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The Gulf of Mexico and  
Canada Basin: Genetic  
Siblings on Either Side  
of North America

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**Call For Short Course and**

**Technical Session Proposals**



**22-25 October**  
**Seattle, Washington, USA**

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## SCIENCE

### 4 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 Tremththamnor ([www.featherlightphotography.co.uk](http://www.featherlightphotography.co.uk)). See related article, p. 4–11.



12 **Final Call: Award & Nomination Deadlines**

12 **2017 GSA Graduate Student Research Grants**

13 **Call for Nominations: GSA Fellowship**

15 **Call for Nominations: GSA Division Awards**

18 **In Memoriam**

19 **Preliminary Announcement and Call for Papers: GSA Rocky Mountain Section Meeting**

22 **Final Announcement: GSA North-Central & Northeastern Sections Joint Meeting**

24 **Education & Outreach Programs at the 2017 Section Meetings**

25 **2017 GSA Section Meetings**

26 **Welcome New GSA Members!**

33 **GSA GeoCorps™ America Program**

33 **National Park Service Geoscientists-in-the-Parks (GIP) Opportunities**

34 **Call for Committee Service**

36 **Elections: GSA Officers & Councilors**

38 **2016–2017 GSA Division and Interdisciplinary Interest Groups Officers and Past Chairs**

40 **Geoscience Jobs & Opportunities**

42 **GSA Thompson Field Forum: Catastrophic Mega-Scale Landslide Failure of Large Volcanic Fields**

43 **GSA Foundation Update**

44 **Groundwork: Connecting the Next Generation of Science Journalists with Scientists in Action**

# 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  $\sim 70^\circ$  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 proneness 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).

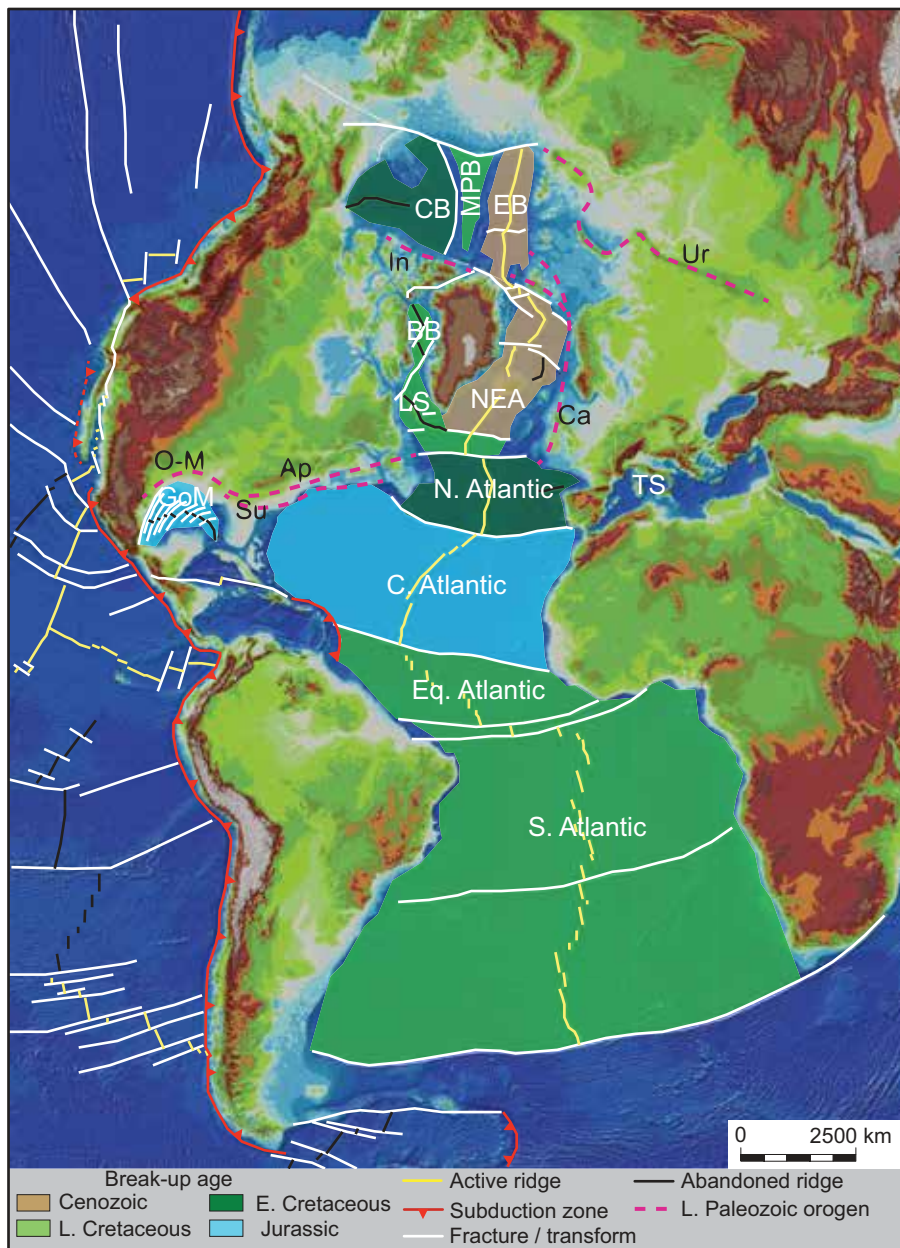
Differences also exist—in particular their paleo-latitudes during opening. The Gulf of Mexico opened between the Middle Jurassic and earliest Cretaceous and was located at a subtropical latitude, whereas the Canada Basin opened between Early and Late Cretaceous and was located close to  $75^\circ$  N. 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 ( $\sim 200$ – $300$  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 magma-rich margin (Holbrook et al., 1994; Imbert and Philippe, 2005) (Fig. 2). The alternative “narrower ocean” interpretation places



**Figure 1. Topographic-bathymetric map of Atlantic-Arctic Oceans.** The Gulf of Mexico and Canada Basin are located in back-arc settings, oriented at a high angle to the Paleo-Pacific subduction zone, and were never linked to the Atlantic seafloor. The pronounced wedge-shaped oceans are situated between North and South America and North America and Eurasia, respectively. Ap—Appalachian orogen; BB—Baffin Bay; Ca—Caledonian orogen; CB—Canada Basin; EB—Eurasia basin; GoM—Gulf of Mexico; In—Innuitian orogen; LS—Labrador Sea; MPB—Makarov-Podvodnikov Basin; NEA—Northeast Atlantic; O-M—Ouachita-Marathon orogen; Su—Suwanne suture; TS—Tyrrenian Sea; Ur—Uralian orogen.

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.

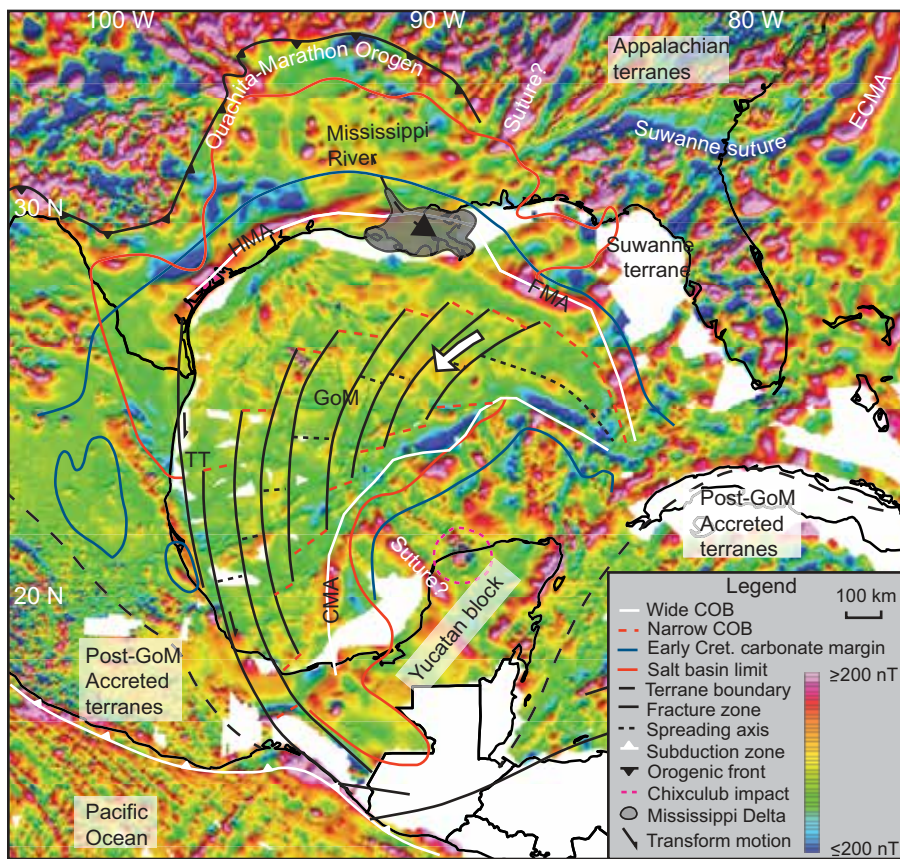
Like a number of previous workers (e.g., Molina-Garza et al., 1992; Marton and Buffler, 1994; Imbert and Philippe, 2005; Pindell and Kennan, 2009; Kneller and Johnson, 2011; Rowan, 2014) we favor a two-phase opening model for the Gulf of Mexico:

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  $78 \pm 11^\circ$  CCW since the Permian, of which  $63^\circ$  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 Quetzalcoatl 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



**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 Buffler (1985). Large arrow illustrates the post-160 Ma rotational opening.

Gulf of Mexico is underlain by thin crust (e.g., Marton and Buffler, 1994; Eddy et al., 2014), with substantial swathes of oceanic crust developing in a back-arc setting to the Paleo-Pacific (Stern and Dickinson, 2010) at an unusually high angle to the line of subduction.

### CANADA BASIN OPENING

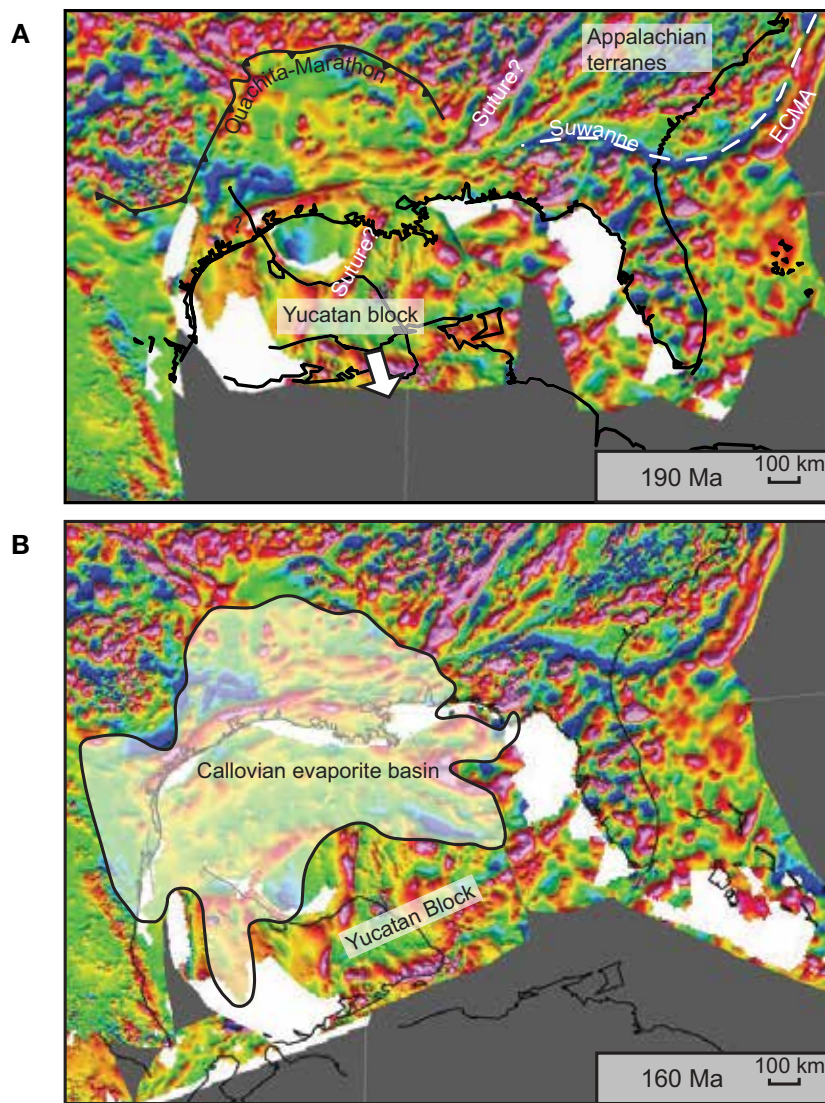
The Canada Basin margins experienced significant rifting in the Kimmeridgian (157.3–152.1 Ma) (Dixon, 1982). Barremian (130.8–126.3 Ma) break-up was coincident with major dike swarms in the Canadian Arctic Island area, Svalbard, and Franz Josef Land. Ages range between ca. 138 and 125 Ma, but appear dominated by ca. 125 Ma high-precision U/Pb geochronology (e.g., Corfu et al., 2013; Døssing et al., 2013; Polteau et al., 2015). Break-up is also marked by a pronounced regional unconformity in the Mackenzie Delta–Beaufort Sea and North Slope of Alaska

(e.g., Bird and Houseknecht, 2011). The Canada Basin is underlain by thin crust (e.g., Alvey et al., 2008; Chian et al., 2016; Doré et al., 2016; Mosher et al., 2016) and has been interpreted to have magma-poor margins, with exhumed mantle, flanking a central area with oceanic crust (Grantz et al., 2011; Chian et al., 2016).

The Arctic is comparatively data-poor due to its remoteness and harsh climate, and several vastly different plate models have been proposed (older models summarized by Lawver and Scotese, 1990). Recently acquired data (e.g., Gottlieb et al., 2014; Mosher et al., 2016) underpin modern models (e.g., Alvey et al., 2008; Whittaker and Ady, 2015; Doré et al., 2016). These are mostly a variation of the “windshield wiper” model (Hamilton, 1970; Grantz et al., 1979), whereby the Canada Basin opened by ~66° CCW rotation of a microcontinental fragment (Alaska-Chukotka), away from 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 3. (A)** Pre-opening reconstruction of the magnetic grid, restoring the Houston and Campeche magnetic anomalies. Note the alignment of the Appalachian frontal positive anomaly with a linear positive anomaly across Yucatan, suggestive of a good fit and a continuation of the orogen across Yucatan. Arrow indicates direction that Yucatan will become pulled with Gondwanaland away from North America. **(B)** 160 Ma reconstruction marking the transition between the mainly translational motion and subsequent pronounced rotation around a rotation pole in the Florida Straits area. ECMA—East Coast magnetic anomaly.

## 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-Quñones 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 hyperextended 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).

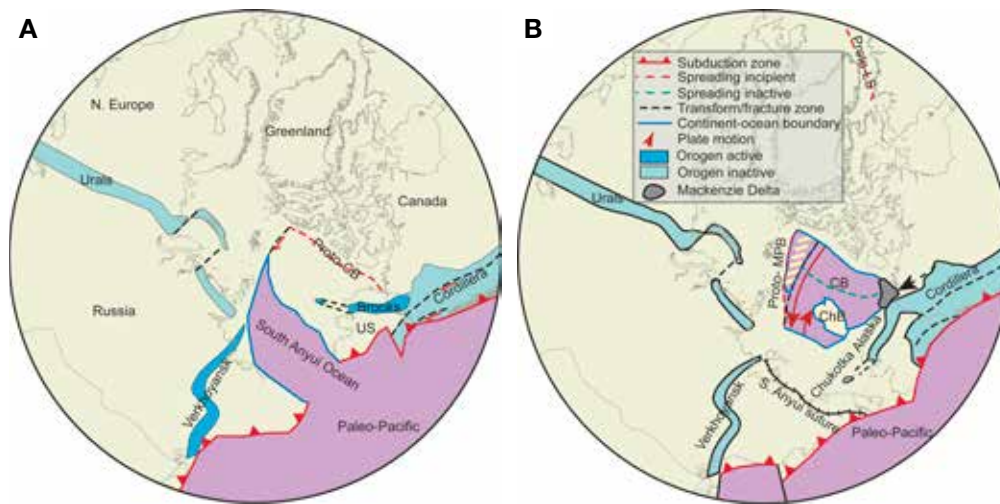


Figure 4. (A) 125 Ma pre-breakup plate reconstruction of Canada Basin (CB). (B) 80 Ma reconstruction. Note that CB is not linked with the Atlantic. ChB—Chukchi Borderlands; LS—Labrador Sea. For details, see Doré et al. (2016).

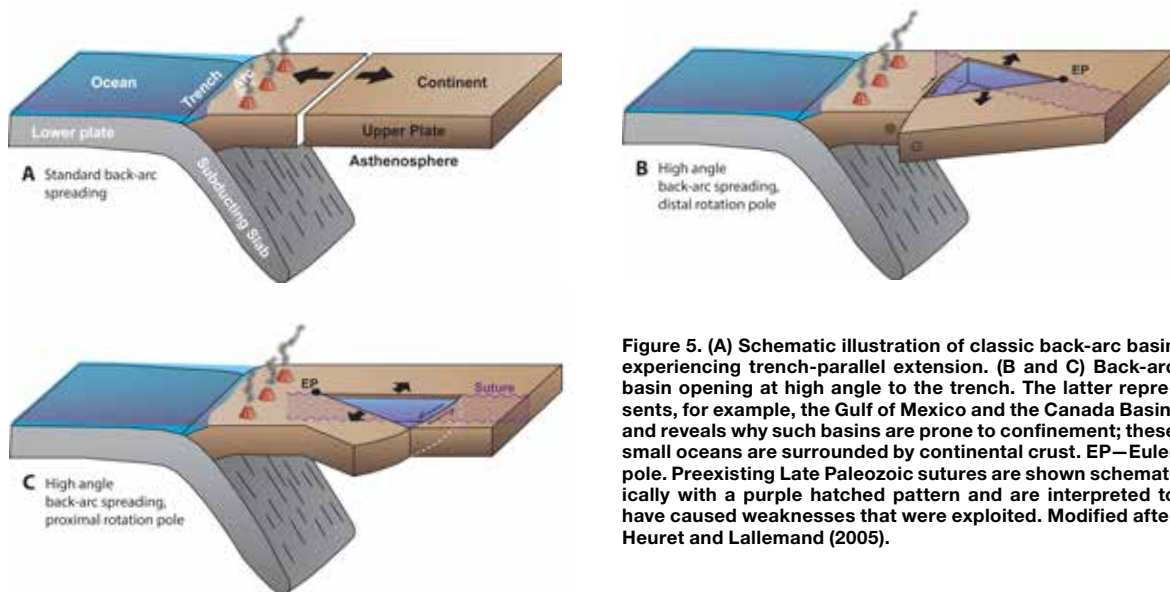


Figure 5. (A) Schematic illustration of classic back-arc basin experiencing trench-parallel extension. (B and C) Back-arc basin opening at high angle to the trench. The latter represents, for example, the Gulf of Mexico and the Canada Basin, and reveals why such basins are prone to confinement; these small oceans are surrounded by continental crust. EP—Euler pole. Preexisting Late Paleozoic sutures are shown schematically with a purple hatched pattern and are interpreted to have caused weaknesses that were exploited. Modified after Heuret and Lallemand (2005).

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 ( $\sim 70^\circ$ );
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 Tyrrhenian 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. Tyrrhenian Basin spreading has been related to indentation of Africa into Eurasia (Faccena et al., 1996), while the South China Sea has been related to extrusion 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 Pangean suture zones in a back-arc stress regime, where these sutures intersect the paleo-Pacific margin. Notably, both the Inuitian 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 re-opened 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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- **AGI Medal in Memory of Ian Campbell for Superlative Service to the Geosciences** recognizes singular performance in and contribution to the profession of geology.
- **AGI Marcus Milling Legendary Geoscientist Medal** is given to a recipient with consistent contributions of high-quality scientific achievements and service to the Earth sciences having lasting, historic value; who has been recognized for accomplishments in field(s) of expertise by professional societies, universities, or other organizations; and is a senior scientist nearing completion or has completed full-time regular employment.

For a list of other national awards and nomination forms, go to [www.geosociety.org/gsa/awards/national.aspx](http://www.geosociety.org/gsa/awards/national.aspx). If you know of an award not listed, please send the details to [awards@geosociety.org](mailto:awards@geosociety.org).

## 2017 GSA Graduate Student Research Grants

**Submission deadline:** Wed., 1 Feb. 2017, at 5 p.m. MST

GSA is proud to offer research grants to its highly qualified student members. The primary role of the GSA graduate student research grants program is to provide partial support of master’s and doctoral thesis research in the geological sciences for graduate students enrolled in universities in the United States, Canada, Mexico, and Central America. In 2016, US\$741,738 was awarded to 359 graduate students (699 students applied), with an average grant of US\$2,066.

GSA graduate student members may receive up to two GSA graduate student research grants during their academic career, regardless of the program they are enrolled in. The maximum award per grant is US\$2,500. Graduate students may also qualify for specialized awards and thereby receive more than US\$2,500 in funding.

Apply *online only* at [www.geosociety.org/gradgrants](http://www.geosociety.org/gradgrants). No paper applications or letters will be accepted.

Can’t find what you’re looking for on the website? Call +1-303-357-1025, or e-mail [awards@geosociety.org](mailto:awards@geosociety.org).

# CALL FOR NOMINATIONS

## GSA Fellowship

[www.geosociety.org/Fellowship](http://www.geosociety.org/Fellowship)

Nominate a deserving colleague with the honor of GSA Fellowship. GSA Fellows are among the best and the brightest geoscientists who have made significant contributions to our science. Members are nominated for Fellowship based on one or more of the following:

- Publications
- Applied research
- Training of geologists
- Administration
- Public awareness of geology
- Professional organizations service
- Editorial, bibliographic, library
- Other

For a list of current GSA Fellows, go to <http://rock.geosociety.org/membership/fellows.asp>.

### How to Nominate

**Deadline:** 1 Feb. 2017

The primary nominator must be a GSA Fellow, and should

1. Complete the online nomination form at [www.geosociety.org/GSA/About/Awards/NominateFellow.aspx](http://www.geosociety.org/GSA/About/Awards/NominateFellow.aspx);
2. Write a letter of support;
3. Collect two additional letters of support (one must be from a Fellow; both must be GSA members);
4. Obtain the nominee's CV; and
5. Submit all documents to [awards@geosociety.org](mailto:awards@geosociety.org).

Fellows may support up to two nominees; however, they may only serve as the primary nominator for one nominee.

**Questions?** Please email [awards@geosociety.org](mailto:awards@geosociety.org).

### ATTENTION GSA FELLOWS!

#### GSA Fellowship is an Honor and an Opportunity

GSA Fellows are an integral part of the GSA community. As a GSA Fellow, you are among the most accomplished and distinguished of geoscientists. We encourage you to continue to engage with the GSA community, help shape the Society, and inspire the next generation of geoscientists.

- Volunteer to serve on a GSA Committee or GSA Council—Help guide the Society;
- Mentor at a Section or Annual Meeting—Share your experience and career advice with students;
- Encourage your students to be involved in GSA by becoming a Campus Rep;
- Recognize an outstanding colleague—Nominate him or her for Fellowship, committee service, or an award;
- Advance your discipline—Be involved in your Division; and
- Get involved with GSA meetings—Chair a session or lead a field trip.

If you are interested in finding out more about these or any of GSA's volunteer opportunities, please contact Kory Potzler at [kpotzler@geosociety.org](mailto:kpotzler@geosociety.org).



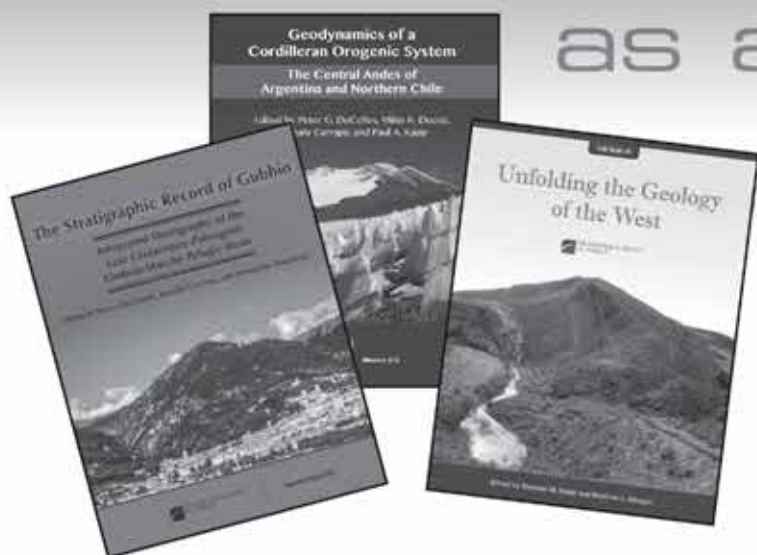
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**MEMOIRS** are likely to remain the authoritative reference on a subject for a number of years.

**FIELD GUIDES** feature field trips held primarily at GSA meetings. Well-illustrated papers include detailed road logs and maps.

.....  
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Include the table of contents, the background and significance of the proposed book, and the abstract.

▶ **PROPOSE AN EDITED VOLUME:**  
Include a list of chapter titles and authors with affiliations, the background and significance of the proposed volume, and any available chapter abstracts.

▶ **ADDITIONAL INFORMATION:**  
<http://tinyurl.com/GSA-book-guide>, or e-mail [books@geosociety.org](mailto:books@geosociety.org) with specific questions about your project.

▶ **GSA BOOKS SCIENCE EDITORS**  
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# Call for Nominations

## GSA DIVISION AWARDS

[www.geosociety.org/divisions](http://www.geosociety.org/divisions)

### ■ ARCHAEOLOGICAL GEOLOGY DIVISION

<http://rock.geosociety.org/arch/>

- **Rip Rapp Award:** Nominations due **15 February**; send materials to [mandel@ku.edu](mailto: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](mailto: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](mailto: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](http://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](mailto: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](http://community.geosociety.org/eegdivision/awards/about)

- **E.B. Burwell, Jr., Award:** Nominations due **1 February**; send materials to Dennis Staley at [dstaley@usgs.gov](mailto: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](mailto: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](http://community.geosociety.org/geophysicsdivision)

**George P. Woollard Award:** Nominations due **15 February**; send materials to Nick Schmerr, [nschmerr@umd.edu](mailto:nschmerr@umd.edu). Please provide the nominee’s name, contact information, and a short paragraph statement on the nominee’s qualifications, including a short summary of their specific work or outcomes and how these have contributed to geology. 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 George P. Woollard Technical Lecture by the recipient before the award ceremony.

### ■ GEOSCIENCE EDUCATION DIVISION

[community.geosociety.org/gedivision/news/awards/biggsaward](http://community.geosociety.org/gedivision/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](mailto: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](http://community.geosociety.org/histphildiv/awards)

- **Mary C. Rabbitt History and Philosophy of Geology Award:** Nominations due **15 February**; send materials to Kathleen Lohff, [kathylohff@msn.com](mailto: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](mailto: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](mailto: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](http://community.geosociety.org/hydrodivision)

Nominations for the following four awards are due **1 February**; send materials to [gsa.hydro.nominations@gmail.com](mailto:gsa.hydro.nominations@gmail.com). Questions should be directed to the appropriate committee chair ([community.geosociety.org/hydrodivision/aboutus/committees](http://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](http://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](http://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](http://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](http://community.geosociety.org/hydrodivision/birdsall/about2017).

## ■ LIMNOGEOLOGY DIVISION

### [community.geosociety.org/limnogeologydivision](http://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](mailto: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/mgpvdivision/awards](http://community.geosociety.org/mgpvdivision/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](mailto: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 groundbreaking 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/qggdivision/awards/awardsoverview](http://community.geosociety.org/qggdivision/awards/awardsoverview)

- **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 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/Sedimentarygeologydiv/awards/sloss](http://community.geosociety.org/Sedimentarygeologydiv/awards/sloss)  
**Laurence L. Sloss Award for Sedimentary Geology:**

Nominations due **1 March**; send materials to Linda Kah, [lckah@utk.edu](mailto: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

[community.geosociety.org/sedimentarygeologydiv/awards/laubach](http://community.geosociety.org/sedimentarygeologydiv/awards/laubach)

**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.

## ■ STRUCTURAL GEOLOGY AND TECTONICS DIVISION

<http://rock.geosociety.org/sgt/>

- **Career Contribution Award:** Nominations due **1 March**; for more information, go to <http://rock.geosociety.org/sgt/CareerAward.htm>. This award is for an individual who, throughout his or her career, has made numerous distinguished contributions that have clearly advanced the science of structural geology or tectonics. Nominees do not need to be U.S. citizens or residents, and GSA membership is not required. Nominations should include (1) name of nominee, present institutional affiliation and address; (2) summary statement of nominee's major career contributions to the science of structural geology and tectonics; (3) selected key published works of the nominee; and (4) name and address of nominator.
- **Outstanding Publication Award:** Nominations due **1 March**; for more information, go to <http://rock.geosociety.org/sgt/BestPaperAward.htm>. This award is given annually for a published work (paper, book, or map) of exceptional distinction that clearly advances the science of structural geology or tectonics. Nominations should include (1) a full citation; (2) nomination (as short as a paragraph; letters or reviews may also be included); and (3) name and address of nominator.

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## 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](http://www.geosociety.org/GSA/Pubs/mmlGuid.aspx) to learn how. Contact the GSA Foundation, [www.gsafweb.org](http://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  
Date of death: 21 Jun. 2016

### **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  
GSA notified 3 Oct. 2016

### **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](http://www.geosociety.org/rm-mtg)



Mount Allan—"The Claw" Three Sisters.

*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 Palaeontology, 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](http://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](mailto: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](mailto:eatond@ucalgary.ca); Jeff Freymueller, University of Alaska Fairbanks, [jfreymueller@alaska.edu](mailto: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](mailto:brian.pratt@usask.ca).

**T3. The Cambrian of Western Laurentia.** Principal organizer: Paul Johnston, Mount Royal University, [pajohnston@mtroyal.ca](mailto:pajohnston@mtroyal.ca).

**T4. Cretaceous Stratigraphy of the North American Foreland.** Principal organizer: TBD; contact Jenni Scott, Mount Royal University, [jescott@mtroyal.ca](mailto:jescott@mtroyal.ca).

**T5. Tertiary and Quaternary Landscapes.** Principle organizer: Robert Young, University of British Columbia, Okanagan Campus, [robert.young@ubc.ca](mailto:robert.young@ubc.ca).

**Energy and Carbon Capture in The Rocky Mountain Region**

**T6. Carbon Capture and Storage.** Principal organizer: Kirk Osadetz, CMC Research Institutes, Inc., [kirk.osadetz@cmcghg.com](mailto:kirk.osadetz@cmcghg.com).

**T7. Geothermal Systems in the Thrust Belt and Adjacent Areas.** Principal organizer: Steve Grasby, Natural Resources Canada, [steve.grasby@canada.ca](mailto:steve.grasby@canada.ca).

**T8. Characterization of Fine-Grained Unconventional Plays.** Principal organizer: TBD; contact Jenni Scott, Mount Royal University, [jescott@mtroyal.ca](mailto: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](mailto: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](mailto:glenn.dolpin@uncalgary.ca).

**Undergraduate Research**

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

## FIELD TRIPS

For additional information, please contact the Field Trip Chair, Jean Hsieh, [jhsieh@repsol.com](mailto: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](mailto: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](mailto: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](mailto: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](mailto: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](mailto: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, [pajohnston@mtroyal.ca](mailto:pajohnston@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@cmcgh.com](mailto:kirk.osadetz@cmcgh.com).

**Geology of the Waterton-Glacier National Parks Area.** Principal organizer: Brian Pratt, University of Saskatchewan, [brian.pratt@usask.ca](mailto:brian.pratt@usask.ca).

**Tertiary and Quaternary Landscapes of Alberta.** Principal organizer: Robert Young, University of British Columbia, Okanagan Campus, [robert.young@ubc.ca](mailto: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](mailto:jonnoad@hotmail.com).

**Canadian Rocky Mountain Fold and Thrust Belt for Geoscience Educators.** Principal organizers: Glenn Dolpin, University of Calgary, [glenn.dolpin@ucalgary.ca](mailto:glenn.dolpin@ucalgary.ca); Katherine Boggs, Mount Royal University, [kboggs@mtroyal.ca](mailto: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., [mradoski@repsol.com](mailto:mradoski@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](mailto: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](mailto:eatond@ucalgary.ca); Jeff Freymueller, University of Alaska–Fairbanks, [jfreymueller@alaska.edu](mailto: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](mailto:glenn.dolphin@ucalgary.ca).

**Virtual Geological Tours—3D Geological Modeling of Outcrops Utilizing Unmanned Aerial Vehicles.** Principal organizer: Rudy Strobl, Executive Director, EnerFox Enterprises.

## OPPORTUNITIES FOR STUDENTS AND EARLY CAREER PROFESSIONALS

### Mentor Programs

For more information, go to [www.geosociety.org/mentors](http://www.geosociety.org/mentors), or contact Jennifer Nocerino at [jnocerino@geosociety.org](mailto: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.

## GSA Calendar PHOTO SEARCH

We know that geoscientists have talent—  
*so give us your best shot!*

You may enter up to three (3) images in landscape orientation using these categories as a guide:

- **Iconic Landscapes**—Striking or notable geologic landscapes and features.
- **Abstract Images**—The patterns of geology at any scale, photomicrographs to satellite images.
- **Geologic Processes Past and Present**—Process or feature resulting from a specific process (e.g., an erupting volcano or volcanic rocks that represent ancient eruptions).

Winning photos will be featured in the 2018 GSA Calendar.

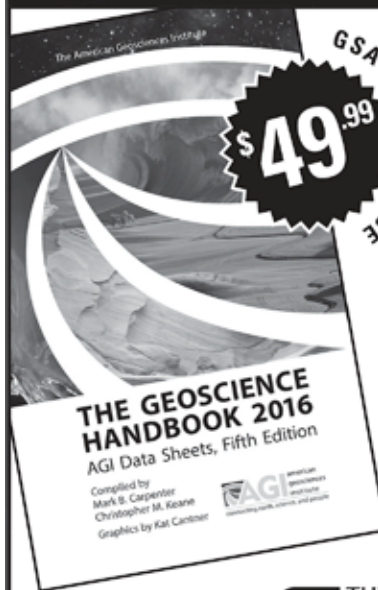


**Submission deadline: 15 March 2017**

Request complete entry rules and information from [editing@geosociety.org](mailto:editing@geosociety.org) or visit:

[www.geosociety.org/pubs/PhotoSearch.htm](http://www.geosociety.org/pubs/PhotoSearch.htm)

## Available through GSA



**GSA MEMBER PRICE**  
**\$49.99**

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*Edited and compiled by Mark B. Carpenter and Christopher M. Keane  
Graphics by Kat Cantne  
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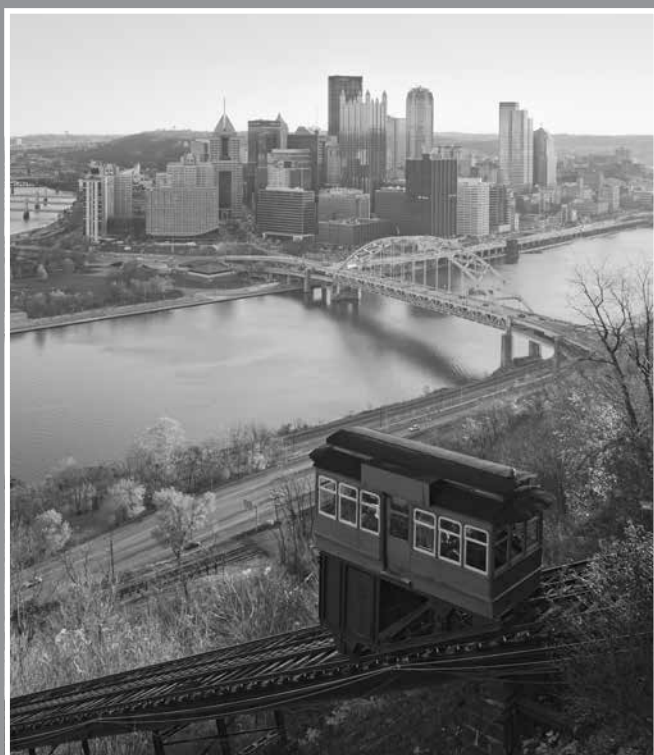
Final Announcement

Joint Meeting

# NORTHEASTERN and NORTH-CENTRAL SECTIONS

52nd Northeastern Section Annual Meeting  
51st North-Central Section Annual Meeting  
Pittsburgh, Pennsylvania, USA  
19–21 March 2017

[www.geosociety.org/ne-mtg](http://www.geosociety.org/ne-mtg)



Downtown Pittsburgh from Duquesne Incline.

## *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)

	Early		On-Site	
	Full	One-Day	Full	One-Day
Professional Member	\$195	\$150	\$235	\$180
Professional Member (70+)	\$100	\$80	\$130	\$100
Professional Non-member	\$230	\$180	\$275	\$195
Early Career Professional	\$135	\$100	\$168	\$125
Student Member	\$75	\$50	\$100	\$70
Student Non-member	\$100	\$60	\$120	\$80
K–12 Professional	\$65	\$50	\$85	\$60
Guest or Spouse	\$50	\$45	\$60	\$50
Field Trip/Workshop Only	\$40	n/a	\$40	n/a

### 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](mailto:jhannibal@cmnh.org), and Kyle Fredrick (NE), [fredrick@calu.edu](mailto:fredrick@calu.edu).

- 1. Abandoned Mine Drainage in the Pittsburgh Area: Occurrence and Passive Treatment.** Bob Hedin, Hedin Environmental, [info@hedinenv.com](mailto:info@hedinenv.com). When: 8 a.m., Sat., 18 March. Cost: US\$70; includes lunch. Min. 7; max. 20.
- 2. Induced Seismicity and Other Environmental Impacts of Shale Gas Development in Northeast Ohio.** Raymond Beiersdorfer, Youngstown State Univ., [rebeiersdorfer@ysu.edu](mailto: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.
- 3. New Insights and Lessons Learned from the Johnstown (Pennsylvania) Flood of 1889.** *Cosponsored by the GSA Environmental & Engineering Division.* Carrie Davis Todd, Baldwin-Wallace Univ., [cdavisto@bw.edu](mailto:cdavisto@bw.edu); Steve Lindberg, Univ. of Pittsburgh–Johnstown. When: 8 a.m., Sat., 18 March. Cost: US\$90. Min. 12; max. 23.
- 4. Pleistocene Features of the Laurel Highlands and Upper Youghiogheny Basin.** Rebecca Kavage Adams, Maryland Geological Survey, [rebecca.adams@maryland.gov](mailto:rebecca.adams@maryland.gov); David K. Brezinski, Maryland Geological Survey. When: 8 a.m., Sat., 18 March. Cost: US\$80. Min. 7, max. 15.
- 5. The Old, the Crude, and the Muddy: Oil History in Western Pennsylvania.** Kristin M. Carter, Pennsylvania Geological Survey, [krcarter@pa.gov](mailto:krcarter@pa.gov); Kathy J. Flaherty. When: 8 a.m., Sat., 18 March. Cost: US\$98. Min. 25; max. 50.
- 6. From Fort Pitt to Coal Hill: Geological, Archaeological, and Historical Aspects of Downtown Pittsburgh and Mount Washington.** Joe Hannibal, Cleveland Museum of Natural History, [jhannibal@cmnh.org](mailto:jhannibal@cmnh.org); Albert Kollar, Carnegie Museum of Natural History. When: 1–5:30 p.m., Mon., 20 March. Cost: US\$28. Min. 5; max. 25.

## 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](mailto: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](mailto:dan@billmangeologic.com).
3. **Ground Penetrating Radar for the Earth Sciences.** Principal organizer: Harry M. Jol, Univ. of Wisconsin, [jolhm@uwec.edu](mailto:jolhm@uwec.edu).
4. **An Introduction to QGIS and Geoscience Applications.** Principal organizer: John G. Van Hoesen, Green Mountain College, [vanhoesenj@greenmtn.edu](mailto:vanhoesenj@greenmtn.edu).

## OPPORTUNITIES FOR STUDENTS, EARLY CAREER PROFESSIONALS, AND TEACHERS

### Mentor Programs

For more information, go to [www.geosociety.org/mentors](http://www.geosociety.org/mentors) or contact Jennifer Nocerino at [jnocerino@geosociety.org](mailto: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.

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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](http://www.geosociety.org/documents/gsa/section/ne/2017/17NE-UrbanGrant.pdf). Questions? Contact Tahlia Bear ([tbear@geosociety.org](mailto: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](mailto:jwarnock@iup.edu), or Donald Stierman (NC), [donald.stierman@utoledo.edu](mailto: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@sru.edu](mailto:patrick.burkhart@sru.edu)

**North-Central Section:** Timothy Fisher, [timothy.fisher@utoledo.edu](mailto:timothy.fisher@utoledo.edu)

## Technical Sessions Chairs

**Northeastern Section:** Richard Becker, [richard.becker@utoledo.edu](mailto:richard.becker@utoledo.edu)

**North-Central Section:** Wendell Barner, [wendell.barner@gmail.com](mailto:wendell.barner@gmail.com)

# Education & Outreach Programs at the 2017 Section Meetings

## GEOCAREERS

### Geoscience Career Workshops

For more information, contact Jennifer Nocerino at [jnocerino@geosociety.org](mailto: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](mailto: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](mailto: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

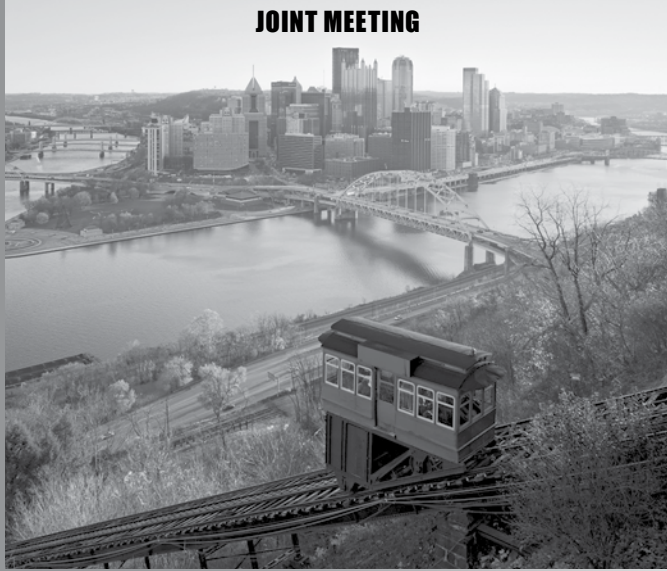
Do you work full-time or care for dependents while attending school? You may be eligible for a travel award to attend the NE/NC Joint Section Meeting. Check the website for eligibility guidelines and application: [www.geosociety.org/documents/gsa/section/ne/2017/17NE-UrbanGrant.pdf](http://www.geosociety.org/documents/gsa/section/ne/2017/17NE-UrbanGrant.pdf).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



# 2017 GSA Section Meetings



Aerial overview of the Canyon Lake spillway of south-central Texas. Photo by Larry Walther.



## JOINT MEETING

Downtown Pittsburgh from Duquesne Incline.



Midlothian Mines. Photo used with permission from Richmond Region Tourism.



Used with permission from Hawai'i Tourism Authority. Photo by Tor Johnson.



Dinosaur Provincial Park. Photo by Jenni Scott.

## South-Central Section

Location: San Antonio, Texas, USA

Dates: 13–14 March

Meeting Chair: Benjamin Surples, [bsurples@trinity.edu](mailto:bsurples@trinity.edu)

[www.geosociety.org/sc-mtg](http://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@sru.edu](mailto:patrick.burkhart@sru.edu)

[www.geosociety.org/ne-mtg](http://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](mailto:timothy.fisher@utoledo.edu)

[www.geosociety.org/nc-mtg](http://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](mailto:david.spears@dmme.virginia.gov); Karen Layou, [klayou@reynolds.edu](mailto:klayou@reynolds.edu)

[www.geosociety.org/se-mtg](http://www.geosociety.org/se-mtg)

## Cordilleran Section

Location: Honolulu, Hawaii, USA

Dates: 23–25 May

Meeting Chair: Craig R. Glenn, [glenn@soest.hawaii.edu](mailto:glenn@soest.hawaii.edu)

[www.geosociety.org/cd-mtg](http://www.geosociety.org/cd-mtg)

## Rocky Mountain Section

Location: Calgary, Alberta, Canada

Dates: 9–10 June

Meeting Chair: Katherine Boggs, [kboggs@mtroyal.ca](mailto:kboggs@mtroyal.ca)

[www.geosociety.org/rm-mtg](http://www.geosociety.org/rm-mtg)

[www.geosociety.org/sections](http://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 Baldrige  
Tamal Barma  
Gregory J. Bell  
Steven Robin Bell  
Michael J. Bickle  
Jacob Birkett  
James F. Bowring  
Doug M. Boyer  
Christabel Jayne Brand  
Nigel Willmott Brand  
Nan Broadbent  
Barbara C. Bruno  
Steven A. Buffone  
Rich Busch  
John H. Bush  
Patrick Byrne  
Jessica Carilli  
Luis Antonio Castillo  
David Catling  
Amel Chakroun EP Khodjet  
Elkhil  
Hazel Joan Chapman  
James Chappell  
Duane D. Chase

Yanjie 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  
Wei Fu  
Eddy Zulkarnaini Gaffar Sr.  
Lisa S. Gardiner  
Lindsey E. Geary  
Ray Gedaly  
Phil Gensler  
Giresh Ghooray  
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 I. 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

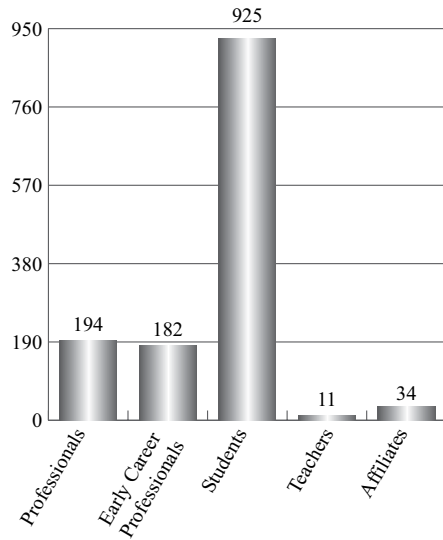
## Top 3 Reasons Geoscientists Become GSA Members

- GSA Meetings
- Career Development
- GSA Publications

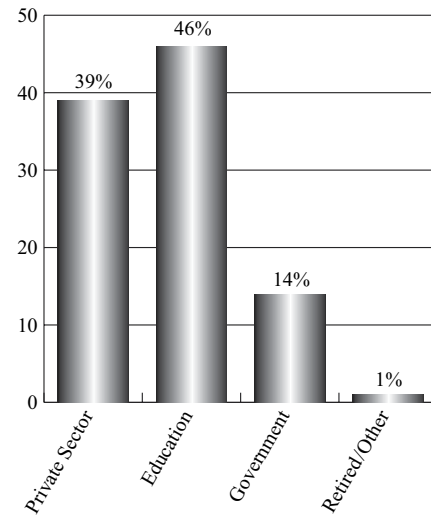


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## Total New Members: 1,346



## New Professional Members by Employment Type



Gerry Simila  
 Judith E. Skog  
 Quinn Eric Smith  
 William Travis Smith Jr.  
 Clayton Steven Sorensen  
 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  
 Julieta 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 Viète  
 Hari Selvi Viswanathan  
 Donna Vorhees  
 Zhifeng Wan  
 Dixie Lee West  
 Brian G. White  
 Zackary Williams  
 Kenneth Wolgemuth  
 Nancy J. Wolverson  
 Marissa A. Wright

Chun-Ming Wu  
 Yigang Xu  
 Elowyn Yager  
 John Albert Yellich  
 Sergey V. Yudintsev  
 Ji'en Zhang  
 Shihong Zhang  
 Karen Ziegler

### EARLY CAREER PROFESSIONALS

Stephen Daniel Alexander  
 Kate Allstadt  
 Eric Andrew Alt  
 Julian Alwakeel  
 Hannah K. Andrascik  
 Ogechukwu Flora Anusiobi  
 Gregor Austermann  
 Simona Avnaim-Katav  
 Albert Babarsky  
 Armel Marie Justin Bationo Jr.  
 Alexander Bear  
 Sarah L. Bergund  
 Jubril A. Blaize  
 Keegan Bohn  
 Munir El-Mahdy Bokhary  
 Adrian J. Bouknight  
 Nathan Van Orden Bradley  
 Cynthia Anne Brezina  
 Aodhán Dermot Butler  
 David J. Button  
 Hui Cao  
 Gareth Chalmers  
 Benjamin Chambers  
 Belle Cheng  
 Gleb Chupakhin

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 Espericueta  
 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 Grunloh  
 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  
 Allison 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 Kilmury  
 Daniel L. Knapp  
 Andrew Koff  
 Simon Kuebler  
 Ashok Kumar  
 Rachel Mollie Lauer  
 Amanda Lawter  
 Berit Lehrmann  
 Samantha Marie Lesniewski  
 Yaofa Li  
 Matthew Lillico  
 Karla S. Lomeli  
 Ian Lynch  
 Vykuntam Madhukar Chowdary  
 Adam Makhluif  
 Lori Manoukian  
 Ishmael Mansaray  
 Seth E. Martin  
 Mohamed Mastere  
 Amy E. Matheny

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 Chukwunwike Ogbogu  
 Valentine Kanayo Okongwu  
 Abayomi Adesola Olajo  
 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 Rendall  
 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  
 Rachael 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. Sympon  
 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. Seamans  
 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



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Emily J. Marshall  
 Hannah Mathy  
 Allison Nelson  
 Madeline Nyblade  
 Hayden L. Owens  
 Hunter Carey Quintal  
 Debattam Sarker  
 William Schroer  
 John Franklin Taylor  
 Larry Taylor  
 Yinghao Xiang

### Climatology/Meteorology

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

### Economic Geology

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

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

### Energy Geology

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

Laura Kunas  
Brendan Timothy Larrow  
Hunter Lawhon  
Devon Leach  
Tyler Nathan Leggett  
Hunter Lipman  
Shuhua Liu  
Yang Liu  
Marybella Martinez  
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  
Ningning Xu  
Qiao Zhang

### **Engineering Geology**

Diletta Acciaro  
Luis Vladimir Amorin Jr.  
Tyler Annis  
Malik Arsalan  
Katie Brower  
Katherine Jean Davis  
Scott Donnell  
Danielle Marie Doorn  
Robert L. Duran  
Arthur Charles Evensen  
Emilio Grande  
Alex Grant  
Daniel John Harris  
Alexa B. Harrison  
Samantha Hartke  
James Luke Jenkins  
Ian A. Johnson

Danielle Leblanc  
Austin Conrad Madsen  
Jason James Marvin  
Krystin Nicole Metzger  
Marion Nicco  
Nicholas John Palfey  
Jansen Pilkington  
Kalyleigh Rodgers  
Tyler Rohan  
Kirby Roucher  
Bonnie Colleen Sams  
Auden 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 Clinard  
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 Grobowsky  
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  
Ashton Dawn Jones  
Megan Kastelen  
Christopher Kevin Kelley  
Leilani J. Konyshv  
Sharra Blair Kucera  
Nicholas Lagamba  
Franziska Landes  
Lainey Marie Le Blanc  
Myrna Mariel Leal  
Crystal Noemi Lucatero  
Abniel Machin  
Jared Major  
Lauren R. Mcmanus  
Neha Mehta  
Anthony Patrick Michna  
Bobbi Minard  
Amber Rose Molina  
Samantha Moore  
Shelley Jean Morton  
Andre Tyler Munoz  
Shane Neumann  
Drew Norton  
Sean M. O'Bryant  
Nkem Chukwukem Omede  
Meaghan O'Neill  
Sharron Osterman  
Francesca Peay  
Molly Peek  
Terra Perez  
Madeline Marie Peters  
Molly Pluenneke  
Ashley Brooke Ramsey  
Simon William Regenold  
Lea L. Richter  
Jonathan Schneider  
Jessica Schottanes  
Amanda Renee Schreiber  
Allison Elena Shafer  
Brock Wyatt Smith  
Devin F. Smith  
Sarah Sokol  
Jeniffer Soto Perez  
Andrew Earl Supplee  
Cody Gene Tolman  
Allegra M. Torres

Christina Jo Tremel  
Gulcin Unal Tosun  
Thomas Spenser Utter  
Gates Walker  
Bartly Roe Webster  
Hallie Widner  
Stephania Zneimer

### **Geography**

H. Samuel Bingay IV  
Paepin Goff  
Dexter Charles Kopas  
Manuel Lopez  
Madeleine O'Brien  
Jesse Olson  
Prasamsa Thapa  
Timmy Wick

### **Geoinformatics**

Saeed Arab  
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

Min Chen  
Jessi Clark  
Lorenzo Colli  
Kelly R. Devlin  
Shrijita Basu Dhar  
Michael Eugene Dudley  
Izz Fauzi  
Ryan O. Gates  
Vaughan Gilmore  
Dulcie Aileen Head  
Ashley R. How  
Caitlan N. Howard  
Jingqiu Huang  
Amber Skye Johnson  
Joshua Robert Jones  
Bakary Kone  
Alec C. Lockett  
Michael A. Maldonado  
Daniel Chinecherem Okpom  
Michael Onazi  
Arienne Pancratz  
Michelle Alexandra Pedrazas  
David Joseph Peterman  
Amy Rianne Pritt  
Bilal H. Qarni  
Erik Rheams  
Sofwa Sabarudin  
Kristen Sides  
Nicholas Hunter Smart  
Rachel Trimble  
Vivian Wallace  
Rosalynn Wang  
Bing Xia  
Anthony Daniel Zamperoni  
Quan Zhou

### **Geoscience Education**

Temitope Adetona  
Angela Nichole Aranda  
Desirée Bayouth  
Elizabeth Helen Cappuccio  
Sara Elshafie  
Mason James Frauhiger  
Jesse Gates  
Joseph Anthony Gutierrez  
Lille Haecker  
Yen Wei Law  
Rebecca Lenz  
Dominic J. Mugavero  
Christina Rose Radford  
Thomas J. Ruberto  
Nathaniel Jade Soriano  
Andrew Richard Sparks  
Grace Louise Stone  
Douglas Stuart

Leah Marie Wiitablake  
Jesus Angel Zapata

### **Geothermal**

Jordan Curtis Anderson  
Abigail Christine Choisser  
Rowan M. Kowalsky  
Gerardo Huerta Luna

### **History and Philosophy of Geology**

Danny Guerra

### **Hydrogeology/Hydrology**

Mary Margaret Allen  
David Michael Anderson  
Jordan Paul Beamer  
Natasha Biarrieta  
Kelsey Bicknell  
Benjamin R. Bliss  
Christopher Michael Boujoukos  
Collin Breheny  
Benjamin G. Bruening  
Christine Marie Capstick  
Chanja Ayanna Cassini de Thury  
Emma L. Collins  
Emily Ann Deebe  
Martin Duda  
Micheale Lafonda Easley  
Morgan Elizabeth Ekmark  
Kristina Falo  
Madison S. Fink  
Neil Flahive  
Mary Gerlach  
Bryan Giberson  
Emily Grace Gillispie  
Dustin Wayne Green  
Katie M. Gurnicz  
Grace Jaqueline Guryan  
Sade C. Haake  
Ryan Ellis Harmon  
Michael Rovert Hedgpeth  
Alice Hill  
Fadhil Kassim Jabbar  
Samuel Noa Jacobson  
Elaiya Journey  
Elizabeth Grace Karson  
Nicole M. Kelley  
Andrew R. Kita  
Wendy Klein  
Claire E. Laetz  
Yuchen Liu  
Bin Ma

Anna-Turi Maher  
Jessica L. McKay  
Zachary Perckett Meyers  
David Miklesh  
Jordyn Beth Miller  
Carlos Montejo  
Gary De Witt Moore  
Lisa Mowery  
Christine Nims  
Morgan R. Okeson  
Joshua Craig Olson  
John Philip Ortiz  
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  
James E. Proctor  
Matthew Rhoads  
Edna Rodriguez  
Andrew Ross  
Sam Wilkins Scheffler  
Jacob Schenk  
Samuel Thomas Schoenmann  
Hayley E. Schram  
Ryan Patrick Schroering  
Amanda Schulz  
Eli Louis Schwat  
Lisa Siceloff  
Helen Siegel  
Everett Smith  
Melinda Smith  
Spencer Smith  
David Collin Springe  
Nicholas C. Stamper  
Mustafa Tageldin  
Arati A. Umarvadia  
Allison Marie Vo  
Shane Von Krosigk  
Jia J. Wang  
Sara Warix  
Larissa Watkins  
Abigail Joanna Wesley  
Martin Christopher Wood  
Beiyi Xu  
Holly Young

### **Karst**

Stacy Wayne Antle  
Bill Femmer  
James Graham

Morgan Bridget Jones  
Julia Nissen  
Bradley David Norman  
Julia Samson  
Hannah L. Schlaerth  
Lijun Tian

### **Limnogeology**

Patricia Carocchia  
Kaci Fitzgibbon

### **Mineralogy, Geochemistry, Petrology, and Volcanology**

Tessa Aby  
Francisco Emmanuel Apen  
Kristy Applebaum  
Russell Ashton  
Megan Taylor Askew  
Robin Austin  
Tomoyo Austin  
Sierra M. Baker  
Meenakshi Banerjee  
Sudip Bauri  
Brett A. Belden  
Aaron Scott Beltzer  
Joseph Biasi  
Gregory Blachly  
Heather Boykin  
Thallapalli Brahmaiah  
Leslie Bruce  
Summer Caton  
Gian Paulo Cella  
Alyssa Marie Chase  
Eduardo Chavez  
June Cho  
Kristen Clevidence  
Molly A. Coates  
Joshua Elliot Copage  
Daniel Alan Coulthard Jr.  
Tom Cummings  
Emilee A. Darling  
Eric Andrew Deck  
Adele Del Avellano  
Robert Demchuk  
Megan Jane Dolan  
Johanna Duarte  
Holly Marie Duff  
Charles Duval  
Viktor Erlandsson  
Shoshauna Farnsworth-  
Pinkerton  
Brett Flessner  
Joshua Fox  
Anthony T. Gallagher

Stephanie Gardiner  
Garrett Goff  
Andrea Elizabeth Goltz  
Nathan Arrow Graham  
Benjamin Scott Grove  
Maimuna Halilu  
Vincent Peyton Hall  
Jihua Hao  
Spencer Douglas Harmon  
Rachel Heineman  
Autumn Lynne Helfrich  
Lauren Allistance Herbert  
Zachary John Huseth  
Abigail Elaine Jenkins  
Stephanie Junior  
Tyler James Kane  
Caroline Rose Kellner  
Daniel Kelly  
Nicole Mae Kinash  
Natali Ann Kragh  
Lucia Krivankova-Smal  
Allison Irene Kubo  
Corinne Kuebler  
Mariah Lyn Kuhr  
Michael Franklin Lannom  
Jennifer Laughlin  
Travis Lewis Leach  
Yuyu Li  
Adrienne Lopez  
Kirstin Lortie  
Derek M. Love  
Christopher James Lyche  
Matthew Stephen Marcarelli  
David Martin  
Keith M. Martin  
Andrew Martzolf  
Allison M. Mastenbrook  
Francisco Mata  
Jessie McCraw  
Katelyn Miles  
Yoko Miyakawa  
Monika Vanessa Moreu  
Aaron Morrison  
Jennifer Nelson  
Bertram Carl Nicke III  
Sean Christopher O'Callaghan  
Brandie Oehring  
Yoli N. Ornelas  
Jorge Padro-Burton  
Alida Perez Fodich  
Liz Peters  
Holly Danielle Pettus  
Nicole Phelan  
Judy Pin Pu  
Molly Ray  
Elizabeth Ashley Reffett

Andre Anthony Reid  
Kristine E. Reilly  
Josiah Reisinger  
Christopher Michael Rogers  
Kayleigh Rogers  
Alex Sains  
Alexis Sansing  
Scott Savko  
Matthew Schiffert  
Madeline Ellen Faith Shaffer  
Daniel Sheikh  
Trent Michael Sherman  
John T. Shukle  
Brandon Michael Smith  
Veronica Carmen Smith  
Kassandra Sofonio  
Einari Suikkanen  
Elizabeth Clare Teeter  
Anna C. Thompson  
Stephen Anthony Tombs  
Larry Fisher Tuttle II  
Chima Finnian Ukaomah  
Scott Ryan Waggner  
John Waida  
Amber Walker  
Chloe Wallace  
Tristan White  
Wyatt W. Wiening  
Lydia Rose Williams  
Mary E. Winsor  
Zachary L. Wolpe  
Robert Seth Wood  
Rui Yang

#### **Oceanography/Marine Geology**

Masoud Asgharianrostami  
Katie R. Diaz  
Sierra Nicole Dillaman  
Aubrey Dunshee  
Raelyn Pisco Eckert  
Michelle Fauber  
Megan Maria Freiberger  
Christian Gfatter  
Clayton Gullett  
Krystina M. Lincoln  
Miguel Wilson Loubriel  
Isabella Valentina MacIsaac  
Michael R. Mathioudakis II  
Rita Kathleen McCreesh  
Brandon Alan Mckittrick  
Jacob William Pratt  
Heather Riikonen  
Maria D. Rodriguez  
Amanda Schulte

Pulkit Singh  
Guy Beckley Stearns III  
Sean Thatcher  
Noah van Hartesveldt  
Genevieve N. Whitman  
Rachel Elizabeth Willis

#### **Paleo Sciences**

Shamim Ahmad  
Trine Arp  
Alec Baines  
Andres Baresch  
Kelsey Archer Barnhill  
Jacob S. Berv  
Raquel Marisol Bryant  
Hannah Carroll  
Debarati Chattopadhyay  
Courtney Chin  
Melissa L. Chipman  
Jason J. Coenen  
Ian T. Culver  
Mason P. Culver  
Julie De Weirtd  
Michael D. Deak  
Aynalem Zenebe Degefa  
Travis Lee Durham  
Saurav Dutta  
Emily Marie Ebaugh  
Amanda Faccioli  
Luke Fairchild  
Aj Ferrara  
Daniel J. Field  
Caleb Flum  
Calum Peter Fox  
Nicholas Freymueller  
Amanda Garcia  
Michael Gigliotti  
Robert Benjamin Gillham  
Selina Groh  
Riley J. Hacker  
Gordon Marsh Haight III  
Gabriel Shai Jacobs  
Jessica Marie Kastigar  
Ezekiel James King Phillips  
Bryce E. Koester  
Danika Lawson  
Katherine L. Long  
Aisha Malik  
Daniel Richard Markbreiter  
Ariana Miranda  
Benjamin Bauer Muddiman  
Sharmistha Paul  
Cody Reich  
Natalie S. Robinson  
Ben William Rodwell

John Joseph Rowan Jr.  
James Gabriel Saulsbury  
Jack Oliver Shaw  
C. Lance Stewart  
Travis N. Stone  
Ian-Michael Taylor-Benjamin  
Michael Tenteromano  
Daniel Joseph Traub  
Joseph Walter Vallo  
David Yarialian  
Joshua Ben Zimmt

#### **Planetary/Space Science**

Lavontria M. Aaron  
Max B. Barnett  
Derek A. Berman  
Ryan Boyd  
Michael Bramble  
Dane Erik Coats  
Ronald Terik Daly  
Matthew Robert Dobson  
Phylindia Gant  
Angela Garcia  
Gregory John Gosselin  
Janelle Anna Florence Heitmeier  
Cassandra K. Hennings  
Josie Ellen Horowitz  
Kynan Hughson  
Ikenna Victor Igboanugwo  
Mark Wave Johansson  
Billette J. Johnson  
Jordan D. Kendall  
Dara Lynn Laczniak  
Tyler Jordan Lorenzi  
James Michael Mahan  
Marie Julia McBride  
Christopher Lee McCoy  
Allison McGraw  
Kyle James Mohr  
Joshua Murphy  
Timothy Nagle-McNaughton  
Robert Vance Palumbo  
Jonathan William Pruiett  
Sharon Rau  
Bethany Reid  
Victoria Roseborough  
Aaron Townes Russell  
Chelsy R. Salas  
Cody Robert Schmidt  
Alexander Michael Sessa  
Katherine Shirley  
Matthew C. Sorensen  
Ami Ward  
Newrence Wills  
Hannah Shea Wirth

## **Policy/Regulatory**

Spencer Royal Conners  
Shane Cole Digan  
Carl-Lars Pedersen Engen  
Keylin Huddleston  
Katie Ann Scott

## **Quaternary Geology/ Geomorphology**

Oliver Abbitt  
Maliha Noshin Ahmed  
Jane Lund Andersen  
Todd Blythe  
Rachael A. Bradley  
Kevin Brock  
Dakota Scott Csanda  
Clarke Robert Delisle  
Helen Eifert  
Victoria Teresa Fitzgerald  
Matthew Gerrek  
Saeideh Gharehchahi  
Gavin Guild  
Nathan V. Gunnell  
Ross Ingram Harrison  
Ruth C. Heindel  
Jingtao Lai  
Jacob Davis Lehner  
Caitlin Connor McGinn  
Tucker Wallace Meredith  
Maraina Louise Miles  
Scott Hunter Miller  
Evan J. Miranda  
Jeff Mitchell  
Brian Joseph Moretti  
Alison Musselman  
Keir A. Nichols  
Kat O'Connor  
William Lee Otto  
Clayton Charles Roehner  
Alexandra Sakoulas  
Bailey Scott  
Natalie Selwood  
Peter Tereszkiewicz  
Amy Renee Towell  
Til Tullis  
Taylor Andrew Weathers  
Xinyi Zeng

## **Seismology**

Taylor Borgfeldt  
Misty Bowen  
Nicole Danielle McMahon  
Camille O'Connor

## **Soil Science**

Gillian C. Gundersen  
Amanda Kerr  
Lauren Ashley Landreneau  
Kali M. Melby  
Andrew Reid  
Ashley H. Schaus  
Christopher Shepard  
Madelyn Jewell Williams

## **Stratigraphy/Sedimentology**

Shaliza Marissa Ali  
Jessica Appledorn  
Shiva-Nandan Arens  
Yang Bai  
Tanyel Baykut  
Luc Chabanole  
Steve Claar  
Victoria Elena Corredor  
Colin J. Davis  
Tenea Rose Dillman  
Stefanie Elizabeth Dodge  
Som Dutta  
Kenedy Edward  
Stephanie Nicole Elmore  
Vanessa Engelke  
Lucy Evans  
Vanessa Gabel  
John William Geiger  
Karena Kimberly Gill  
Lucas Clark Gosney  
Marcel Hanisch  
Elizabeth Alexander Haralson  
Benjamin Robert Hines  
Arif Hussain  
Evelyn Kathleen Hussey  
Andrei Ichazo  
Brent A. Jackson  
Mary Langworthy  
Zhexuan Li  
Haoran Liu  
Georgina Lukoczki  
Lorin Macklin  
Alex McLillip  
Kamal Messamri  
Deborah Caridad Morales  
Selena Neale  
Jonathan Reid Noles  
Frederick Kelechi Onu  
Adam R. Parker  
Mariah Peters  
Mikaela Pulsipher  
Hannah Richardson  
Bethany Grace Rysak  
Mayra I. Santiago

Maxwell Saylor  
Alex Sedlak  
Oluwaseun Soaga  
Gabriela Antoinette Enriquez St.  
Pierre  
Thomas Richard Valachovics  
Marili Vincent-Couture  
Wei Wang  
Atif Waqas  
Jessica Lynn Welch  
Sarah Wörndle-Quoëx  
Qinghai Xu  
Shuai Zhang  
Xu Zhang

## **Structural Geology/ Tectonics**

Luis E. Aguirre Palafox  
Carmen Atkins  
Allison Berry  
Niladri Bhattacharjee  
Rebecca Butcher  
Melanie Bergmann Callihan  
Julia Irene Corradino  
Kelsey T. Crane  
Kylie G. Cush  
Michael Delucia  
Kristen Dennis  
Reagen Dandridge Desilets  
Mason Dossey  
Christopher Frank  
Derya Guerer  
Ivan David Gutierrez  
Carter Hafif  
Kayla Renea Hillis  
Fredrik Hilmersson  
Hunter Hinckley  
Naomi Jahan  
Jeffrey C. Jennings  
Michael Seth Jensen  
Forest Kan  
Michael Kassela  
Eric W. Ketzler II  
Chad Joseph Kwiatkowski  
Parker Leglue  
Miranda Lehman  
Gabriela Salomão Martins  
Andrea Mazon Carro  
Juan N. Medina III  
Nicole M. Page  
Samuele Papeschi  
Chirantan Parui  
Rain Savannah Patrick  
Jose Eduardo Pulido Mancera  
Samantha Ramirez

Tyler Edward Ricketts  
Patrick Jay Roche  
James E. Rutkofske  
Felipe Souza e Almeida Saliba  
Hikaru Sawada  
Vladimir Shipilin  
Hamid Soleymani  
Ryan Kevin Stoner  
Michael James Stumpf  
Norito Takesue  
Corinne Tanner  
Prithvi Thakur  
Cody A. Unferdorfer  
Jacob Jaap Verbaas  
Eric Wang  
Shannon Wang  
Ali Marie Wiemer  
Muhammad Yaseen Jr.  
Daniel Joseph Young  
Tianran Zhang

## **Other Professional Interests**

Hannah Anderson  
Josephine Li Arcuri  
Tania Babu  
Adam Berg  
Lin Boynton  
Antonio Ivan Conde  
Kaelie Marlene Contreras  
Sam Gordon DeYoung  
Melisa Diaz  
Camera Alexandra Ford  
Matthew Michael Gallagher Jr.  
Esayas Gebremichael  
Eduardo Luis Gonzalez Lugo  
William Joseph Graves  
Elizabeth Higgins  
Diana Krupnik  
Sarah Lizarraga  
Andreana Madera  
Monica Martinez  
Ali Mirza  
Faith Marie Moore  
Mark Murray IV  
Lori Nabors  
Joseph Nolan  
Pureunsol Oh  
Annabelle Q. O'Neill  
Kathlyn Ortega  
Ashley Ostraff  
Dinesh Panday  
Kezang E. Phuntsho  
Kaylee Richards  
Angelica Rodriguez  
Jason Ronza



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

Waseem Khan  
 Benjamin Knapp  
 Kenneth M. Martin  
 Catherine Lynn Morris  
 Allison Steckler  
 Jennifer L. Thompson

James Raymond Eldridge  
 Lia Farrell  
 Nathaniel Fisher  
 Hazel Joan Gordon  
 Eric Hodder  
 Maria Iredale  
 Karen Isakson  
 Garlin Jones  
 Joseph E. Lane  
 Sartaj Hussain Madni  
 Francisco Madrigal  
 Brittany Leigh Malinowski  
 Michael McCleary  
 Joseph H. McKenney  
 James Meek

David W. Melanson  
 Steven M. Miller  
 David Paul Muth  
 Gabriel Sean Powell  
 Gaoshun Qiu  
 Graeme Sharrock  
 Cameron Michael Smith  
 Aaron Dawson Spurling  
 Barbara Beatrice Steinberg  
 Mengzhou Wang  
 Chaohu Wei  
 Shihu Wei  
 Colonel Vaughn Wilson

**K-12 TEACHERS**

Stacy Butler  
 Harold Douglas Hanks  
 Valerie G. Hoyos  
 Elizabeth Adele Outdoor Hunter  
 Kevin Kapanka

**AFFILIATES**


Trevor Ager  
 Dagmar Beck  
 Theresa Boersma  
 David Francisco Bustos Sr.  
 David Andrew Collins  
 Haley Curie Domer



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# GEOLOGY

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**GSA GeoCorps™ America Program**

Temporary, short-term geoscience opportunities  
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GeoCorps will provide dozens of exciting geoscience  
 opportunities on federal public lands. Project areas include  
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**National Park Service Geoscientists-in-the-Parks  
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 professionals (18–35 years old) in National Park Service  
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 America, and Environmental Stewards.

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National Park Service Environmental Stewards THE GEOLOGICAL SOCIETY OF AMERICA®

## Help Shape the Future of Geoscience Serve on a GSA Committee

**Deadline:** 15 June 2017

**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](http://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](mailto: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.

#### **JOINT TECHNICAL PROGRAM COMMITTEE**

**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.

#### **MEMBERSHIP AND FELLOWSHIP COMMITTEE**

**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/T)**

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)

**One vacancy (3-year term 1 Jan. 2018–1 Jan. 2021) (B/E):**

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)

**One vacancy (3-year term 1 Jan. 2018–1 Jan. 2021) (E/M):**

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.

# 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

(July 2017–June 2018) /

(July 2018–June 2019)

**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.

# SCIENCE EDITOR

## OPENINGS FOR 2018

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](mailto: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**.

*GSA Today* ▶ 1 position

*GSA Bulletin* ▶ 1 position

*Geosphere* ▶ 1 position

*Geology* ▶ 1 position

### 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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Judson Finley, Secretary-Treasurer  
Katherine A. Adelsberger, Past Chair

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TBD, Secretary  
TBD, Treasurer  
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TBD, Second Vice-Chair  
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Michael S. Smith, First Vice-Chair  
TBD, Second Vice-Chair  
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## **HYDROGEOLOGY DIVISION**

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Stephen J. Van der Hoven, First Vice-Chair  
William (Bill) L. Cunningham, Second Vice-Chair  
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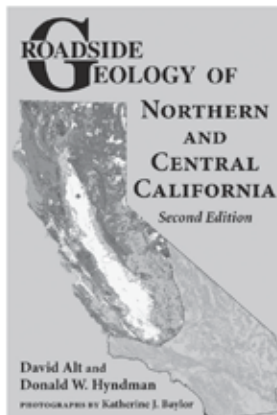
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Geology in the Public Interest (GPI), a 501c3 non-profit in the Seattle area, announces a search to fill a vacancy on its Board of Directors. This is an unpaid volunteer position that requires knowledge of geoscience and a desire to fulfill the mission 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](mailto: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 Appala-

chian 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 2300 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](http://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 Geological Sciences in the Jackson School 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 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 <http://apply.interfolio.com/39559>. For questions related to the search, please contact [dgs@jsg.utexas.edu](mailto: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](mailto:dgs@jsg.utexas.edu). Review of applications will begin January 6, 2017, and continue until the position is filled.

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### UNCONVENTIONAL RESOURCE PROFESSOR OF PRACTICE POSITION BERG-HUGHES CENTER AND DEPARTMENT OF GEOLOGY AND GEOPHYSICS TEXAS A&M UNIVERSITY

The Berg-Hughes Center (BHC) for Sedimentary 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



Geology and Geophysics. The principal responsibility of this position is to spearhead the collaborative Unconventional Resources research and teaching programs in the recently established BHC-Crisman Institute joint industry program. This responsibility includes leading in the development of a robust externally funded research program in Unconventional Resources that includes research collaboration with researchers in the petroleum industry; teaching integrative courses that introduce advanced concepts and technologies needed for understanding the geohistory of sedimentary basins and the origin and location of unconventional and conventional petroleum resources inherent to sedimentary basins, and supervising graduate students and mentoring faculty in the use of sophisticated computational and applied research approaches and techniques to solve complex geologic problems related to Unconventional Resources.

We seek candidates who have had extensive experience in Unconventional Resources and in serving as a team leader on multi-disciplinary research projects, and who have demonstrated the ability to develop and maintain an externally funded research program. Applicants must have a record of success in working collaboratively with researchers in academia and the petroleum industry and be enthusiastic about teaching integrative courses and supervising graduate students in Unconventional Resources and related areas. Applicants must have either: (1) an earned Ph.D. in the geosciences and 10 years industry experience, or (2) an M.S. in the geosciences and more than 20 years industry experience. Successful applicants will be expected to teach effectively at the graduate level in Unconventional Resources and related fields and in team taught courses, including classes in the Petroleum Certificate curriculum and to supervise undergraduate, M.S. and Ph.D. research, including students who are interested in pursuing careers in the petroleum industry. Applicants are expected to build and maintain a collaborative program with engineers in the oil and gas industry and national and international research institutions.

Interested candidates should submit electronic versions of a letter of application, curriculum vita, teaching philosophy, statement of research vision, strategies to implement that vision, and accomplishments, and the names and email addresses of at least three references to the Chair of the Unconventional Resources Search Committee (cdengo@tamu.edu). Screening of applications for the position began November 15, 2016 and continue until the position is filled. The Berg-Hughes Center (berg-hughes.tamu.edu) and the Department of Geology and Geophysics (geoweb.tamu.edu) are part of the College of Geosciences, which also includes the Departments of Atmospheric Sciences, Geography, and Oceanography; the Geochemical and Environmental Research Group (GERG); and the Integrated Ocean Drilling Program (IODP). Texas A&M University, a land, sea, and space grant university, is located in a metropolitan area with a dynamic and international community of 257,000 people. 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](mailto: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 OSHKOSH**  
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.

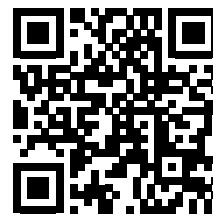
These PhD students will work collaboratively within this interdisciplinary team of Fellows and their faculty advisors. The focus project takes a comprehensive systems approach to analysis of interbasin transfer of surface water into the Tempisque River watershed in Costa Rica. This water transfer has altered hydrology, land use, community economic structure, and health of the downstream Palo Verde wetland in the Tempisque 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](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](mailto: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.

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## CALL FOR APPLICATIONS

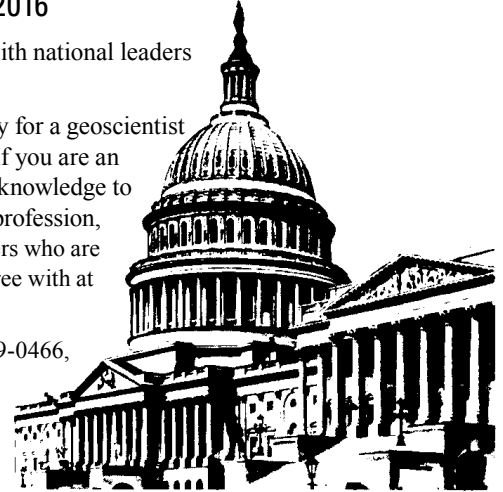
# 2017–2018 GSA-USGS Congressional Science Fellowship

**Application deadline: 1 Feb. 2016**

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.

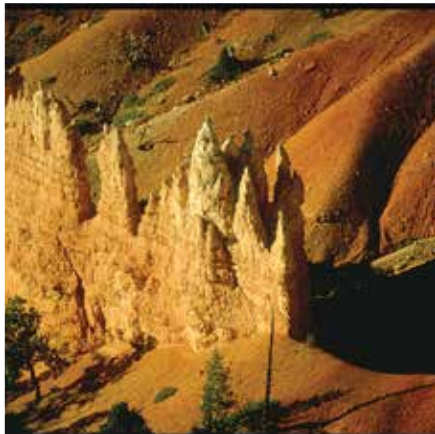
Learn more at [www.geosociety.org/csf](http://www.geosociety.org/csf) or by contacting Kasey White, +1-202-669-0466, [kwhite@geosociety.org](mailto:kwhite@geosociety.org).



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## Catastrophic Mega-Scale Landslide Failure of Large Volcanic Fields

Cedar City and Bryce Canyon City, Utah, USA • 16–22 Sept. 2017



### Conveners

**Robert F. Biek**, Utah Geological Survey, Salt Lake City, Utah, USA,  
[bobbiek@utah.gov](mailto:bobbiek@utah.gov)

**David B. Hacker**, Dept. of Geology, Kent State University, Kent, Ohio, USA,  
[dhacker@kent.edu](mailto:dhacker@kent.edu)

**Peter D. Rowley**, Geologic Mapping Inc., New Harmony, Utah, USA,  
[pdrowley@rushisp.com](mailto:pdrowley@rushisp.com)

This six-day field forum is designed to investigate the concept of exceptionally large catastrophic collapse of volcanic fields using the distinguishing characteristics and geologic implications of the gigantic Markagunt gravity slide and Marysville volcanic field, southwest Utah, USA.

**Application deadline: 31 January**

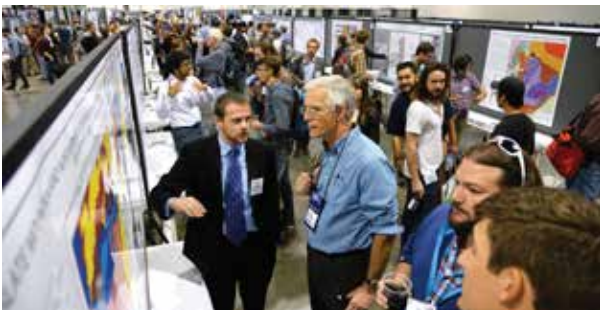
**[www.geosociety.org/GSA/fieldexp/Field\\_Forums.aspx](http://www.geosociety.org/GSA/fieldexp/Field_Forums.aspx)**



## Looking Toward GSA'S Future

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



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.

### Future Geoscientists



Gift Ntuli, a GSA On To the Future alum, at a field camp in the Bighorn Basin.

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



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.

### Policy



GSA President Claudia Mora, Matt Polizzotto, Jessica Witt, and Thomas Luckie, the GSA Rocky Mountain student award winner, thank Rep. David Price (D-NC) for his leadership preventing cuts to geoscience research at NSF.

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](mailto:jhess@geosociety.org) or +1-303-357-1011.



## Connecting the Next Generation of Science Journalists with Scientists in Action

*Andrea Jones\**, Planetary Science Institute, NASA Goddard Space Flight Center, 8800 Greenbelt Road, Greenbelt, Maryland 20771, USA; *Lora Bleacher, Jacob Bleacher*, NASA Goddard Space Flight Center, 8800 Greenbelt Road, Greenbelt, Maryland 20771, USA; *Timothy Glotch*, Stony Brook University, 250 Earth and Space Sciences, Stony Brook, New York 11794-2100, USA; *Kelsey Young*, CRESST/University of Maryland at NASA's Goddard Space Flight Center, 8800 Greenbelt Road, Greenbelt, Maryland 20771, USA; *Barbara Selvin and Richard Firstman*, Stony Brook University School of Journalism, 3384 SUNY, Stony Brook, New York 11794-3384, USA

### 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 (RIS<sup>4</sup>E; 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 RIS<sup>4</sup>E Science Journalism Program. This innovative program uses RIS<sup>4</sup>E research to help journalism students strengthen their understanding of the practice of science and learn to report more effectively and accurately on scientific research. RIS<sup>4</sup>E 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 RIS<sup>4</sup>E SCIENCE JOURNALISM PROGRAM

The RIS<sup>4</sup>E team ([ris4e.labs.stonybrook.edu](http://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. RIS<sup>4</sup>E 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. RIS<sup>4</sup>E 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 RIS<sup>4</sup>E 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 RIS<sup>4</sup>E research directly from the RIS<sup>4</sup>E science team. RIS<sup>4</sup>E 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 RIS<sup>4</sup>E 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. RIS<sup>4</sup>E 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 RIS<sup>4</sup>E, 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 RIS<sup>4</sup>E field campaign but also that students worked together to paint a picture of the integrated research effort in rich,

complementary colors. The students posted daily blog updates, shared highlights from the field through social media, and ultimately presented their polished work on a collaboratively designed public website: <http://reportingris4e.com/>.

## PROGRAM FOUNDATIONS AND INNOVATIONS

The RIS<sup>4</sup>E 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 RIS<sup>4</sup>E 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



**Figure 1.** In the spring of 2015, five journalism students joined NASA's RIS<sup>4</sup>E science team to report on planetary science research in action. Photo credit: NASA/RIS<sup>4</sup>E/Andrea Jones.

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 RIS<sup>4</sup>E team prepare the

second RIS<sup>4</sup>E Science Journalism Program, to be held in 2017.

## ACKNOWLEDGMENTS

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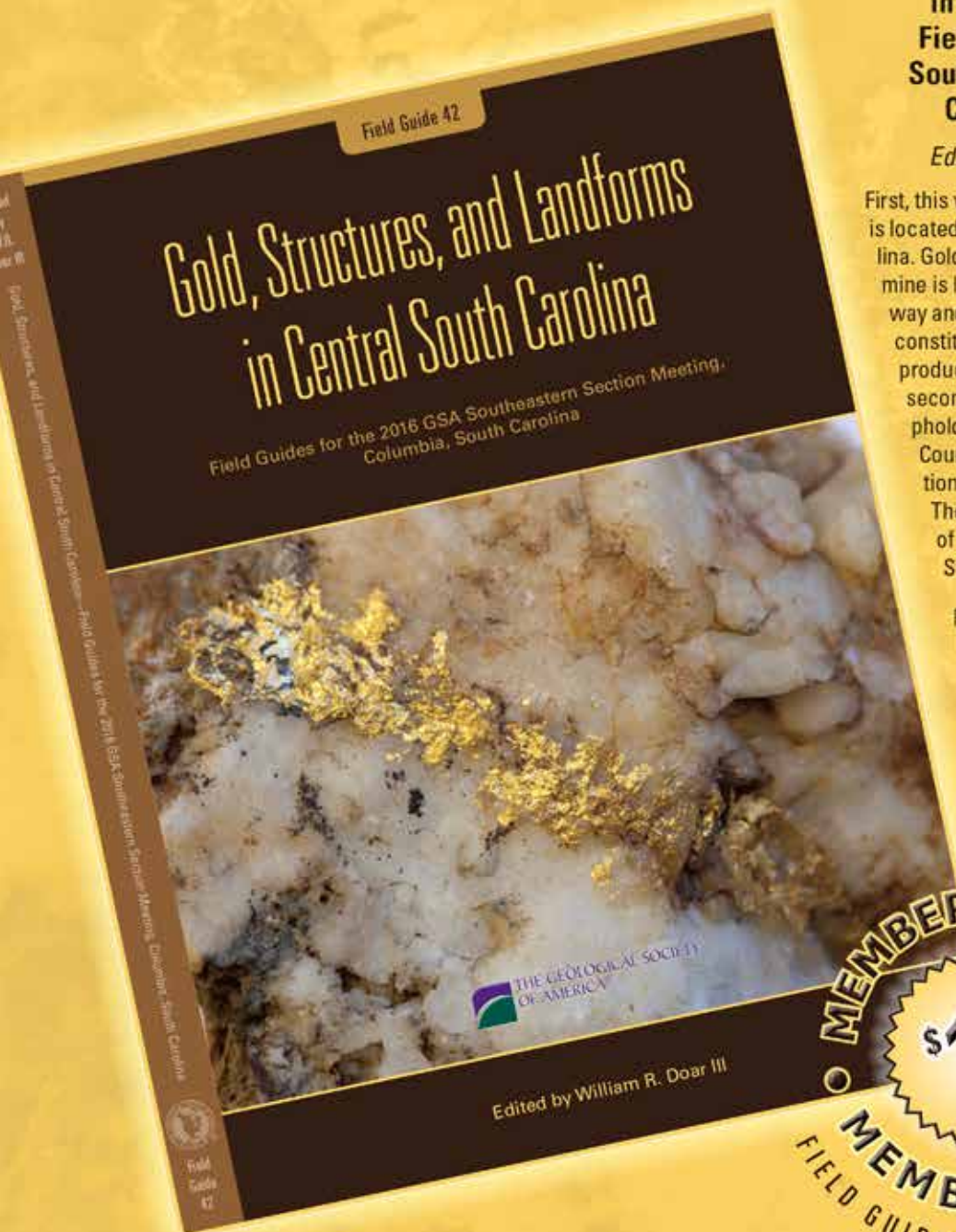
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