu. This award recognizes outstanding contributions in the field of coal geology that advance the science both within and outside of North America.

ENVIRONMENTAL AND ENGINEERING GEOLOGY DIVISION
community.geosociety.org/eegdivision/awards/about
• E.B. Burwell, Jr., Award: Nominations due 1 February; send materials to Dennis Staley at dstaley@usgs.gov. This award honors the memory of one of the founding members of the Division and the first chief geologist of the U.S. Army Corps of Engineers. It recognizes the author or authors of a published paper of distinction that advances knowledge concerning principles or practice of engineering geology or of related fields, such as applied soil or rock mechanics, where the role of geology is emphasized. The paper must (1) deal with engineering geology or a closely related field, and (2) have been published no more than five years prior to its selection. There are no restrictions on the publisher of the paper.
• Richard H. Jahns Distinguished Lecturer: Nominations due 28 February; submit materials to Thad Wasklewicz, wasklewicz@ecu.edu. This lectureship is awarded to an individual who through research or practice has made outstanding contributions to the advancement of environmental and/or engineering geology. The awardee will speak on topics of earth processes and the consequences of human interaction with these processes, or the application of geology to environmental and/or engineering works. Learn more at http://community.geosociety.org/eegdivision/awards/jahns.

GEOPHYSICS DIVISION
community.geosociety.org/geophysicsdivision
George P. Woollard Award: Nominations due 15 February; send materials to Nick Schmerr, nschmerr@umd.edu. This award recognizes innovative and effective teaching in college-level earth sciences. A curriculum vitae helps, but is not required. This award recognizes outstanding contributions to geology through the application of the principles and techniques of geophysics. A highlight of the presentation is the honorary Biggs Award for Excellence in Earth Science Teaching:

GEOLOGY DIVISION
community.geosociety.org/gsasociety/gsasociety/news/awards/biggsaward
Biggs Award for Excellence in Earth Science Teaching:
Nominations due 15 February; submit nominations online; direct your questions to GEOEDGSA@gmail.com. This award recognizes innovative and effective teaching in college-level earth science. Earth-science instructors and faculty members from any academic institution engaged in undergraduate education who have been teaching full-time for 10 years or fewer are eligible (part-time teaching is not counted in this requirement). Both peer- and self-nominations will be accepted. An additional travel reimbursement is also available to the recipient to enable him or her to attend the award presentation at the GSA Annual Meeting.

HISTORY AND PHILOSOPHY OF GEOLOGY DIVISION
community.geosociety.org/histphildiv/awards
• Mary C. Rabbit History and Philosophy of Geology Award: Nominations due 15 February; send materials to Kathleen Lohff, kathylohff@msn.com. This award recognizes an individual’s exceptional scholarly contributions of
fundamental importance to understanding the history of the geological sciences. Achievements deserving of the award include, but are not limited to, publication of papers or books that contribute new and profound insights into the history of geology based on original research or a synthesis of existing knowledge. Nominators and nominees do not have to be members of the Division or of GSA. The nomination packet should include (1) a letter detailing the contributions that warrant the award; (2) the nominee’s current curriculum vitae, including name, title, affiliation, education, degrees, honors and awards, and major career events.

• **Gerald M. and Sue T. Friedman Distinguished Service Award**: Nominations due 15 February; send materials to Kathleen Lohff, kathylohff@msn.com. This award is presented for exceptional service in advancing the knowledge of the history and philosophy of the geological sciences. Nominators and nominees do not have to be members of the Division or of GSA. Service to the history and philosophy of geology may include, but is not limited to, the discovery of and making available rare source materials; comprehensive bibliographic surveys; organizing meetings and symposia on the history and philosophy of geology; and exceptional service to the Division. The nomination packet should include (1) a letter detailing the contributions that warrant the award; and (2) the nominee’s current curriculum vitae including name, title, affiliation, education, degrees, honors and awards, and major career events.

• **History and Philosophy of Geology Student Award**: Nominations due 15 June; send materials to Kathleen Lohff, kathylohff@msn.com. This award, in the amount of US$1,000, recognizes excellence in a student paper to be given at GSA’s Annual Meeting. Awards may also be given for second place. Oral presentations are preferred. Faculty advisors may be listed as second author, but not as the lead author of the paper. The proposed paper may be (1) on the history or philosophy of geology; or (2) a literature review of ideas for a technical work or thesis/dissertation; or (3) some imaginative aspect of the history or philosophy of geology we have not thought of before. Students should submit an abstract of their proposed talk and a 1,500–2,000 word prospectus. The awards committee will assist the winner(s) with an abstract to facilitate presentation according to GSA standards. Currently enrolled undergraduates and graduate students are eligible, as are students who received their degrees at the end of the fall or spring terms immediately preceding GSA’s annual meeting. It is open to all students regardless of discipline, provided the proposed paper is related to the history or philosophy of a geological idea or person.

### HYDROGEOLOGY DIVISION

community.geosociety.org/hydrodivision

Nominations for the following four awards are due 1 February; send materials to gsa.hydro.nominations@gmail.com. Questions should be directed to the appropriate committee chair (community.geosociety.org/hydrodivision/aboutus/committees).

• **The O.E. Meinzer Award** recognizes the author or authors of a publication or body of publications that have significantly advanced the science of hydrogeology or a closely related field. The nomination must cite the publication(s) on which the nomination is based and describe the role of the publication(s) in advancing hydrogeology or a closely related discipline. Inclusion of up to three additional third-party letters in support of the nomination is encouraged. More information: community.geosociety.org/hydrodivision/awards/meinzer.

• **The George Burke Maxey Distinguished Service Award** will be made in recognition of distinguished personal service to the hydrogeology profession and to the Hydrogeology Division, based on a history of sustained creditable service. The recipient must be a member of the Hydrogeology Division and not have previously received the award. Please submit a letter of nomination that describes the distinguished service that warrants the nomination. Supporting letters are helpful but not required. More information: community.geosociety.org/hydrodivision/awards/serviceaward.

• **The Kohout Early Career Award** will be presented to a distinguished early career scientist (35 years of age or younger throughout the year in which the award is to be presented or within 5 years of receiving their highest degree or diploma) for outstanding achievement in contributing to the hydrogeologic profession through original research and service and for the demonstrated potential for continued excellence throughout their career. The nomination package must include (1) at least one letter of nomination with a description of the significant contributions or accomplishments; (2) a copy of the nominee’s curriculum vitae with complete bibliography; and (3) at least four supporting letters. More information: community.geosociety.org/hydrodivision/awards/kohout.

• **The Birdsall-Dreiss Distinguished Lecturer** is selected based on outstanding contributions to hydrogeology or a closely related field through original research and public communication, as well as a potential for continued contributions to the profession. To nominate, include at least one letter of nomination, a copy of the nominee’s curriculum vitae, and at least two supporting letters describing the significant contributions or accomplishments constituting the basis for the nomination. More information: community.geosociety.org/hydrodivision/birdsall/about2017.

### LIMNOGEOLOGY DIVISION

community.geosociety.org/limnogeologydivision

The **Israel C. Russell Award** is given for major achievements in limnogeology through contributions in research, teaching, and service. Nominations due 1 March. Documents in support of the nomination, including (1) a letter describing the nominee’s accomplishments in the field of limnogeology (broadly defined and including limnogeology, limnology, and paleolimnology), service to students and teaching, and contributions to GSA; and (2) a curriculum vitae, should be sent to David Finkelstein at finkelstein@hws.edu. Although the nominee need not be a member of the Limnogeology Division or GSA, they must have made valuable contributions to the Society. The dossiers of nominees who did not receive the award in any given year will be retained and considered for two succeeding years; thus, nominations are valid for a total of three years. Updated information for carryover candidates may be sent to the Division treasurer during the ordinary call for nominations.
MINERALOGY, GEOCHEMISTRY, PETROLOGY, AND VOLCANOLOGY (MGPV) DIVISION

community.geosociety.org/mgpvd/awards

Nominations due 31 March. For each of the following awards, send materials to J. Alex Speer, Mineralogical Society of America, 3635 Concorde Pkwy Suite 500, Chantilly, Virginia 20151-1110, USA; jaspeer@minsocam.org. MGPV awards emphasize achievements in geologic and multidisciplinary approaches. Geologic work is by nature generalistic and has an important field component, with Earth as the natural laboratory. Send (1) a cover letter from an MGPV Division member, no longer than three pages, summarizing the nominee’s most important accomplishments in geologic approaches to mineralogy, geochemistry, petrology, and/or volcanology. Special attention should be paid to describing how the nominee’s published work demonstrates field-based multidisciplinary geologic accomplishments of a ground-breaking nature. The letter should include the name, address, and contact information of the nominator as well as from whom letters of support can be expected; (2) a curriculum vitae of the nominee and (3) three letters of support that can be either from members or non-members of GSA or the MGPV Division.

- The MGPV Distinguished Geologic Career Award will go to an individual who, throughout his or her career, has made distinguished contributions in one or more of the following fields of research: mineralogy, geochemistry, petrology, and/or volcanology, with emphasis on multidisciplinary, field-based contributions. Nominees need not be citizens or residents of the United States, and GSA membership is not required.

- The MGPV Early Career Award will go to an individual near the beginning of his or her professional career who has made distinguished contributions in one or more of the following fields of research: mineralogy, geochemistry, petrology, and/or volcanology, with emphasis on multidisciplinary, field-based contributions. Nominations are restricted to those who are within eight years of receiving their final degree. For example, awards decided before 31 Dec. 2016 will include all candidates whose final degree was awarded no earlier than 1 Jan. 2009. Extensions of up to two years will be made for nominees who have taken career breaks for family reasons or caused by serious illness. Nominees need not be citizens or residents of the United States, and GSA membership is not required.

QUATERNARY GEOLOGY AND GEOMORPHOLOGY

community.geosociety.org/qggd/awards

Kirk Bryan Award for Research Excellence: Nominations due 1 February. This award is presented to the author or authors of a published paper of distinction that advances the science of geomorphology or related field, such as [Pleistocene] Quaternary geology, and has been published not more than five years prior to its selection for the award.

Farouk El-Baz Award for Desert Research: Nominations due 1 April. This award recognizes excellence in desert geomorphology research worldwide. It is intended to stimulate research in desert environments by recognizing an individual whose research has significantly advanced the understanding of the Quaternary geology and geomorphology of deserts.

- Distinguished Career Award: Nominations due 1 April. This award is presented annually to a Quaternary geologist or geomorphologist who has demonstrated excellence in their contributions to science.

- Student Awards: Proposals are due 1 February. Proposals will be considered for the following awards by selecting “Quaternary geology and geomorphology” as the general field or research when submitting a GSA Graduate Student Research Grant. QG&G administered awards include: J. Hoover Mackin Award (Ph.D. research), Arthur D. Howard Award (M.S. research), Marie Morisawa Award (female M.S./Ph.D.), and Peter Birkeland Award (soil geomorphology). GSA specialty awards include the Robert K. Fahnstock Award (sediment transport or fluvial geomorphology), John Montagne Fund (Quaternary geology or geomorphology), John A. Black Award (coastal processes), and Stanley A. Schumm Research Grant Award (fluvial geomorphology).

SEDIMENTARY GEOLOGY DIVISION

community.geosociety.org/sgd/awards

Laurence L. Sloss Award for Sedimentary Geology: Nominations due 1 March; send materials to Linda Kah, lckah@utk.edu, including (1) a cover letter describing the nominee’s accomplishments in sedimentary geology and contributions to GSA, (2) a curriculum vitae, and (3) any additional supporting letters. Nomination materials remain active for three years. This award is given annually to a sedimentary geologist whose lifetime achievements best exemplify those of Larry Sloss (i.e., achievements that contribute widely to the field of sedimentary geology and service to GSA).

SEDIMENTARY GEOLOGY DIVISION/STRUCTURAL GEOLOGY AND TECTONICS DIVISION JOINT AWARD

Stephen E. Laubach Structural Diagenesis Research Award: Nominations due 1 April. This award promotes research that combines structural geology and diagenesis and also curriculum development in structural diagenesis. It addresses the rapidly growing recognition that fracturing, cement precipitation and dissolution, evolving rock mechanical properties, and other structural diagenetic processes can govern recovery of resources and sequestration of material in deeply buried, diagenetically altered and fractured sedimentary rocks. The award also highlights the growing need to break down disciplinary boundaries between structural geology and sedimentary petrology, as exemplified by the work of Dr. Stephen Laubach and colleagues. Graduate students, postgraduates, and faculty-level researchers are eligible. Note that the application includes a budget page; we anticipate giving one award of US$2,500 in 2017.
In Memoriam

The Society notes with regret the deaths of the following members (notifications received between 17 August 2016 and 31 October 2016). To honor a friend or colleague with a GSA memorial, please go to www.geosociety.org/GSA/Pubs/mmlGuid.aspx to learn how. Contact the GSA Foundation, www.gsafweb.org, to make a gift in memory of a colleague, friend, or family member.

Jon P. Davidson  
Durham, England, UK  
Date of death: 26 Sep. 2016

Jelle Zeilinga De Boer  
Haddam, Connecticut, USA  
Date of death: 23 Jul. 2016

Andrew Griscom  
Palo Alto, California, USA  
Date of death: 21 Jun. 2015

Wallace R. Hansen  
Lakewood, Colorado, USA  

Wallace D. Lowry  
Blacksburg, Virginia, USA  
Date of death: 4 Feb. 2016

William M. McKinney  
Corvallis, Oregon, USA  
Date of death: 5 May 2016

Philip H. Osberg  
Orono, Maine, USA  

Eldon Joseph Parizek  
Shawnee Mission, Kansas, USA  
Date of death: 11 Jun. 2016

Carl A. Pearson  
East Orleans, Massachusetts, USA  
Date of death: 21 Aug. 2016

Terence T. Quirke Jr.  
Golden, Colorado, USA  
Date of death: 5 May 2016

Charles R. Stelck  
Edmonton, Alberta, Canada  
Date of death: 7 Oct. 2016

Donald L. Streib  
Morgantown, West Virginia, USA  
Date of death: 1 Jan. 2016
Preliminary Announcement and Call for Papers

ROCKY MOUNTAIN SECTION

69th Annual Meeting of the Rocky Mountain Section, GSA
Calgary, Alberta, Canada
9–10 June 2017
www.geosociety.org/rm-mtg

Join Us in the Heart of the Western Canadian Sedimentary Basin, the Gateway to the Canadian Rockies

LOCATION
Calgary is located in the heart of the Western Canadian Sedimentary Basin within sight of the Canadian Rockies. Our vibrant city is blessed with two of the largest urban parks in North America, Fish Creek Provincial Park and Nose Hill, in addition to the Weaselhead and Glenmore Reservoir, which are walking distance from Mount Royal University. The technical program explores much of the geological time scale and is intended to bridge across the North American Rocky Mountains. The field trips offer opportunities to explore our local UNESCO World Heritage sites, such as the bone beds at Dinosaur Provincial Park and the Burgess Shale Trilobite beds in Yoho National Park, the Royal Tyrell Museum of Paleontology, as well as the landscapes, geology, hot springs, and innovative carbon capture facilities of Alberta.

CALL FOR PAPERS
Abstract deadline: 21 Feb. 2017
Submit online at www.geosociety.org/gsa/rm-mtg.
Abstract submission fee: US$18 for students and US$30 for all others.
For additional information, please contact the Technical Program Chair, Jenni Scott, jescott@mtroyal.ca.

TECHNICAL SESSIONS
Transition from Earthscope to EarthsCAN and the Canadian Cordillera Array
T1. From Earthscope to EarthsCAN and the Canadian Cordillera Array. Principal organizers: Dave Eaton, University of Calgary, eatond@ucalgary.ca; Jeff Freymueller, University of Alaska Fairbanks, jfreymueller@alaska.edu.

Cross-Border Evolution of the Rocky Mountain Region
T2. Proterozoic Evolution of Western North America. Principal organizer: Brian Pratt, University of Saskatchewan, brian.pratt@usask.ca.
T3. The Cambrian of Western Laurentia. Principal organizer: Paul Johnston, Mount Royal University, pajohnston@mtroyal.ca.
T4. Cretaceous Stratigraphy of the North American Foreland. Principal organizer: TBD; contact Jenni Scott, Mount Royal University, jescott@mtroyal.ca.
T5. Tertiary and Quaternary Landscapes. Principle organizer: Robert Young, University of British Columbia, Okanagan Campus, robert.young@ubc.ca.

Energy and Carbon Capture in The Rocky Mountain Region
T7. Geothermal Systems in the Thrust Belt and Adjacent Areas. Principal organizer: Steve Grasby, Natural Resources Canada, steve.grasby@canada.ca.
T8. Characterization of Fine-Grained Unconventional Plays. Principal organizer: TBD; contact Jenni Scott, Mount Royal University, jescott@mtroyal.ca.

Sedimentology, Paleontology, and Paleoecology
T9. Revisiting Marginal Marine Environments through the Integration of Paleontology, Paleoecology, and Process Sedimentology. Principal organizer: TBD; contact Jenni Scott, Mount Royal University, jescott@mtroyal.ca.

Geoscience Education
T10. Using the Rocky Mountains as a Natural Laboratory for Teaching the “What” and the “How” of Geology. Principal organizer: Glenn Dolpin, University of Calgary, glenn.dolpin@uncalgary.ca.

Undergraduate Research
T11. Undergraduate Research in the Geosciences (Posters). Principal organizer: Katherine Boggs, Mount Royal University, kboggs@mtroyal.ca.

www.geosociety.org/gsatoday
FIELD TRIPS
For additional information, please contact the Field Trip Chair, Jean Hsieh, jhsieh@repsol.com.

Pre-Meeting
Hot and Cold Running Water in the Canadian Rockies. Principal organizer: Steve Grasby, Natural Resources Canada, steve.grasby@canada.ca.

Glacial Events and Environments in the region of the purported Ice Free Corridor. Principal organizer: Robert Young, University of British Columbia, Okanagan Campus, robert.young@ubc.ca

Effects of Sedimentology and Facies on Structural Styles in the Canadian Rocky Mountain Fold and Thrust Belt. Principal organizer: Byron Veilleux, Repsol Oil & Gas Canada, Inc., bveilleux@repsol.com.

New Looks at Old Paradigms—Semi-Radical Interpretations of Geomorphology and Cenozoic Rocks and Sediments in the Red Deer River Valley. Principal organizer: Milovan Fustic, University of Calgary, mfustic@ucalgary.ca.

Post-Meeting
Late Cretaceous Geology and Fossils of the Red Deer River Valley. Principal organizer: Don Henderson, Royal Tyrrell Museum, don.henderson@gov.ab.ca.

More than Trilobites—The Geology and Paleoecology of the Middle Cambrian Burgess Shale at the Mount Stephen Trilobite Beds. Principal organizer: Paul Johnston, Mount Royal University, pjohnston@mtroyal.ca.

Carbon Capture and Storage: A Trip to Visit Past and Recent Changing Environments in Alberta’s Plains and Shell’s World-Leading Quest CCS Project. Principal organizer: Kirk Osadetz, CMC Research Institutes, Inc., kirk.osadetz@cmcghg.com.

Geology of the Waterton-Glacier National Parks Area. Principal organizer: Brian Pratt, University of Saskatchewan, brian.pratt@usask.ca.

Tertiary and Quaternary Landscapes of Alberta. Principal organizer: Robert Young, University of British Columbia, Okanagan Campus, robert.young@ubc.ca.

Montney Analogue Field Trip: The Sulphur Mountain Formation around Canmore and Kananaskis. Principal organizer: Jon Noad, Sedimental Services, jonnoad@hotmail.com.

Canadian Rocky Mountain Fold and Thrust Belt for Geoscience Educators. Principal organizers: Glenn Dolpin, University of Calgary, glenn.dolpin@uncalgary.ca; Katherine Boggs, Mount Royal University, kboggs@mtroyal.ca.

WORKSHOPS
Pre-Meeting
Clastic Sedimentology Workshop—Applications and Examples from the Energy Industry (Students, K–12 Teachers, and Geoscience Educators). Principal organizer: Mark Radomski, Repsol Oil & Gas Canada Inc., mradomski@repsol.com.

Digital Field Methods for Sed/Strat and Structural Geology: Use of Tablet-Based Apps for Mapping and Measurements in Undergraduate Courses. Principal organizer: Lawrence Malinconico, Lafayette College, malincol@lafayette.edu.

Post-Meeting
Planning for the Future of the Canadian Cordillera Array and EarthsCAN. Principal organizers: Dave Eaton, University of Calgary, eatond@ucalgary.ca; Jeff Freymueller, University of Alaska–Fairbanks, jfreymueller@alaska.edu.

Using Virtual Field Experiences (VFEs) to Enhance Learning in Undergraduate Geology Courses. Principal organizer: Glenn Dolphin, University of Calgary, glenn.dolphin@ucalgary.ca.


OPPORTUNITIES FOR STUDENTS AND EARLY CAREER PROFESSIONALS
Mentor Programs
For more information, go to www.geosociety.org/mentors, or contact Jennifer Nocerino at jnocerino@geosociety.org.

Roy J. Shlemon Mentor Program in Applied Geoscience Luncheon. Fri., 9 June, noon–1:30 p.m. Students will have the opportunity to discuss career prospects and challenges with professional geoscientists from multiple disciplines over a FREE lunch.

John Mann Mentors in Applied Hydrogeology Program Luncheon. Sat., 10 June, noon–1:30 p.m. Students interested in applied hydrogeology or hydrology as a career will have the opportunity to network with professionals in these fields over a FREE lunch.

Geoscience Career Workshops
Part 1: Career Planning and Informational Interviewing. Your job-hunting process should begin with career planning, not when you apply for jobs. This workshop will help you begin this process and will introduce you to informational interviewing.

Part 2: Geoscience Career Exploration. What do geologists in various sectors earn? What do they do? What are the pros and cons to working in academia, government, and industry? Workshop presenters, and, when possible, professionals in the field, will address these issues.

Part 3: Cover Letters, Résumés, and CVs. How do you prepare a cover letter? Does your résumé need a good edit? Whether you are currently in the job market or not, learn how to prepare the best résumé possible. You will review numerous examples to help you learn important résumé dos and don’ts.
ACCOMMODATIONS

Hotel registration deadline: 25 May 2017
A block of rooms has been reserved at Grey Eagles Hotel; 3777 Grey Eagle Drive, Calgary, Alberta, Canada. The meeting rate is CDN$149.00 per night plus tax, which includes breakfast and a shuttle to campus. Reservations should be made by calling Grey Eagles Resort and Casino at +1-844-719-8777. Please mention that you are attending the GSA Rocky Mountain Section Meeting to get the discount.

Residences registration deadline: 1 May 2017
A block of rooms has been reserved at Mount Royal University Residences (West Residence Front Desk for check-in, 200 Mount Royal Circle SW, Calgary, Alberta, Canada). The meeting rate is CDN$49.05 per night plus tax. Reservations should be made by calling Mount Royal University Residences at +1-866-264-7875 or local +1-403-440-6275. Please mention that you are attending the GSA Rocky Mountain Section Meeting to get the discount.

REGISTRATION

Early registration deadline: 1 May 2017
Cancellation deadline: 8 May 2017
Registration opens in March. For further information or if you need special accommodations, please contact the meeting Chair, Katherine Boggs, kboggs@mtroyal.ca.

LOCAL COMMITTEE

Chair: Katherine Boggs, kboggs@mtroyal.ca
Technical Session Chair: Jenni Scott, jescott@mtroyal.ca
Field Trip Chair: Jean Hsieh, jhsieh@repsol.com
For questions about exhibits or sponsors, contact Katherine Boggs, kboggs@mtroyal.ca.
Shale Gas Production: Views from the Energy Roller Coaster

LOCATION

Pittsburgh is a thriving city with a vibrant community, great restaurants, and many museums. The meeting area offers a variety of geologically interesting venues—excellent examples of the Allegheny Front separating the Valley and Ridge and Appalachian Plateaus Provinces, including terminal Laurentide moraines, as well as oil, gas, coal, aggregates, and a wealth of additional natural resources, overprinted with myriad geotechnical hazards.

REGISTRATION

Early Registration Deadline: 13 February
Cancellation Deadline: 21 February
Registration Fees (in U.S. dollars)

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ACCOMMODATIONS

A block of rooms has been reserved at the historic Omni William Penn Hotel in Pittsburgh at US$159/night single or double, with US$10 extra for the third and the fourth occupants. This convention rate is guaranteed until 24 Feb. 2017. Parking in adjacent lots is US$9–US$15 per day for self-park.

FIELD TRIPS

Field trip coordinators: Joe Hannibal (NC), jhannibal@cmnh.org, and Kyle Fredrick (NE), fredrick@calu.edu.


2. Induced Seismicity and Other Environmental Impacts of Shale Gas Development in Northeast Ohio. Raymond Beiersdorfer, Youngstown State Univ., rebeiersdorfer@ysu.edu; John Williams, Buckeye Forest Council; Susan Beiersdorfer, Youngstown State Univ. When: 8 a.m., Sat., 18 March. Cost: US$35. Min. 6; max. 15.


WORKSHOPS

All workshops will be held on Saturday, 18 March.

1. **3D Printing of Terrain Models.** Principal organizer: Chris Harding, Iowa State Univ., charding@iastate.edu.
2. **Geologic Overview and Environmental Considerations in Marcellus and Utica–Point Pleasant Exploration and Production.** Principal organizers: Jeffrey Dick, Youngstown State Univ.; Dan Billman, dan@billmangeologic.com.
3. **Ground Penetrating Radar for the Earth Sciences.** Principal organizer: Harry M. Jol, Univ. of Wisconsin, jolhm@uwec.edu.
4. **An Introduction to QGIS and Geoscience Applications.** Principal organizer: John G. Van Hoesen, Green Mountain College, vanhoesenj@greenmtn.edu.

OPPORTUNITIES FOR STUDENTS, EARLY CAREER PROFESSIONALS, AND TEACHERS

**Mentor Programs**

For more information, go to www.geosociety.org/mentors or contact Jennifer Nocerino at jnocerino@geosociety.org.

**Roy J. Shlemon Mentor Program in Applied Geoscience.**

Mon., 20 March. Students and early career professionals will have the opportunity to discuss career prospects and challenges with applied geoscientists from various sectors over a FREE lunch.

**John Mann Mentors in Applied Hydrogeology Program.**

Tues., 21 March. Students and early career professionals interested in applied hydrogeology or hydrology as a career will have the opportunity to network with professionals in these fields over a FREE lunch.

**Geoscience Career Workshops**

**Part 1: Career Planning and Informational Interviewing.** Your job-hunting process should begin with career planning, not when you apply for jobs. This workshop will help you begin this process and will introduce you to informational interviewing.

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**Part 3: Cover Letters, Résumés, and CVs.** How do you prepare a cover letter? Does your résumé need a good edit? Whether you are currently in the job market or not, learn how to prepare the best résumé possible. You will review numerous examples to help you learn important résumé dos and don’ts.

**Travel Grants**

**Application Deadline:** 13 February

Find information and applications for student travel grants at the respective section websites. Please review the eligibility guidelines and application procedure for your section.

**All-Expense-Paid Travel**

**Application deadline:** 3 February

You may be eligible for a travel award to attend this meeting if you work full-time or care for dependents while attending school. Check the website for full eligibility guidelines and application www.geosociety.org/documents/gsa/section/ne/2017/17NE-UrbanGrant.pdf. Questions? Contact Tahlia Bear (tbear@geosociety.org).

**Volunteers**

The committee and officers of GSA's North-Central and Northeastern Sections rely on student volunteers to help meetings run smoothly, and we are pleased to offer student volunteers complimentary registration for the meeting in return for ~7 hours of work. Contact student volunteer coordinators Jonathan Warnock (NE), jwarnock@iup.edu, or Donald Stierman (NC), donald.stierman@utoledo.edu, for more information.

**Early Career Professionals**

**Early Career Professional Focus Group.** Have you graduated in the last five years and are either a working professional or still looking for a job? GSA would like to support you in pursuing your professional goals. During this 45-minute session, you’ll be asked for your input regarding potential programming and activities that GSA could offer to help you reach your professional goals. Tahlia Bear, Diversity and Career Officer, GSA.

**PAESTA—Pennsylvania Chapter of the National Earth Science Teachers Association**

- Environmental Discovery Tour, Streams as Classrooms: Impacts of Mine Discharge, Stormwater Runoff and Hydraulic Fracturing Fluids. 10 a.m.–1 p.m., Saturday, 18 March.
- Afternoon Keynote Address, Climate Research for the Classroom, Dr. Richard Alley, Pennsylvania State Univ. 2:30–4 p.m., Saturday, 18 March.
- Teachers Reception and Networking Event: 4–5 p.m., Saturday, 18 March.
- Panel Discussion (workshop): Ask-a-Geologist: Teachers Ask, Experts Answer: noon–1 p.m., Sunday, 19 March.

**Local Contacts**

**Northeastern Section:** Patrick Burkhart, patrick.burkhart@sr.edu

**North-Central Section:** Timothy Fisher, timothy.fisher@utoledo.edu

**Technical Sessions Chairs**

**Northeastern Section:** Richard Becker, rbecker.utoledo.edu

**North-Central Section:** Wendell Barner, wendell.berner@gmail.com
GEOCAREERS
Geoscience Career Workshops

For more information, contact Jennifer Nocerino at jnocerino@geosociety.org.

Geoscience Career Workshop Part 1: Career Planning and Informational Interviewing. Your job-hunting process should begin with career planning, not when you apply for jobs. This workshop will help you begin this process and will introduce you to informational interviewing.

Geoscience Career Workshop Part 2: Geoscience Career Exploration. What do geologists in various sectors earn? What do they do? What are the pros and cons?

Geoscience Career Workshop Part 3: Cover Letters, Résumés, and CVs. How do you prepare a cover letter? Does your résumé need a good edit? Learn how to prepare the best résumé possible and avoid typical pitfalls.

Early Career Professional Focus Group
(NE/NC and SC meetings only)

Have you graduated in the last five years and are either a working professional or still looking for a job? GSA would like to support you in pursuing your professional goals. During this 45-minute session, participants will be asked a series of questions regarding potential programming and activities that GSA could offer to help you reach your goals. For more information, contact Tahlia Bear at tbear@geosociety.org.

MENTOR PROGRAMS

Enjoy a free lunch while meeting with geoscience mentors working in the applied sector. The popularity of these programs means that space is limited, so plan to arrive early, because lunch is first-come, first-served. For further information, contact Jennifer Nocerino at jnocerino@geosociety.org.

South-Central Section Meeting
San Antonio, Texas, USA
Shlemon Mentor Luncheon Program: Mon., 13 March
Mann Mentors in Applied Hydrology Luncheon: Tues., 14 March

Northeastern/North-Central Joint Meeting
Pittsburgh, Pennsylvania, USA
Shlemon Mentor Luncheon Program: Mon., 20 March
Mann Mentors in Applied Hydrology Luncheon: Tues., 21 March

Southeastern Section Meeting
Richmond, Virginia, USA
Shlemon Mentor Luncheon Program: Thurs., 30 March
Mann Mentors in Applied Hydrology Luncheon: Fri., 31 March

Cordilleran Section Meeting
Honolulu, Hawaii, USA
Shlemon Mentor Luncheon Program: Tues., 23 May
Mann Mentors in Applied Hydrology Luncheon: Wed., 24 May

Rocky Mountain Section Meeting
Calgary, Alberta, Canada
Shlemon Mentor Luncheon Program: Fri., 9 June
Mann Mentors in Applied Hydrology Luncheon: Sat., 10 June

TRAVEL GRANTS TO NE/NC GSA 2017

Do you work full-time or care for dependents while attending school? You may be eligible for a travel award to attend the NE/NC Joint Section Meeting. Check the website for eligibility guidelines and application: www.geosociety.org/documents/gsa/section/nc/2017/17NE-UrbanGrant.pdf. Deadline: 3 Feb. If you have questions, email Tahlia Bear at tbear@geosociety.org.
2017 GSA Section Meetings

South-Central Section
Location: San Antonio, Texas, USA
Dates: 13–14 March
Meeting Chair: Benjamin Surpless, bsurples@trinity.edu
www.geosociety.org/sc-mtg

Northeastern Section
(Joint with North-Central Section)
Location: Pittsburgh, Pennsylvania, USA
Dates: 19–21 March
Meeting Chair: Patrick Burkhart, patrick.burkhart@srue.edu
www.geosociety.org/ne-mtg

North-Central Section
(Joint with Northeastern Section)
Location: Pittsburgh, Pennsylvania, USA
Dates: 19–21 March
Meeting Chair: Timothy G. Fisher, timothy.fisher@utoledo.edu
www.geosociety.org/nc-mtg

Southeastern Section
Location: Richmond, Virginia, USA
Dates: 30–31 March
Meeting Co-Chairs: David Spears, david.spears@dmme.virginia.gov; Karen Layou, klayou@reynolds.edu
www.geosociety.org/se-mtg

Cordilleran Section
Location: Honolulu, Hawaii, USA
Dates: 23–25 May
Meeting Chair: Craig R. Glenn, glenn@soest.hawaii.edu
www.geosociety.org/cd-mtg

Rocky Mountain Section
Location: Calgary, Alberta, Canada
Dates: 9–10 June
Meeting Chair: Katherine Boggs, kboggs@mtroyal.ca
www.geosociety.org/rm-mtg

www.geosociety.org/sections
Welcome New GSA Members!

The following geoscientists were elected to GSA membership at the GSA Council’s fall meeting.

PROFESSIONALS

Wendy Abshire
Festus Tongwa Aka
Eric D. Anderson
Nuratu Mohammed Badamasi
Alice Baldridge
Tamal Barma
Gregory J. Bell
Steven Robin Bell
Rich Busch
John H. Bush
Patrick Byrne
Nan Broadbent
Barbara C. Bruno
Steven A. Buffone
Duane D. Chase

Yanje Chu
Sagy Cohen
James J. Connors
Dominic Digiulio
Peter Michael Downes
Robert Ebelhar
Yvette Eley
James Emme
Utami W. Enberg
Diane Marie Erwin
Korhan Esat
Matthew Randall Feller
Dominic Leonard Filiano
We Fu
Eddy Zulkarnaini Gafflar Sr.
Lisa S. Gardiner
Lindsey E. Geary
Ray Gedaly
Phil Gensler
Giresh Ghooaray
Joe Gillman
Ashley E. Gingeleski
Tewodros Rango Godebo
Sophie M. Green
Christine Marie Griffith
Gretchen Gurtler
Alexander Gysi
Paul Hall

Virginia Hatfield
Jeff Robert Havig
Rebecca A. Hawkins
Genaro R. Hernandez Castillo
Christopher P. Hettinger
Catherine R. Hill
Lori Hoose
Betsy R. Hovda
David Ellsworth Hoyt
Chunju Huang
ReBecca K. Hunt-Foster
Linda Marler Hutchins
Georgia A. Hybels
Christina Ifrim
Olugbenga A. Ige
Scott Jasechko
Gerald Jean-Baptiste
Gary Jones
Joshua T. Kannenberg
Ronald D. Karpilo
Arthur Kasson
Leah Ann Kasten
Mark Eugene Kelley
Marc W. Killingstad
Glenn C. King
Scott D. King
David Kirk
Hiroshi Kitazato
Klaudia Kuiper
Lindsay Lafleur
Antonio Lanzirotti
Daniel Lasco
Daniel Le Heron
Chao Lei
Adam Leiter
Sylvie Lévesque
Jörg Lewandowski
Christopher J. Lewis
Jill Libby
Greg Liggett
Mark Longacre
Marc-Antoine Longpre
Robert Bruce Macnaughton
Todd Kent Mann
Chris Marone
Kristen Rachele Marra
Tari N. Mattox
Linda Ruiz McCall
Deanna H. McCay
Kenneth Otto McDowell
Virginia L. McGuire
Claire Louise McLeod
Steven Joseph Medina
David R. Melling
Artaches A. Migdissov
Dave Miller
Trinity Alexandra Miller
Kamran Mirza
Eric Mittelstaedt
Neil A. Moig
Steven Moore
John P. Morton
Malay Mukul
Simon Mullen
Anne L. Nelson
Kimberly A. Nichols
Ebenezer Yemi Obunbadewa
Lawrence F. O’Hanlon
Olusola Johnson Ojo
Ndip Ojong
Mitsuru Okuno
Stephanie Annette O’Meara
Chinedu H. Onugu
Clark Osterlund
Geraint Owen
Michael John Parker
Jayne Pasternak
Charlotte Louise Pearson
Per Kent Pedersen
Joshua M. Pfarr
Tanner A. Posey
Harold Sherman Pranger II
Maria-Teresa Ramirez-Herrera
Jacqueline Elisabeth Reber
Donald Matthew Reeves
Ray P. Reser
Krista Rogers
Elizabeth Roller
Philip Ryder
Wallace Bryce Sconiers Jr.
Gail D. Sease
Julio Sepulveda
Bing Shen
Sarah Shriver

Top 3 Reasons Geoscientists Become GSA Members

• GSA Meetings
• Career Development
• GSA Publications
Gerry Simila
Judith E. Skog
Quinn Eric Smith
William Travis Smith Jr.
Clayton Steven Sorenson
Ian Gordon Stanistreet
Andre Stonge
Joyce A. Strain
Steve Strait
Luke Cameron Strotz
Diana Sturm
Charles Sulfrian
Morgan Sullivan
Yasser Mohamed Hassan Sultan
Stephen Joseph Sunnenberg
Julia Suriano
Mark D. Sutton
Shigeyuki Suzuki
Chengpeng Tan
Liangcheng Tan
Matthew D. Therrell
Jordan Thomson
Trista L. Thornberry-Ehrlich
Paul Upchurch
Atteeq Ur-Rehman
Julie Vanmiddlesworth
Deborah Veasey
Daniel Ricardo Viete
Hari Selvi Viswanathan
Donna Vorhees
Zhifeng Wan
Dixie Lee West
Brian G. White
Zackary Williams
Kenneth Wolgemuth
Nancy J. Wolvearson
Marissa A. Wright
Chun-Ming Wu
Yigang Xu
Elowyn Yager
John Albert Yellich
Sergey V. Yudintsev
Ji’en Zhang
Shihong Zhang
Karen Ziegler
Joanna Victoria Clark
Buck Emanuel Collins
Fanny Marie Coutelot
Kelsey Crocker
Alan Czepinski
Kristen Lynn Davis
Timothy M. Dittrich
William Cody Duckworth
Paul R. Durkin
Tait Ernest Earney
Paul Reinhold Eizenhöfer
Desiree Nicole Esericueta
Leathon Arthur Femmel
Danielle Fraser
Jenny A. Gales
Davide Gamboa
James Gardiner
Alex Gavryushkin
Alexandra Gavryushkina
Josie Gonzales
Gabriela Gonzalez
Connor Robin Grabus
Alexander C. Grady
Sunny Gunslo
Nicole Guinn
Tena D. Haines
Andrea Jo Miller Hanna
Sophie Harland
Alix Hartmann
Amelia Ann C. Hays
Michelle E. Heider
McKenzie Hengesh
Philip J. Heron
William Grant Hess
Anne Hildenbrand
Kristen Kelley Ewer Hocutt
Aryn Kinley Hoge
Jacob Andrew Hollander
Shan Huang
Yihe Huang
Nicole Carmen Hurtig
Anna-Marie Hyatt
Dallas M. Jacobs
Alison Jeanne Jaeger
Peter Christoffer Jensen
Teresa Johnson
Amanda Jones
Kayla M. Jones
Rachel Frances Kane
Sarah Katz
Cassandra L. Kaul
Lindsay Keeney
Andrew James Kelly
Chinbat Khishgee
Aaron Kilmurry
Daniel L. Knapp
Andrew Koff
Simon Kuebler
Ashok Kumar
Rachel Mollie Lauer
Amanda Lawter
Berit Lehrmann
Samantha Marie Lesniewski
Yaofa Li
Matthew Lillico
Kara S. Loneli
Ian Lynch
Vyakti Madhukar Chowdary
Adam Makhluf
Lori Manoukian
Ishmael Mansaray
Seth E. Martin
Mohamed Mastere
Amy E. Matheney
Elsie C. McBride
Ian Alexander McCary
Sheila McClure
Ryan McCutcheon
Rex McLachlan
Mohit Melwani Daswani
Margaux Mesle
Ryan Patrick Miller
Hari Mix
Brian Moe
Margaux Mouchene
Rahul Mukherjee
Keila Munz
Michael Narup
Adam J. Neely
Vanya Marie North
Samuel Chukwuunwike Ogbogu
Valentine Kanayo Okongwu
Abayomi Adesola Olaajo
Dane Michael Olson
Staaysha Olson-Larsen
Erdenebayar Oyun
Brandon Tyler Page
Carolyn Parcheta
Melissa I. Pardi
Diana Lynn Parios
Himangshu Paul
Francesco Pavano
David W. Peake III
Shanti Penprase
Jonathan Patrick Perkins
William Perry
Esther Pinheiro
Michael Roger Plampin
Adriana Potra
Alexandra Maree Price
Jessica Quintanar
Erik Raab
Nicholas Brian Ratcliff
Benjamin Ellis Render
Justin Rice
Melissa Susanne Rice
Joshua Robert Robinson
Lucia Rodriguez-Freire
James Alan Rosenberg
Kelsey Russo-Nixon
Daniel Rutte
Sarah Sams
Mark Loren Schmelter
Jon Schneyer
Rachel Severn
Azhar Hussain Shah
Anay Subhash Shende
Emily Frances Smith
Brian C. Snow
Michelle R. Sobba
James Taylor St. Clair
Michael G. Starkie
Eric Stata
Sophie J. Stauffer
Jonathan LeRoy Stephenson
Lee Stocks Jr.
Kimberly Stone
Valerie K. Stucker
Anja Sundal
Elizabeth Swanner
Kristofer Ryan Swenson
Lane E. Sympson
Ryan D. Taylor
Elizabeth Jane Terry
June Then
Craig M. Thomas
Jessica L. Till
Jessica Lindsay Towell
Whitney Trainor-Guitton
Anne Turnbull
Kaitlynn Lea Walker
Rachel Maclean Ward
Kelly Watson
Nathan Watson
Rachel Werderits
Nasser Alexander Zirakparvar

STUDENTS
(listed by professional interest)

Archaeological Geology
Aspen Byram
Justine Ann Channing
Elizabeth Colella
Cajetan G.F. Geiger
Hoabin Hong
Heidi Katter
Sean McClure
Maria L. Mick
Ben Olinger
Cody J. Pridmore
Jarrod Richter
John Rucker
Eric Nathan Schoolmeester
Jackelyn M. Seams
Christina E. Walker

Biogeosciences
Nathaniel William Fortney
Ankita Gupta
Olivia Healy
Andrea Jones
Megan Krusor
Caitlin Patricia Lebel

Top 5 Fields of Interest for New Student Members

- Mineralogy, Geochemistry, Petrology, and Volcanology
- Hydrogeology/Hydrology
- Environmental Science
- Energy Geology
- Paleo Sciences

Climatoloogy/Meteorology
Nurudeen Abiodun Adesina
Edward Ballaron
Jared Ballew
Charles Louis Becker
Christopher Warren Benson
Anthony Crespo
Cameron B. De wet
Megan King
Pavel Munshi
Kyle Passamano
Madison Grace Shankle
Kimberly Slinski

Economic Geology
Taoreed Adeola
John Asafo-Akowuah
Patrick Buonamici
Clayton L. Burgess
Zachary Byrd
Alexandria Fay Cerpowicz
Robert Collar
Lucille Daver
Gino Jovannie Figueroa
Barra Jr.
Alexandra Thersa Heller
Adam Joseph Humphreys
Ian Kallio

Energy Geology
Syed Fahad Ahsan
Mohammed Albuwaidy
Christina Arszulowicz
Kyle Scott Balling
Alex Morgan Bascom
Bryan Michael Bottoms
Jordan Bratcher
Jacob Cole Burleson
Connor L. Cain
Michael P. Cuiik
Matthew Danielson
Jacob Dyson
Katherine Lynn Erwin
Dalton Fantechi
Joseph Frank
Jonathan Graham II
Sarah Marie Gresh
Ferdinand Hüll
Andrew S. Jensen
Hiroyumi Kobayashi
Joel Francis Kohnke
Kyeong pil Kong
Joseph Taylor Kulenguski

Martin Keenan
Halley A. Keevil
Brandon Lee Keirn
Vincent Michael Leblanc
Michael Ian Lopez
Sena Lyonsward
Neal M. Maguire
Samuel Mraz
Maria Alejandra Rodriguez Mustafa
Lee Seunghan
David Tremblay
Christos Vasilopanagos
Laurene-Marie Wavrant
Everett Brennan Wood
Yuting Yu
Kaiwen Zhu
Laura Kunas
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Devon Leach
Tyler Nathan Leggett
Hunter Lipman
Shuhua Liu
Yang Liu
Marybella Marinez
Brittany Martinez
Justin Patrick McLeod
Fasick T. Mulugeta
Margaret Musser
Sage Denali Muttel
Caroline Nazworth
Hanna Kristina Olson
Tanner Polen
Hunter d Redmond
August R. Ridde
Blake Everett Rothlisberger
Radhika Sangani
Robert L. Schoen
Julia Shea
William Macon Shepherd
Vishal Singh
Annie Smoot
Samantha Jane Strasburger
Seth Suydam
Benjamin Alexander Thomas
April Anahi Treviño
Jesse Garnett White
Robet Widodo
Celeste Woock
Lanyu Wu
Qiao Zhang

Danielle Leblanc
Austin Conrad Madsen
Jason James Marvin
Krystin Nicole Metzger
Marion Nicco
Nicholas John Paltey
Jansen Pilkington
Kalyleigh Rodgers
Tyler Rohan
Kirby Roucher
Bonnie Colleen Sams
Audra Schilder
Lei Sun
Darren Sundys
Zain A. Tahir
Schuyler Taylor
Deborah Ruth Woods
Andrew Bernard Yokel-Deliduka
Jillian Shaye Young

Environmental Science
Rainey Aberle
Jacob Ryan Allgood
Nikhil N. Amin
Thomas Angel-Flavan
Robin Arnold
Caroline Atwood
Rachel A. Bacher
Grace Anna Bachmann
Darcy Lynn Bird
Mark A. Bradley
Catherine Christine Carballo
Brandon Cupertino Carreno
Thomas James Casteel II
Ashley Clinarad
Egan C. Cornachione
Rex Cosgrove
Kelsey Maranda Culbertson
Adeline Annette Davis
Kayla E. Deciechi
Clara Deck
Iris M. Diaz-Olmo
Monica Elizabeth Dix
Catherine Ruth Erway
Shannon Evans
Giselle Fernandez
Devan Fitzpatrick
Jake Peter Flores
Jared Anthony Foster
Sarah Gauld
Russell Dory Glickman
Michael Goers
Kate Grobowski
Margot Habets
Oona Heacock

Ian V. Heckman
Elli Melissa Heil
Matthew Shawn Hemler
Annette Elizabeth Hilton
Iris Holzer
Victoria Hubbard
Holly A. Hume
Heather Hurtado
Lookman Issa
Cole R. Jimerson
Thomas S. Johnson
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Sarah Sokol
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Cody Gene Tolman
Allegra M. Torres

Christina Jo Tremel
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Prasamsa Thapa
Timmy Wick

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Chelsea Chen
Ryan Fitzsimmons
Kendall Hartman
Xinxing Liu
Alfonso Rodriguez
Stephanie Christina Rodriguez
Janice Wallenburg
Panshu Zhao

Geology and Health
Ality Oshior Aghedo
Prakash Chandra Arya
Samantha Rae Bartnik
Julia Beckert
Juan Miguel Ramirez Guotana
Danielle Jackson
Caitriona Keogh
Thomas Alan Kissack Sr.
Cody L. Maccabe
Mayra Ivett Peña
Shawkat Hossain Quazi
Kelly Smith

Geophysics/Tectonophysics
Kathleen Abbott
Gozde Akay
Kayleigh C. Alme
Yuta Ando
Natalie Jane Angel
Shawn Anthony Buskey
Joel Camacho
Joshua Tucker Celestine

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Zachary Perkett Meyers
David Miklesh
Jordyn Beth Miller
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Christine Nims
Morgan R. Okeson
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Sarah C. Osgood
Zakary J. Owens
Philip Lee Paitz
Justin Raul Pardo
Erik Mark Patton
Gregg Elliott Paulson
Kyle Pena
Paula J. Perilla
Silvia Jennifer Perritte
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Edna Rodriguez
Andrew Ross
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Samuel Thomas Schoenmann
Hayley E. Schram
Ryan Patrick Schroeriong
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The NPS-GIP program places college students and early career professionals (18–35 years old) in National Park Service units for three months to one year to assist with geology and integrated science projects. This program is a partnership between the National Park Service, the Geological Society of America, and Environmental Stewards.

www.geosociety.org/gip

Izaak Ruiz
Jessyka Ann Scherer
Thomas Shahan
Joshua Blake Smith
Jacob Michael Sounik
Thomas H. Tremain
Luis Enrique Valentin-Alvarado
Victor Ikechukwu Vincent

K–12 TEACHERS
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Valerie G. Hoyos
Elizabeth Adele Outdoor Hunter
Kevin Kapanka

Waseem Khan
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Allison Steckler
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James Raymond Eldridge
Lia Farrell
Nathaniel Fisher
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Terms begin 1 July 2018 (unless otherwise indicated)

If you are looking for the opportunity to work toward a common goal, give back to GSA, network, and make a difference, then we invite you to self-nominate (or nominate a fellow GSA member) to serve on a Society committee or as a GSA representative to another organization.

Learn more and access the nomination form at www.geosociety.org/aboutus/committees. Use the online form to make a nomination or self-nomination. GSA Headquarters Contact: Pamela Fistell, GSA, P.O. Box 9140, Boulder, CO 80301-9140, USA; fax: +1-303-357-1074; pfistell@geosociety.org.

Key: B—Meets in Boulder or elsewhere; E—Communicates by phone or electronically; M—Meets at the Annual Meeting; T—Extensive time commitment required during application review period.

ACADEMIC AND APPLIED GEOSCIENCE RELATIONS COMMITTEE

One member-at-large vacancy (industry-related; 3-year terms) (E/M)

This committee is charged with strengthening and expanding relations between GSA Members in applied and academic geosciences. As such, it proactively coordinates the Society’s effort to facilitate greater cooperation between academia, industry, and government geoscientists. Qualifications: Committee members must work in academia, industry, or government and be committed to developing a better integration of applied and academic science in GSA meetings, publications, short courses, field trips, and education and outreach programs. Professional Interest: Environmental & Engineering Geology, Hydrogeology, Karst, Quaternary Geology & Geomorphology, Structural Geology & Tectonics, Sedimentary Geology. Members must also be active in one or more GSA Division.

ANNUAL PROGRAM COMMITTEE

Three member-at-large vacancies (4-year terms) (B/E/M)

This committee is charged with developing a plan for increasing the quality of the annual and other society-sponsored meetings in terms of science, education and outreach; evaluating the technical and scientific programs annually to identify modifications necessary for accomplishing the Society’s long-range goals; conducting short and long-range planning for the society meetings as a whole, and developing a long-term logistical plan/strategy for the technical programs of all GSA meetings and other society-sponsored meetings. One member-at-large should have previous meeting experience.

ARTHUR L. DAY MEDAL AWARD

Two member-at-large vacancies (3-year terms) (E/T)

This committee selects candidates for the Arthur L. Day Medal. Qualifications: Members should have knowledge of those who have made “distinct contributions to geologic knowledge through the application of physics and chemistry to the solution of geologic problems.” All of the committee’s work will be accomplished during the months of February/March. All committee decisions must be made by 1 April.

DIVERSITY IN THE GEOSCIENCES COMMITTEE

Two member-at-large vacancies (3-year terms) (E/M)

This committee provides advice and support to GSA Council and initiates activities and programs that will increase opportunities for people of ethnic minority, women, and persons with disabilities and raise awareness in the geosciences community of the positive role these groups play within the geosciences. The committee is also charged with stimulating recruitment and promoting positive career development for these groups. Qualifications: Members of this committee must be familiar with the employment issues these groups face; expertise and leadership experience in such areas as human resources and education is also desired.

EDUCATION COMMITTEE

Three vacancies: One graduate educator and one informal science educator (museum, visitor center, interpretation officer, etc.) (4-year terms); and one undergraduate student representative (2-year term) (B/E/M)

This committee works with GSA members representing a wide range of education sectors to develop informal, pre-college (K–12), undergraduate, and graduate earth-science education and outreach objectives and initiatives. Qualifications: Members of this committee must have the ability to work with other interested scientific organizations and science teachers’ groups.

GEOLOGIC MAPPING AWARD COMMITTEE

One member-at-large vacancy (government; 3-year term) (E)

The purpose of this committee is to generate, receive, and evaluate candidates for the Geologic Mapping Award. This award acknowledges contributions in published, high-quality geologic mapping that led the recipient to publish significant new scientific or economic-resource discoveries, and to contribute greater understanding of fundamental geologic processes and concepts. The objective is to encourage training and support toward production of excellent, accurate, detailed, purposeful geologic maps and cross sections. With respect to size or scale, there are no restrictions on map products. GSA’s Geological Mapping Award will be made on an annual basis, leaving the option open for multiple awards to be given under unusual circumstances in any given year; or to make no award in any given year.

GEOLOGY AND PUBLIC POLICY COMMITTEE

Three vacancies: two members-at-large (3-year terms) and one student representative (2-year term) (B/E/M)

This committee provides advice on public policy matters to Council and GSA leadership by monitoring and assessing international, national, and regional science policy; formulating and recommending position statements; and sponsoring topical white
papers. This committee also encourages active engagement in geoscience policy by GSA members. **Qualifications:** Members should have experience with public-policy issues involving the science of geology; ability to develop, disseminate, and translate information from the geologic sciences into useful forms for the general public and for GSA Members; and familiarity with appropriate techniques for the dissemination of information.

**GSA INTERNATIONAL**

Three vacancies: one member-at-large (International Associated Society), one member-at-large (North America), and one member-at-large (outside North America) (4-year terms) (E/M)

Serve as GSA’s coordination and communication resource seeking to promote, create, and enhance opportunities for international cooperation related to the scientific, educational, and outreach missions shared by GSA and like-minded professional societies, educational institutions, and government agencies. Build collaborative relationships with Divisions and Associated Societies in International issues and serve as channel for member generated proposals for international themes.

**JOINTECHNICALPROGRAMCOMMITTEE**

Two member-at-large vacancies: one paleoclimatology & paleoceanology and one Precambrian geology (2-year terms 1 Dec. 2017–30 Nov. 2019) (B/E)

Members of this committee help finalize the technical program for GSA’s annual meetings by participating in the Web-based selection and scheduling of abstracts, as well as topical session proposal review. **Qualifications:** Members must be familiar with computers and the Internet, be a specialist in one of the specified fields, and be available in late July through mid-August for the organization of the annual meeting technical program.

**MEMBERSHIPANDFELLOWSHIPCOMMITTEE**

One member-at-large vacancy (government; 3-year term) (B)

This committee contributes to the growth of the GSA membership, enhances the member experience, and serves a vital role in the selection of Fellows, all with the goal of fostering a membership community as pertinent and global as our science. Committee members should understand what various segments of our members want from GSA and should be familiar with outstanding achievers in the geosciences who would be worthy of fellowship.

**NOMINATIONS COMMITTEE**

Two member-at-large vacancies (industry, government) (3-year terms) (B/E)

This committee recommends nominees to GSA Council for the positions of GSA Officers and Councilors, committee members, and Society representatives to other permanent groups. **Qualifications:** Members must be familiar with a broad range of well-known and highly respected geoscientists. Meets in Boulder in July or August.

**PENROSE CONFERENCES AND FIELD FORUMS COMMITTEE**

Two member-at-large vacancies (3-year terms) (E)

This committee reviews and approves Penrose Conference and Field Forum proposals and recommends and implements guidelines for the success of these meetings. **Qualifications:** Committee members must be past conveners of a Penrose Conference or Field Forum.

**PENROSE MEDAL AWARD COMMITTEE**

Two member-at-large vacancies (3-year terms) (E/T)

Members of this committee select candidates for the Penrose Medal Award. Emphasis is placed on “eminent research in pure geology, which marks a major advance in the science of geology.” **Qualifications:** Members should be familiar with outstanding achievers in the geosciences worthy of consideration for the honor. All of the committee’s work will be accomplished during the months of February/March. All committee decisions must be made by 1 April.

**PROFESSIONAL DEVELOPMENT COMMITTEE**

One member-at-large vacancy (3-year term) (E)

This committee directs, advises, and monitors GSA’s professional development program; reviews and approves proposals; recommends and implements guideline changes; and monitors the scientific quality of courses offered. **Qualifications:** Members must be familiar with professional development programs or have adult education teaching experience.

**PUBLICATIONS COMMITTEE**

Two vacancies: one member-at-large and one young professional member-at-large (4-year terms) (B/E/M)

The primary responsibilities of the committee are: nomination of candidates for editors when positions become vacant; reviewing the quality and health of each Society publication, and reporting with an annual report to Council that shall include recommendations for changes in page charges, subsidies, or any other publishing matter on which Council must make a decision. To carry out this charge, GSA headquarters will provide the committee with all necessary financial information.

**RESEARCH GRANTS COMMITTEE**

Eleven member-at-large vacancies and one NSF delegate (3-year terms) (B/E/M)

The primary function of this committee is to evaluate the research grant applications received, by delegation of the Council’s authority and within the limits of the research grants budget, to award specific grants to chosen recipients. The committee will also act on the distribution of funds derived from any other gifts or memorial or award funds that are to be administered by it. **Qualifications:** Members should have experience in directing research projects and in evaluating research grant applications. **Extensive time commitment required 15 Feb.–15 April.**

**YOUNG SCIENTIST AWARD (DONATH MEDAL) COMMITTEE**

One member-at-large vacancy (3-year term) (E/T)

Committee members investigate the achievements of young scientists who should be considered for this award and make recommendations to GSA Council. **Qualifications:** Members should have knowledge of young scientists with “outstanding achievement(s) in contributing to geologic knowledge through original research which marks a major advance in the earth sciences.” All of the committee’s work will be accomplished during the months of February/March. All committee decisions must be made by 1 April.
GSA REPRESENTATIVES TO OTHER ORGANIZATIONS

GSA Representative to the AAAS Consortium of Affiliates for International Programs (CAIP)
CAIP encourages cooperation on projects with international aspects and facilitates networking in its member societies.
Qualifications: Interest in the international area of his/her society, but no other specific qualifications.

GSA Representative to the AGI Environmental Geoscience Advisory Committee (EGAC)
Fosters communications within the community about issues related to serving the broader international community; helps identify and focus on the highest priority environmental informational needs and issues best addressed by the geoscience community.
Qualifications: Well-acquainted with GSA programs in environmental geoscience.

North American Commission on Stratigraphic Nomenclature:
One vacancy (3-year term Nov. 2018–Nov. 2021) (E/M): This committee develops statements of stratigraphic principles, recommends procedures applicable to classification and nomenclature of stratigraphic and related units, reviews problems in classifying and naming stratigraphic and related units, and formulates expressions of judgment on these matters.

GSA Representative to the U.S. National Committee for Soil Science (USNC/SS):
One vacancy (3-year term 1 July 2018–30 June 2021) (B/E): The mission of the USNC/SS is to promote the advancement of soil science in the United States and throughout the world in order to strengthen U.S. soil science as a contributor to the international scientific community and to inform the U.S. scientific community of soil science activities carried out elsewhere in the world.

Committee, Section, and Division Volunteers: Council Thanks You!
GSA Council acknowledges the many member-volunteers who, over the years, have contributed to the Society and to our science through involvement in the affairs of the GSA. Your time, talent, and expertise help build a solid and lasting Society.

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ELECTIONS: GSA OFFICERS and COUNCILORS

GSA ELECTIONS BEGIN 17 MARCH 2017
GSA's success depends on you—its members—and the work of the officers serving on GSA's Executive Committee and Council. Members will receive instructions for accessing a member-only electronic ballot via our secure website, and biographical information on the nominees will be online for you to review at that time. Paper versions of both the ballot and candidate information will also be available upon request. Please help continue to shape GSA's future by voting on these nominees.

2017 OFFICER NOMINEES

**PRESIDENT**
(July 2017–June 2018)
Isabel P. Montanez
University of California Davis
Davis, California, USA
We congratulate our incoming president!

**PRESIDENT-ELECT / PRESIDENT**
Robbie R. Gries
Gries Energy Partners LLC
Lakewood, Colorado, USA

**TREASURER**
(July 2017–June 2018)
Richard C. Berg
Illinois State Geological Survey
Champaign, Illinois, USA

2017 COUNCIL NOMINEES

**COUNCILOR POSITION 1**
(July 2017–June 2021)
Rónadh Cox
Williams College
Williamstown, Massachusetts, USA
Carmala N. Garzione
University of Rochester
Rochester, New York, USA

**COUNCILOR POSITION 2**
(July 2017–June 2021)
Joan E. Fryxell
California State University San Bernardino
San Bernardino, California, USA
Michael L. Williams
University of Massachusetts–Amherst
Waltham, Massachusetts, USA

**COUNCILOR POSITION 3**
(July 2017–June 2021)
Margaret R. Eggers
Eggers Environmental Inc.
Oceanside, California, USA
Suzanne O’Connell
Wesleyan University
Middletown, Connecticut, USA

To be counted, ballots must be submitted electronically, faxed to GSA Headquarters, or postmarked before midnight on 16 April 2017.
GSA is soliciting applications and nominations for science co-editors for *Geology*, *GSA Bulletin*, *Geosphere*, and *GSA Today* with four-year terms beginning 1 January 2018. Duties include: ensuring stringent peer review and expeditious processing of manuscripts; making final acceptance or rejection decisions after considering reviewer recommendations; and maintaining excellent content through active solicitation of diverse and definitive manuscripts.

**POSITIONS AVAILABLE**

**GSA Today**
The editor of *GSA Today*, one of the most widely read earth science publications in the world, must have a wide range of interests and expertise along with the ability to identify research topics of both high quality and broad appeal. Prior editing experience and a publication record in a wide range of journals is key.

**GSA Bulletin**
Research interests that would complement those of the continuing editors include, but are not limited to: stratigraphy; geomorphology; geochemistry; tectonics; structural geology; deformation; and paleoclimatology.

**Geosphere**
Research interests that would complement those of the continuing editors include, but are not limited to: geochronology; geochemistry; volcanology; petrology; sedimentary geology; remote sensing/GIS; tectonics, structural geology; geosciences education; and dynamic content.

**Geology**
Research interests that would complement those of the continuing editors include, but are not limited to: hard-rock geology; tectonics; geodynamics; geochemistry; tectonophysics; volcanology; marine geology; structural geology; geophysics; and planetary geology.

Note that candidates should not feel they must have expertise in every area listed; however, editors will sometimes need to handle papers outside of their main disciplines.

**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** First consideration will be given to nominations or applications received by 15 February 2017.


**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.
# 2016–2017 GSA Division and Interdisciplinary Interest Groups

## Officers and Past Chairs

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<tr>
<th>Division</th>
<th>Chair</th>
<th>First Vice-Chair</th>
<th>Second Vice-Chair</th>
<th>Secretary-Treasurer</th>
<th>Past Chair</th>
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<tr>
<td><strong>ARCHAEOLOGICAL GEOLOGY DIVISION</strong></td>
<td>Cynthia M. Fadem, Chair</td>
<td>Richard Dunn</td>
<td>Judson Finley</td>
<td>Katherine A. Adelsberger, Past Chair</td>
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<td><strong>ENERGY GEOLOGY DIVISION</strong></td>
<td>J. Fred McLaughlin, Chair</td>
<td>Marc L. Buursink</td>
<td>Laura S. Ruhl</td>
<td>Cortland F. Eble, Secretary-Treasurer</td>
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<td><strong>ENVIRONMENTAL &amp; ENGINEERING GEOLOGY DIVISION</strong></td>
<td>Thad A. Waskiewicz, Chair</td>
<td>Jessica E. Witt</td>
<td>Stephen L. Slaughter</td>
<td>Matthew M. Crawford, Past Chair</td>
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<td><strong>GEOBIOLOGY &amp; GEOMICROBIOLOGY DIVISION</strong></td>
<td>Simon A.F. Darroch, Chair</td>
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<td>Marc Laflamme, Past Chair</td>
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<td><strong>GEOINFORMATICS DIVISION</strong></td>
<td>Denise J. Hills, Chair</td>
<td>Leslie Hsu</td>
<td>TBD</td>
<td>Anders Noren, Secretary-Treasurer</td>
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<td><strong>GEOLOGY AND HEALTH DIVISION</strong></td>
<td>Andrew Hunt, Chair</td>
<td>TBD</td>
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<td>Thomas H. Darrah, Past Chair</td>
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<td><strong>GEOLOGY AND SOCIETY DIVISION</strong></td>
<td>David W. Szymanski, Chair</td>
<td>Susan Stover</td>
<td>John A. Chermak</td>
<td>Bruce R. Clark, Past Chair</td>
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<td><strong>GEOPHYSICS DIVISION</strong></td>
<td>Nicholas C. Schmerr, Chair</td>
<td>Lisa Tauxe</td>
<td>Benjamin Drenth</td>
<td>Samantha E. Hansen, Past Chair</td>
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<td><strong>GEOSCIENCE EDUCATION DIVISION</strong></td>
<td>Shane V. Smith, Chair</td>
<td>Natalie Bursztyn</td>
<td>Robyn Mieko Dahl</td>
<td>Jacquelyn E. Hams, Secretary-Treasurer</td>
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<td><strong>HISTORY AND PHILOSOPHY OF GEOLOGY DIVISION</strong></td>
<td>Dorothy Sack, Chair</td>
<td>Michael S. Smith</td>
<td>TBD</td>
<td>Kathleen Lohff, Secretary-Treasurer</td>
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<td><strong>HYDROGEOLOGY DIVISION</strong></td>
<td>Abe E. Springer, Chair</td>
<td>Stephen J. Van der Hoven</td>
<td>William (Bill) L. Cunningham, Second Vice-Chair</td>
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<td><strong>KARST DIVISION</strong></td>
<td>Jason Polk, Chair</td>
<td>Jonathan B. Sumrall</td>
<td>Joshua Feinberg</td>
<td>Ben Tobin, Treasurer</td>
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<td><strong>LIMNOGEOLOGY DIVISION</strong></td>
<td>Scott W. Starratt, Chair</td>
<td>Lisa E. Park Boush</td>
<td>Michelle F. Goman</td>
<td>Johaan C. Varekamp, Past Chair</td>
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<tr>
<td><strong>MINERALOGY, GEOCHEMISTRY, PETROLOGY, AND VOLCANOLOGY</strong></td>
<td>Wendy A. Bohrson, Chair</td>
<td>Anita L. Grunder</td>
<td>John W. Shervais</td>
<td>Yildirim Dilek, Past Chair</td>
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PLANETARY GEOLOGY DIVISION
James J. Wray, Chair
Bradley J. Thomson, First Vice-Chair
Sharon A. Wilson Purdy, Second Vice-Chair
Emily Martin, Secretary-Treasurer
Danielle Y. Wyrick, Past Chair

QUATERNARY GEOLOGY AND GEOMORPHOLOGY DIVISION
Glenn D. Thackray, Chair
Tammy M. Rittenour, First Vice-Chair
Grant Meyer, Second Vice-Chair
Sarah Brown Lewis, Secretary
Scott F. Burns, Treasurer
Anne J. Jefferson, Newsletter Editor/Web Manager
Anne Chin, Past Chair

SEDIMENTARY GEOLOGY DIVISION
Katherine A. Giles, Chair
Gary L. Gianniny, Vice-Chair
Linda C. Kah, Secretary-Treasurer
Marjorie A. Chan, Past Chair

STRUCTURAL GEOLOGY AND TECTONICS DIVISION
James (Jim) P. Evans, Chair
Margaret E. Rusmore, First Vice-Chair
Paul Umhoefer, Second Vice-Chair
Rebecca M. Flowers, Secretary-Treasurer
Jean M. Crespi, Past Chair

INTERDISCIPLINARY INTEREST GROUPS (IIGS)

SOILS IIG
Neil J. Tabor, Chair
TBD, Chair-Elect
Steven G. Driese, Past Chair

INTERNATIONAL IIG
Nazrul I. Khandaker, Chair
TBD, Community Administrator
Positions Open

BOARD OF DIRECTORS

GEOLOGY IN THE PUBLIC INTEREST

Geology in the Public Interest (GPI), a 501c3 non-profit in the Seattle area, announces a search to fill a vacancy on its Board of Directors. This is an unpaid volunteer position that requires knowledge of geoscience and a desire to fulfill the mission of GPI (http://publicgeology.org/). Special attention will be given to those familiar with fundraising and who can assist with enhancing individual and corporate contributions, and grant funding. Directors serve a term of two years unless extended. Residence in western Washington is not mandatory; some participation via conference call is expected. If interested, please email gwessel@publicgeology.org. We will reply with a short questionnaire regarding your interests and capabilities. A complete application will include your response to the questionnaire and a copy of your résumé or C.V. Deadline for complete applications is February 15, 2017. Gregory R. Wessel, President and Board Chairman.

ASSISTANT PROFESSOR

STRUCTURE/TECTONICS

WILKES UNIVERSITY

Wilkes University invites applicants for a tenure-track Assistant Professor of Geology in the Environmental Engineering and Earth Sciences Department starting August 2017. The Environmental Engineering and Earth Sciences programs, including Geology, are exclusively undergraduate programs that have a long tradition of personalized learning/teaching experiences with small class sizes, publishable undergraduate research, and hands-on projects throughout the curriculum. The successful applicant would be expected to complement the science and engineering faculty (8 full-time members) and value undergraduate research. The Department seeks a candidate with expertise in tectonics/structural geology, teaching experience at the undergraduate level in these and related areas, experience mentoring undergraduate level students in research, an ability to work with an interdisciplinary team of faculty and a desire to assist the Department in delivering a modern undergraduate geology major. Teaching and/or research experience that bridges environmental science, energy resources, or a closely related field will be considered favorably. Field-based research and an interest in the North American Appalachian orogenic belt are desirable. The successful candidate is expected to assist in the development of a summer geology field course. Candidates must have earned a doctoral degree at the time of appointment.

Primary teaching duties include courses in tectonics and structural geology, applied geophysics and field methods. We seek a candidate who is able to provide outstanding classroom, laboratory, and in-field instruction and who is amenable to teach courses outside of their specialty area such as hydrogeology, paleontology and energy resources. The successful applicant will be expected to develop a research program that involves undergraduate students and to pursue external research funding.

Wilkes University is an independent, comprehensive university dedicated to academic excellence in the liberal arts, sciences, and selected professional programs. The University has approximately 2,300 students at the undergraduate level and over 2,000 full time equivalent students at the graduate and first professional levels. Its institutional focus is on developing strong mentoring relationships with each of its students and contributing vitally to economic development of Northeastern Pennsylvania. The University is located in Wilkes-Barre, Pennsylvania, a revitalized city that is located on the scenic Susquehanna River and is within two and one-half hours driving distance of New York City and Philadelphia.

To apply, visit www.wilkes.edu and click “Jobs at Wilkes.” Please include a cover letter, curriculum vitae, statement of teaching philosophy, and contact information for three references. Review of applications begins February 1, 2017, and will continue until the position is filled. Information on the Department is at http://www.wilkes.edu/academics/colleges/science-and-engineering/environmental-engineering-earth-sciences/.

Wilkes University is constantly seeking to become a more diverse community and to enhance its capacity to value and capitalize on the cultural richness that diversity brings. The University strongly encourages applications from persons with diverse backgrounds.

TENURE-TRACK FACULTY

LITHOSPHERE DYNAMICS

THE UNIVERSITY OF TEXAS AT AUSTIN

The Department of Geosciences at The University of Texas at Austin is seeking a dynamic faculty member at the tenure-track Assistant Professor level in the broad field of Lithosphere Dynamics. We seek a researcher-educator who will complement existing strengths in tectonics and structural geology, petrology and geochemistry, and geophysics. Individuals who bridge any or all of these disciplines are encouraged to apply. Specific areas of interest include (but are not limited to): igneous and metamorphic processes in Earth’s crust and lithospheric mantle; active tectonics and the interplay between surface processes, tectonics, and climate; experimental rock mechanics and its extrapolation to transient and long-term crustal and mantle deformation; and seismology and geodesy applied to understanding the structure and dynamics of the lithosphere.

As part of the Jackson School of Geosciences, the Department of Geosciences has over 50 faculty and a community of research staff with a broad range of specialization and access to outstanding research facilities and support.

Applicants should submit a letter of application, curriculum vitae, statements of research and teaching interests, and contact information for at least three references. Submit electronic copies of these materials online at http://apply.interfolio.com/39559. For questions related to the search, please contact dgs@jsg.utexas.edu. Review of applications will begin January 10, 2017, and continue until the position is filled.

The University of Texas at Austin is an Equal Opportunity Employer with a commitment to diversity at all levels.

ASSISTANT PROFESSOR IN

HYDROLOGIC AND WATER SCIENCE

THE UNIVERSITY OF TEXAS AT AUSTIN

The Department of Geological Sciences in the Jackson School of Geosciences at The University of Texas at Austin seeks to hire a tenure-track Assistant Professor in Hydrologic and Water Science. We seek candidates at the forefront of their science and who have interdisciplinary research and teaching interests. This search covers a wide range of disciplines related to water. Candidates interested in chemical, physical, and ecological processes and water resource sustainability, are encouraged to apply.

As part of the Jackson School of Geosciences, the Department of Geological Sciences has over 50 faculty and a community of research staff with a broad range of specialization and access to outstanding research facilities and support.

Applicants should submit a letter of application, curriculum vitae, statements of research and teaching interests, and contact information for at least three references. Submit electronic copies of these materials online at https://apply.interfolio.com/39541. For questions related to the search, please contact dgs@jsg.utexas.edu. Review of applications will begin January 6, 2017, and continue until the position is filled.

The University of Texas at Austin is an Equal Opportunity Employer with a commitment to diversity at all levels.

UNCONVENTIONAL RESOURCE PROFESSOR OF PRACTICE POSITION

BERG-HUGHES CENTER AND DEPARTMENT OF GEOLOGY AND GEOPHYSICS

TEXAS A&M UNIVERSITY

The Berg-Huges Center (BHC) for Sedimentary Resources and Petroleum Systems and the Department of Geology and Geophysics at Texas A&M University invite applications from individuals for a non-tenure-track, three-year renewable contract position as a Professor of Practice in Unconventional Resources beginning as early as January 1, 2017. This position will be a joint appointment with teaching, research and service responsibilities in the Berg-Hughes Center and Department of
Texas A&M University is an affirmative action/equal opportunity employer committed to excellence through the recruitment and retention of a diverse faculty and student body and compliance with the Americans with Disabilities Act. We encourage applications from minorities, women, veterans, and persons with disabilities. Texas A&M University also has a policy of being responsive to the needs of dual-career partners.

Texas A&M University is an equal opportunity, affirmative action employer committed to diversity.

FACULTY POSITIONS
DEPARTMENT OF GEOSCIENCES
NATIONAL TAIWAN UNIVERSITY

The Department of Geosciences at NTU is seeking active scientists to fill two faculty positions starting from August 1st, 2017. The positions are open to candidates from all fields in geosciences, but those who have strong background in the fields of mineralogy and petrology, geo-resources, stratigraphy, sedimentology, structural geology and hydro- and applied geology will receive more favorable consideration. Applicants are requested to submit the following documents: CV, list of publications, statements of teaching and research interests, names and contact information of three referees, and three to five articles published within the last seven years (one of which need to be designated as representative paper and must be published after August 1st, 2012). Application materials should be sent by email to Prof. J. Bruce H. Shyu, the Chair of the Searching Committee, at jbhs@ntu.edu.tw.

Deadline for application: January 15th, 2017. For more information, please refer to the website: http://web.gl.ntu.edu.tw/.

INSTRUMENTATION SPECIALIST
UNIVERSITY OF WISCONSIN OSHKOSHI

The Department of Geology seeks a technician for a 12-month, academic staff position starting September 1, 2017. BS/BA in geology required, MS preferred. She or he will maintain samples, supplies, and equipment, help teach summer field camp, and help train and supervise students: (1) in use of instruments and laboratories, and (2) as outreach presenters. Experience with geology laboratories and instruments, field mapping, specimen/sample curation, and geology software preferred. Refer to https://www.uwosh.edu/hr/employment/instrumentation-specialist-051a.1617 for more information.

Opportunities for Students

Ph.D. Fellowships at University of Florida Water Institute. The University of Florida Water Institute is seeking 6 highly motivated doctoral-degree students for Fellowships that provide an annual stipend, tuition waiver and health insurance for 4 years starting fall term 2017. These PhD students will work collaboratively within this interdisciplinary team of Fellows and their faculty advisors. The focus project takes a comprehensive systems approach to analysis of interbasin transfer of surface water into the Tempiques River watershed in Costa Rica. This water transfer has altered hydrology, land use, community economic structure, and health of the downstream Palo Verde wetland in the Tempiques watershed.

We will look especially for open-minded candidates eager to work across disciplines and willing to become proficient in Spanish in order to gain a deeper appreciation of the issues. Applicants should have a strong demonstrated interest in water issues and either a Master’s degree in natural sciences, social sciences, or engineering, or a JD degree. Exceptional students with a Bachelor’s degree plus research experience in an appropriate discipline will also be considered. Persons from groups under-represented in science and engineering professions are encouraged to apply.

For more information and to apply for a Fellowship, go to http://waterinstitute.ufl.edu/WIGF/2017Cohort/Overview_2017.html. Fellowship applications are due to the UF Water Institute by January 16, 2017. Questions? Contact Carol Lippincott at calippincott@ufl.edu.

Jonathan O. Davis Scholarship, University of Nevada, Reno. The Jonathan O. Davis Scholarship supports graduate students working on the Quaternary geology of the Great Basin. The national scholarship is $7,500 and the University of Nevada, Reno stipend is $7,500. The national scholarship is open to graduate students enrolled in an M.S. or Ph.D. program at any university in the United States. The Nevada stipend is open to graduate students enrolled in an M.S. or Ph.D. program at the University of Nevada, Reno. Applications must be post-marked or submitted electronically by February 17, 2017. Details on application and submission requirements can be found at http://www.dri.edu/GradPrograms/Opportunities/JonathanDavis. Proposals will not be returned.
Bring your science and technology expertise to Capitol Hill to work directly with national leaders at the interface between geoscience and public policy.

The GSA-USGS Congressional Science Fellowship provides a rare opportunity for a geoscientist to spend a year working for a member of Congress or congressional committee. If you are an earth scientist with a broad geologic background, experience applying scientific knowledge to societal challenges, and a passion for helping shape the future of the geoscience profession, GSA and the USGS invite your application. The fellowship is open to GSA members who are U.S. citizens or permanent residents, with a minimum requirement of a master’s degree with at least five years of professional experience or a Ph.D. at the time of appointment.

Learn more at www.geosociety.org/csf or by contacting Kasey White, +1-202-669-0466, kwhite@geosociety.org.
As we begin a new year, you will start to see more details about carefully determined priority areas that GSA has asked the GSA Foundation to support over the next several years. Each area is vital to leading the way and advancing the geosciences across the full breadth of our field. We hope that you have noticed our recent stories highlighting specific program areas in which our members’ contributions have made tangible impacts. These chosen priorities are critical to the future of our field:

Communicating Our Science

The expansion of field experiences brings science alive not only for students, but also for teachers who are often the start to a child’s first encounter with earth science. GSA has the opportunity to make field experiences available to educators, college students, and post-graduates, providing formative opportunities like GeoCorps™ America and Geoscientists-in-the-Park positions on federal lands or field camp opportunities to hone skills and find geoscience passions.

Future Geoscientists

GSA is uniquely positioned to invest in and foster the next generation of geoscientists, which really means investing in the future of our field. About 9,400 GSA members are students who could benefit from strengthened career pathways at every level, whether it be increased graduate research support, mentoring and career development opportunities, or the advancement of a more diverse geoscience community.

Education

Since its beginning, one of GSA’s primary purposes has been the communication of geoscience knowledge through publications and scientific meetings. The in-person interactions that occur at the Annual Meeting, Penrose Conferences, Thompson Field Forums, and global meetings are essential to our field. Technological advances, enhanced accessibility and participation, and support of central meeting elements are key to the vitality of these gatherings. Additionally, GSA’s transition to open-access journals will ensure content availability to all audiences while assisting authors and safeguarding that researchers of all circumstances from around the world can be published in GSA’s high-quality journals.

Policy

Geoscience must be at the table for critical issues and policies shaping earth science research, natural resource regulation and energy exploration, and the broad landscape of science education. GSA’s Washington, D.C., policy office coordinates hundreds of congressional office visits—including for students—and partners with many other scientific societies to make sure our voices are heard. Our Policy Fellowship’s role is critical as a science policy liaison to GSA members and committees; sustaining this position for years to come will be transformative in our efforts.

If you would like details on any of these priorities, and how you can help, please contact me directly at jhess@geosociety.org or +1-303-357-1011.
Connecting the Next Generation of Science Journalists with Scientists in Action

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INTRODUCTION

As scientific advances and controversies flood the media, journalists with strong scientific backgrounds must ensure that complex science is portrayed accurately (Mooney, 2004). Science journalists see evidence-based reporting with scientific explanation and argumentation as essential tenets of their work (Secko and Fleury, 2014). NASA’s Remote, In Situ, and Synchrotron Studies for Science and Exploration (RIS4E; pronounced “rise”) team recognizes this need, and in collaboration with the Stony Brook University School of Journalism and the Alan Alda Center for Communicating Science, created the RIS4E Science Journalism Program. This innovative program uses RIS4E research to help journalism students strengthen their understanding of the practice of science and learn to report more effectively and accurately on scientific research. RIS4E begins with a semester-long science journalism practicum and culminates with a field experience in which students report on active NASA planetary science field research. This is the first program to engage undergraduate and graduate journalism students as a team in a deep, extended investigation of a NASA research effort.

THE RIS4E SCIENCE JOURNALISM PROGRAM

The RIS4E team (ris4e.labs.stonybrook.edu) is part of NASA’s Solar System Exploration Research Virtual Institute (SSERVI). SSERVI scientists study the Moon, moons of Mars, and near-Earth asteroids as potential targets for future robotic and human exploration by NASA. RIS4E takes a comprehensive approach to this investigation to maximize scientific return throughout the exploration process—from remotely sensed spectral data preparation for safe and efficient human surface exploration to analysis of small, precious returned samples. The team simulates astronaut exploration of extraterrestrial surfaces in planetary analog environments, such as volcanic terrains in Hawai’i, and analyzes extraterrestrial materials, including their possible effects on human health, at some of the most technologically advanced research facilities on Earth. RIS4E student journalists report on each aspect of this multi-layered program.

Six undergraduates and two graduate students were competitively selected to participate in the first RIS4E practicum in the spring of 2015. This course, offered through the Stony Brook University School of Journalism, was modeled after the university’s successful Journalism Without Walls program, which gives students hands-on, practical experience in reporting beyond their campus. The students learned about RIS4E research directly from the RIS4E science team. RIS4E scientists visited their classrooms, sat for one-on-one interviews, and provided tours of their laboratories. The students practiced interviewing and reporting all semester and prepared for the physically harsh conditions of working in the field. Students learned science-writing fundamentals and explored the business of science. On a trip to NASA’s Goddard Space Flight Center, students met with NASA science writers to learn about navigating a career path in science journalism.

REPORTING FROM THE FIELD

After completing the practicum, five students, accompanied by a journalism professor, a teaching assistant, and NASA education specialists, joined the RIS4E team during the 2015 field season at Kīlauea’s December 1974 lava flow on the Island of Hawai‘i. Volcanic gases from Kīlauea have altered the basalt (Chemtob et al., 2010; SeeLos et al., 2010) and overlying sediments in the area, resulting in volcanic terrain analogous to basaltic terrains found on other planets and satellites. RIS4E scientists study this site to better understand planetary volcanism and igneous processes, and to test state-of-the-art field equipment and techniques to make recommendations to NASA about developing portable scientific instruments for astronauts to use for exploring the Solar System.

The journalism students reported on the entire 10-day field campaign, from setup and weather-related changes in plans to data analysis and investigation of questions that arose as a result of field discoveries (Fig. 1). The students took hundreds of photos, recorded dozens of hours of video footage, and interviewed scientists both as they worked and after hours. Their role was to document planetary science fieldwork in action: to watch the scientists do their work, find out why it matters, and share it with the world.

In addition to reporting on RIS4E, each student pursued and published related science stories. For example, one student was intrigued by a simulated Mars habitat called HI-SEAS (Hawai‘i Space Exploration Analog and Simulation); others explored the heated debate over the construction of a 30-meter telescope on Mauna Kea. Professors ensured that each student reported not only on a unique aspect of the RIS4E campaign but also that students worked together to paint a picture of the integrated research effort in rich,
The RISE4E program uniquely provides a broad overview of many research topics, with emphasis on individual students or professional journalists and western), but most are designed for graduate students or professional journalists and provide only a broad overview of many research topics, with emphasis on individual reporting. The RISE4E program uniquely enables undergraduate journalism students to gain hands-on reporting experience— as individuals and collaboratively—while focusing on a single, multifaceted field-based research effort over six months.

PROGRAM FOUNDATIONS AND INNOVATIONS

The RISE4E science team, NASA education specialists, and journalism professors with decades of professional print and video journalism experience worked together to develop a program that would provide an immersive, stimulating experience for learners over an extended period of time. Before field deployment, science and journalism leads discussed how to navigate difficult situations, such as how to best maintain journalistic integrity and impartiality, while respecting the need for scientists’ downtime after intense days in the field. NASA educators helped answer questions and provided coordination between the science team, journalism professors, and students. They also arranged tours of science and cultural facilities to broaden students’ perspectives on Hawaiian science, life, and culture.

Several science journalism programs in the United States provide real-world reporting experiences (e.g., MIT, New York University, Johns Hopkins, and Northwestern), but most are designed for graduate students or professional journalists and provide only a broad overview of many research topics, with emphasis on individual reporting. The RISE4E program uniquely enables undergraduate journalism students to gain hands-on reporting experience— as individuals and collaboratively—while focusing on a single, multifaceted field-based research effort over six months.

PROGRAM FEEDBACK

Student feedback was overwhelmingly positive. Students reported a better understanding of how scientific research is conducted and the time scales over which it takes place, increased awareness of interconnections between scientific fields, and knowledge of what scientists’ careers are really like. One student commented, “The scientific method was abundantly in use in the field, and this sort of hands-on exposure is something that I believe everyone should take part in at some point.” Another said, “Seeing people who love what they do in action is the best sort of education I can imagine.” Students reported gains in practical science-journalism experience: They learned the benefits of planning by setting priorities, laying groundwork, and early action, such as conducting film interviews at the start of the field camp in case they needed to reshoot. They became familiar with journalism equipment (such as microphones that reduce wind noise) and preparation (such as a background in broadcast journalism) that aid reporting in the field: “In the field you only get one shot to get what you need.” They also gained confidence in reporting on scientific research: “In the field I proved to myself that I am capable of doing reporting and videography alone outdoors.” Survey results indicate that the majority of participants are more likely to pursue science journalism as a career as a result of participating in this program. Student recommendations for improving the program included providing access to more examples of science journalism products, spending more time in the field, and setting clearer expectations for finished products.

Scientists reported that discussing their research with students helped them to improve their own communication skills. They liked how the student website made their research more accessible to the public. Scientists recommended encouraging students to seek feedback before posting their stories, saying, “Scientific journalism should involve having the student go back to the scientist to see if the science was portrayed accurately and adequately.” Suggestions from students and scientists will help the RISE4E team prepare the second RISE4E Science Journalism Program, to be held in 2017.

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REFERENCES CITED


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Please join us in welcoming the science editors starting terms this month:

**Geology:** Dennis Brown, Instituto de Ciencias de la Tierra “Jaume Almera,” CSIC  
**Geology:** Mark Quigley, University of Melbourne  
**Lithosphere:** Laurent Godin, Queen’s University

GSA thanks the editors whose terms ended 31 December 2016 for their service to the Society and to the science: Robert Holdsworth and James Spotila, Geology; and Arlo Weil, Lithosphere.

The current list of editors is posted to www.geosociety.org/GSA/Pubs/editors.aspx  
Find your research at www.gsapubs.org
Gold, Structures, and Landforms in Central South Carolina—Field Guides for the 2016 GSA Southeastern Section Meeting, Columbia, South Carolina


First, this volume explores the Haile gold mine, which is located in southern Lancaster County, South Carolina. Gold was discovered at the site in 1827, and the mine is located between the past producing Ridgeway and Brewer mines that, when all are combined, constitute a significant amount of historical gold production in the southeastern United States. The second guide focuses on the geology and geomorphology of the Carolina Sandhills in Chesterfield County, South Carolina, an area in the updip portion of the U.S. Atlantic Coastal Plain province. The third guide provides a structural analysis of the Kiokee belt and its framing elements: Savannah River transect.

FLD042, 51 p., ISBN 9780813700427
list price $20.00 member price $14.00
GSA Mentor Programs

STUDENTS—Interested in a career in the applied geosciences?

Plan now to attend a Roy J. Shiemon Mentor Program in Applied Geoscience and/or a John Mann Mentors in Applied Hydrogeology Program at your 2017 Section Meeting to chat one-on-one with practicing geoscientists. These volunteers will answer your questions and share insights on how to get a job after graduation.

PROFESSIONALS—Interested in sharing information about your applied geoscience career with students?

Being a mentor is a rewarding experience. If you are interested in becoming a mentor at one of the GSA Section Meetings, contact Jennifer Nocerino, jnocerino@geosociety.org. Early career professionals are encouraged to volunteer.

www.geosociety.org/mentors/