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Cover: Wisconsin River at Ferry Bluff. See related article, p. 4–11.

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Late Cenozoic Evolution of the Upper Mississippi River, Stream Piracy, and Reorganization of North American Mid-Continent Drainage Systems

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ABSTRACT
River systems and associated landscapes are often viewed to exist in a dynamic equilibrium that exhibits a natural range of variability until and unless external driving forces cause a radical change such as abrupt drainage reorganization. Here, we reinterpret the late Cenozoic evolution of the upper Mississippi River and present evidence that the uppermost Mississippi River basin (upstream of the confluence of the Mississippi and Wisconsin Rivers) evolved as a late Cenozoic drainage system that carried water eastward into the Gulf of St. Lawrence and North Atlantic Ocean rather than to the Gulf of Mexico. Coring to determine the dip of a remnant strath surface in the lower Wisconsin River valley demonstrates that this valley was carved by an eastward-flowing river (opposite of the modern westward-flowing Wisconsin River). Geomorphic features, including the presence of numerous barbed tributaries along the lower Wisconsin River valley and the width and morphology of the Mississippi and Wisconsin River valleys, support this interpretation. GIS analysis of logs of water wells in eastern Wisconsin delineate the presence of a major buried valley system continuing east into the Great Lakes lowland. We herein refer to this ancestral drainage system as the “Wyalusing River.”

Quaternary glaciations played a significant role in reorganizing ancestral rivers in the Appalachians and eastern Great Lakes region to form the modern Ohio River as a tributary of the Mississippi River. We propose that Quaternary glaciations also played a significant role in capturing the Wyalusing drainage and routing it southward to the Gulf of Mexico. The total area diverted away from the Gulf of St. Lawrence and toward the Gulf of Mexico by Quaternary stream piracy represents at least ~420,000 km² of the modern Mississippi River basin and provides nearly one quarter of the mean annual discharge of the Mississippi River. The permanent loss of that volume of freshwater runoff into the Gulf of St. Lawrence may have had a significant impact on North Atlantic thermohaline circulation and northern hemisphere climate dynamics through the Quaternary.

INTRODUCTION
Over the past several decades, significant effort has been focused on constraining the flux of freshwater from the North American continent associated with the melting of the Laurentide Ice Sheet (e.g., Broecker et al., 1989; Teller, 1990; Licciardi et al., 1999; Wickert, 2016). This flux has been linked to abrupt cooling events during the last deglaciation as massive, temporary pulses of fresh meltwater off the North American continent disrupted North Atlantic thermohaline circulation (Condron and Winsor, 2012; Ivancic et al., 2017). While much of this work has focused on abrupt climate change events during the last glaciation, the question of freshwater forcing on North Atlantic thermohaline circulation also pertains to longer timescales and processes not directly related to the demise of continental ice sheets.

For more than a century, it has been documented that the advance and retreat of Quaternary ice sheets in North America has profoundly altered fluvial drainage patterns (Fig. 1A). The southwesterly path of the Missouri River is the direct result of rerouting the river roughly parallel to the Marine Oxygen Isotope Stage 2 (MIS 2) ice margin (Todd, 1914; Flint, 1949; Dyke et al., 2002) and likely bears little resemblance to earlier Cenozoic drainage in the region (Sears, 2013). The modern Ohio River was formed by the blockage of several northward-flowing rivers by early to middle Quaternary glaciers that were rerouted to become tributaries of the Mississippi River (e.g., Wright, 1890; Chamberlin and Leverett, 1894; Tight, 1903). While some researchers have suggested alternate pre-Quaternary configurations of the upper Mississippi River (Hobbs, 1997) or changes in the size of the draining basin through the Quaternary (Knox, 2007; Galloway et al., 2011; Cox et al., 2014; Cupples and Van Arsdale, 2014), it has been axiomatic that the general course and planform of the upper Mississippi River evolved through the late Cenozoic as it appears today (e.g., Baker et al., 1998). Although some of the documented alterations to drainage systems have amounted to simply repositioning a reach of a river channel, other events have amounted to large-scale stream piracy that has redirected runoff to an entirely new master stream. This is particularly evident in the Ohio River basin, where rivers that flowed north to the Gulf of St. Lawrence prior to Quaternary glaciations were rerouted toward the Gulf of Mexico to become tributaries to the Mississippi River (Coffey, 1958). The record of late Cenozoic stream piracy is particularly significant in the humid eastern portions of the North American mid-continent, where a disproportionately large amount of its freshwater runoff into the oceans is derived.

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It is within the context of stream piracy and routing of freshwater off the North American mid-continent that we investigated the lower Wisconsin River valley in the Driftless Area of southwestern Wisconsin (Figs. 1A and 1B). As an isolated area of unglaciated terrain north of the overall maximum extent of Quaternary glaciations in North America, the Driftless Area provides a much longer temporal window to landscape and drainage basin evolution than in the surrounding glaciated regions. This allows the opportunity to reevaluate the late Cenozoic evolution of the upper Mississippi River basin, and to assess the impact of diversion of freshwater runoff from the North American mid-continent away from the North Atlantic Ocean and toward the Gulf of Mexico.

**STUDY AREA AND BACKGROUND**

The upper Mississippi watershed is a major sub-basin of the greater Mississippi River system that has been significantly impacted by Quaternary glaciations. The upper Mississippi and Wisconsin Rivers and their major tributaries (Fig. 1) all cross the MIS 2 glacial margin and exhibit the effects of multiple Quaternary glaciations on their geomorphology, planform, and course (Warren, 1884; MacClintock, 1922). Buried bedrock valleys, modern streams under-fit to the bedrock channels in which they flow, and river courses aligned to former ice margin positions are common features. Furthermore, late Quaternary glaciations drove sequences of aggradation and incision, producing multiple cut-and-fill terraces along the upper Mississippi and lower Wisconsin Rivers and their tributaries; several outwash terraces are graded to a higher elevation than the modern floodplain surface (Flock, 1983; Knox, 1996). In the North American mid-continent, however, the lower Wisconsin River is atypical among major rivers for containing prominent remnants of a strath (bedrock) terrace. This surface, known as the Bridgeport terrace, is found at a higher elevation than adjacent depositional terraces along the Wisconsin River. Three isolated remnants of the strath occur within 60 km of the confluence of the Wisconsin and Mississippi Rivers (Figs. IC and 2).

The lower Wisconsin River flows west from the Baraboo Hills in south-central Wisconsin through the Driftless Area to its confluence with the Mississippi River. This region of southwestern Wisconsin was apparently never glaciated during the Quaternary (Chamberlain, 1883; Alden, 1918), an observation that has been recognized since the 1820s (Martin, 1932). It is bounded on the east by MIS 2 glacial deposits, and on the north, west, and south by older glacial sediment. Regionally, the Paleozoic sedimentary bedrock is heavily dissected by fluvial incision (Trotta and Cotter, 1973) that is expressed in the hilly surface morphology because of the lack of Quaternary glacial deposits in the Driftless Area. While a traditional explanation for the particularly deep incision of the upper Mississippi and lower Wisconsin Rivers and their tributaries is simply surface expression of long-term process, a compelling argument will be made here that the lack of glacial cover in the Driftless Area affords a window to view late Cenozoic drainage integration of the upper Mississippi River basin.

Within the lower Wisconsin River valley, Knox and Attig (1988) identified a moraine and glacial outwash consistent with a glacial advance from the west to a few kilometers east of the confluence of the modern Wisconsin and Mississippi Rivers (Fig. 2A). The outwash, preserved on the Bridgeport strath, contains eastward-dipping foreset bedding, indicating that water flow at the time of deposition was in the opposite direction as flow of...
the modern Wisconsin River. Reversed polarity to the remnant magnetism of this sediment indicates it was deposited prior to ~780,000 years ago. They hypothesized that this glaciation blocked the mouth of the Wisconsin River and caused a temporary reversal of flow to the east.

An alternate hypothesis to the presumption that the lower Wisconsin River valley was incised through the late Cenozoic by a westward-flowing river and experienced a temporary reversal of flow at the time of the “Bridgeport” glaciation is that incision of the lower Wisconsin River valley to the level of the Bridgeport strath was accomplished through the late Cenozoic by an eastward-flowing river. A subsequent stream piracy event caused a permanent reversal to the modern westward flow. The test of this hypothesis is to identify the direction of dip of the bedrock surface of the Bridgeport strath, which necessarily dips in the direction of water flow at the time it was the bedrock floor of the valley.

METHODS AND RESULTS

Testing this alternate hypothesis required coring through the unconsolidated sediment on the terrace to establish bedrock elevations at numerous points along the length of the terrace. This was accomplished using a combination of high-resolution LiDAR-derived digital elevation models to precisely identify ground-surface elevation to within ~5 cm and Geoprobe direct-push coring to precisely identify depth to bedrock to within ~2.5 cm. The strath surface is comprised of glauconitic units of the Cambrian Tunnel City Group, which facilitated unambiguous recognition of the transition between Quaternary sediment and the strath. Cores were collected from 62 sites on the strath surface on an ~60-km transect (Fig. 2; GSA Data Repository Table 1). The highest bedrock elevation points were connected, based on the assumption that they represent a good proxy for the original, un-eroded bedrock surface (see Data Repository Fig. 1 [see footnote 1]).

As expected, individual coring sites reveal considerable variability below the (upper) trend line of the original strath surface owing to localized erosion following abandonment. However, the trend of the strath dips to the east, in the opposite direction of flow of the modern Wisconsin River, with an estimated gradient of 0.15 m/km (Fig. 3A). The gradient of the strath surface estimated from coring is consistent over a broad scale with many other mid-continent streams, and close to the gradients of the modern lower Wisconsin River floodplain and associated MIS 2 outwash terraces. Within the context of the westward-dipping late Quaternary surfaces in the lower Wisconsin River valley, the eastward dip of the Bridgeport strath stands in stark contrast (Fig. 3B). The inescapable conclusion to be drawn from the orientation of the strath is that the lower Wisconsin River valley was carved to the level of the Bridgeport strath by a river flowing to the east.

1GSA Data Repository Item 2017404, supplementary core and well log data and methods used to support interpretations, is online at www.geosociety.org/datarepository/2017/.
Geomorphology of the Lower Wisconsin River Valley

Transformative events to the landscape should—and often do—leave indications of previous conditions, and the geomorphology of the lower Wisconsin River valley contains several indications of having been formed by an eastward-flowing river (Fig. 4). They are as follows:

1. The lower Wisconsin River valley, between the modern confluence with the Mississippi River and the MIS 2 glacial margin, has a large number of barbed tributaries—valleys that join the lower Wisconsin River valley angling to the east, as would be expected if they formed over time as tributaries to an eastward-flowing river (blue arrows in Fig. 1C). Lacking an overriding structural control, the presence of barbed tributary valleys has long been held as primary evidence of reversal of flow on the mainstem stream (e.g., Chamberlin and Leverett, 1894, p. 265).

2. The curve of the valley wall at the inside of the confluence of the modern Mississippi and Wisconsin Rivers (i.e., to the immediate northeast; solid orange in Fig. 1C) is inconsistent with having been incised as the confluence of two rivers. Rather than coming to a point as would be expected at the confluence of streams in a dendritic system, the valley wall is a smooth curved radius. It is consistent with being at the inside of a tight bend of a single river; numerous similar forms can be found along the insides of curves along the upper Mississippi and lower Wisconsin Rivers.

3. The lower Wisconsin River valley narrows incongruously from east to west. Lacking overriding bedrock geologic control, river valleys broaden in the downstream direction. The narrowing in the downstream direction exhibited in the lower Wisconsin River valley lends additional credence to the argument for a valley that was incised by an eastward-flowing river and subsequently reversed.

Geomorphology of the Upper Mississippi River

In addition to the lower Wisconsin River displaying geomorphic features that reflect a major reorganization, the Mississippi River also contains a hallmark feature of stream piracy. The reach of the Mississippi River valley immediately south of its confluence with the Wisconsin River is distinctly narrow with short, steep tributaries (yellow bracket in Fig. 1C). The dissimilarity of these tributaries to other valleys throughout the region is so

Figure 4. Proposed time series for the common processes that drove stream piracy and reorganization of pre-Quaternary drainage patterns in the North American mid-continent to create the modern Ohio (MO) and upper Mississippi (UM) Rivers. (A) Proposed configuration of the ancestral Wyalusing (W), Teays (T), and Pittsburgh (P) Rivers as they evolved prior to Quaternary glaciations. Red dashed line represents the approximate location of the continental drainage divide. (B) Damming of the lower St. Lawrence drainage by early to middle Quaternary glaciation(s) blocked the ancestral Wyalusing River to create the informally named glacial Lake Muscoda (GLMu); the ancestral Teays River to create glacial Lake Tight (GLT); and the ancestral Pittsburgh River to create glacial Lake Monongahela (GLMo). Spill-over of the lakes at the lowest drainage divides (red diamonds) initiated reorganization of river systems. (C) Modern drainage configuration, with continental drainage divide (red dashed line) moved northward as drainage capture diverted river systems away from the Gulf of St. Lawrence and toward the Gulf of Mexico. UO—upper Ohio River.
striking, in fact, that the tributaries to the Mississippi River immediately north and south of the confluence with the Wisconsin River are locally referred to by the etymologically distinct term “coulee.” While these characteristics could be attributed to incision through the bedrock escarpment formed by resistant Ordovician dolostone in the area, they are consistent with a stream that has experienced recent and pronounced down-cutting driven by base-level adjustment following stream piracy. Within the context of recognizing a major reversal on the nearby lower Wisconsin River valley, it should not be surprising that the Mississippi River valley contains geomorphic features that reflect such a significant reorganization of drainage patterns.

**DISCUSSION**

**The Ancestral Wyalusing River and the Continental Drainage Divide**

Recognition of an eastward-flowing river occupying the modern lower Wisconsin River valley necessitates consideration of the larger drainage pattern required to achieve this configuration. We propose that a river that we herein refer to as the “Wyalusing River” (named for the town of Wyalusing, Wisconsin, USA, immediately south of the confluence of the Wisconsin and Mississippi Rivers; Fig. 1C) developed through the late Cenozoic flowing eastward to incise the valley now occupied by the lower Wisconsin River. The high, east-west–trending ridge to the south of the lower Wisconsin River valley, known locally as Military Ridge (Fig. 1C), is formed by the resistant dolostone of the Ordovician Galena and Platteville Formations; the topographic ridge formed by this bedrock structure represents a logical location for a major drainage divide separating southward flow to the Gulf of Mexico from northeastward flow toward the Gulf of St. Lawrence. In this configuration, the numerous barbed tributaries along the modern lower Wisconsin River are explained; the curve of the valley wall at the modern confluence of the Mississippi and Wisconsin Rivers is simply the inside of a bend in the Wyalusing River; and the width of the valley along this reach broadens in the downstream direction as would typically be expected.

**Downstream Continuation of the Wyalusing River**

Late Quaternary glacial deposits obscure direct evidence for the course of this river east of the Baraboo Hills (Fig. 1C). However, depth-to-bedrock maps (Trotta and Cotter, 1973) and previous studies (Stewart, 1976) show a deep, buried bedrock valley that trends southwest-to-northeast in the east-central portion of the state. To evaluate this buried valley as a potential downstream continuation of the Wyalusing River system, Bates and Carson (2013) assessed 115,176 logs of water wells in east-central Wisconsin. As needed, logs were geo-located in ArcGIS to accurately identify ground surface elevation and sorted to remove logs that lacked relevant depth-to-bedrock information. After this processing, a total of 60,186 logs were used to generate a buried bedrock elevation map for east-central Wisconsin extending from the easternmost extent of the Bridgeport strath in the lower Wisconsin River valley to the shores of Green Bay. The resulting bedrock topography map identifies the presence of a buried bedrock valley trending to the more than 300 km northeast toward the Lake Michigan/Huron lowlands at the appropriate elevation and grade to be the continuation of the Wyalusing River (GSA Data Repository Fig. 2 [see footnote 1]). Having been traced into the Lake Michigan basin, we conclude that the Wyalusing River was the westernmost tributary of a major river system that drained the North American mid-continent through the St. Lawrence lowland to the Atlantic Ocean.

As such, this represents a significant drainage area that evolved through the late Cenozoic as part of the St. Lawrence drainage basin that has been pirated and converted to the headwaters of the Mississippi drainage basin. Reversal of the Wyalusing River and, as a result, redirection of the mainstem Mississippi River upstream of the modern confluence with the Wisconsin River, added 205,000 km$^2$ to the modern Mississippi River basin. This is 6.9% of its total watershed area. This event likely occurred sometime during the early to middle Quaternary as constrained by the reversed paleomagnetism of fine-grained sediments within sand and gravel that were deposited while the river still drained to the Gulf of St. Lawrence (i.e., the deposits identified by Knox and Attig [1988] that are associated with eastward-dipping foreset beds). As interpreted by the data presented here, the conversion of the basin from the St. Lawrence to the Mississippi drainage involves shifting the continental drainage divide northward across Wisconsin and Minnesota. As an independent verification, our field-based interpretation of this drainage reorganization is consistent with the evolution of North American drainage systems through the Cenozoic as inferred by the volume and geometry of sediment packages deposited in the Gulf of Mexico (Galloway et al., 2011).

**Reorganization of North American Mid-Continent Drainages**

Having traced the ancestral Wyalusing River into the Lake Michigan basin, and thus into the St. Lawrence drainage, it is possible to consider the larger drainage patterns that are implicated by such a configuration of this river. The evolution of the ancestral Wyalusing River from headwaters of the St. Lawrence drainage system to its modern configuration as headwaters of the Mississippi drainage system is likely intimately associated with Quaternary glaciations. While this is a new observation in the upper Mississippi basin, it is not unique in the greater Mississippi basin. It has long been recognized that the ancestral Pittsburgh and Teays Rivers were rerouted to become the upper and middle Ohio River when Quaternary ice centered in the Hudson Bay region advanced far enough south to block the lower portions of the St. Lawrence valley (e.g., Chamberlin and Leverett, 1894; Tight, 1903). This caused large proglacial lakes to form: glacial Lake Monongahela in the ancestral Pittsburgh River valley (White, 1896; Leverett, 1934) and glacial Lake Tight in the ancestral Teays River valley (Janssen, 1953; Goldthwait, 1983). While there is a lack of consensus as to whether the ancestral Teays system drained to the St. Lawrence or into the now-buried Mahomet River system in Illinois (flowing toward the Gulf of Mexico) prior to Quaternary glaciations, it is certainly viable that the Teays River developed as a tributary of the St. Lawrence drainage and was pirated multiple times (e.g., Coffey, 1958; Gray, 1991). Spill-over of those lakes at the lowest drainage divide.
initiated stream piracy events that reorganized those river systems to become the modern Ohio River that drains to the Gulf of Mexico (Fig. 4). An isotopic signal for this reversal may be preserved in Gulf of Mexico sediments (e.g., Joyce et al., 1993; Shakun et al., 2016), although the clarity of such a signal would be a function of whether all drainages in the Midwest and Appalachians were rerouted in a short period of time or over multiple glaciations.

As outlined here, the ancestral Wyalusing River was also a tributary to the St. Lawrence River system prior to Quaternary glaciations. As such, a common mechanism for the reorganization of the Ohio and upper Mississippi Rivers during the Quaternary is logical and appealing. The early to middle Quaternary glaciations that blocked the lower St. Lawrence drainage and caused the reorganization of the modern Ohio River necessarily would have also blocked the ancestral Wyalusing River in the Midwest. This provides a single causative agent for reorganization of drainage systems across the eastern and Midwestern United States.

Farther to the west, evidence exists that the area currently drained by the Missouri River was modified such that the modern Missouri River closely follows the MIS 2 margin, though it may previously have contributed additional drainage area and runoff to the Gulf of St. Lawrence-directed system.

Hemispheric Implications

The area of the combined ancestral Pittsburgh, Teays, and Wyalusing River basins is significant, representing at least ~420,000 km² of the modern Mississippi River basin that has been pirated from the pre-Quaternary St. Lawrence River basin. Because these areas are located in the relatively humid portion of the larger Mississippi basin, they represent a disproportionately large amount of the Mississippi River’s discharge. Analysis of modern gage records indicates that these pirated basins represent ~14% of the area of the Mississippi River basin yet contribute nearly one quarter of the mean annual discharge of the Mississippi River (Carson et al., 2014), roughly equivalent to 150 km³/year of water (a permanent diversion of nearly 5,000 m³/s, based on modern hydrology). While this amount of freshwater is small relative to late Quaternary outburst floods that temporarily disrupted North Atlantic thermohaline circulation (e.g., Teller, 1990; Licciardi et al., 1999; Clark et al., 2001), piracy of these basins in the midcontinent and flux of that water away from the Gulf of St. Lawrence and toward the Gulf of Mexico represents a permanent step-function decrease in freshwater delivery to the North Atlantic from a non-climatic source. These estimations of drainage area shift and discharge flux are based on modern morphologies and flow regimes; the redirection of glacial meltwater toward the Gulf of Mexico following reorganization would only serve to further increase the significance of drainage reorganization on freshwater delivery to the Gulf of Mexico (Wickert et al., 2013; Wickert, 2016).

It has long been understood that the delivery of freshwater, and particularly fresh meltwater during glaciations, exerts a significant control on North Atlantic thermohaline circulation. Multiple studies (Broecker et al., 1989; Condron and Winsor, 2012; Ivanovic et al., 2017) have shown that a large pulse of meltwater was the mechanism that initiated the Younger Dryas by reducing Atlantic Meridional Overturning Circulation (AMOC), which led to cooler air and surface temperatures and increased ice cover. However, previous studies have focused on the effects of a large, discrete meltwater pulse derived from the demise of a North American ice sheet. The data and interpretations presented herein raise the question of the ability of a much smaller, though permanent, flux in continental runoff caused by drainage reorganization to impact North Atlantic thermohaline circulation.

For example, the middle Pleistocene is noted for a step-function shift in the periodicity of glacial maxima from a predominantly 41-k.y. cycle to a 100-k.y. cycle (Shackleton and Opdyke, 1976). This Middle Pleistocene Transition (MPT) took place between 1250 and 700 ka. Lacking a stochastic cause for this shift in glacial periodicity derived directly from orbital forcing, a deterministic mechanism is required. Numerous mechanisms have been proposed to explain the occurrence of the MPT, including physical processes associated with calving and meltwater discharge feedback (DeBlonde and Peltier, 1991); long-term deepwater cooling (Tziperman and Gildor, 2003); or the progressive erosion of regolith from the North American continent during successive early Quaternary glaciations that eventually exposed unweathered bedrock across the craton (Clark and Pollard, 1998; Clark et al., 2006). The budget of freshwater delivery to the North Atlantic Ocean is one of the major determinants of the strength of North Atlantic thermohaline circulation (Clark et al., 2002); the strength and structure of North Atlantic thermohaline circulation, in turn, plays a critical role in driving global heat transfer and climatic fluctuations. For example, coupled thermohaline circulation and energy balance climate models (e.g., Sakai and Peltier, 1997) demonstrate climate sensitivity to freshwater runoff from ice sheets. While this and similar studies explicitly investigate glacial versus non-glacial conditions during the late Pleistocene, a future avenue of investigation would be to assess the effects of a permanent step-function flux of freshwater away from the North Atlantic and toward the Gulf of Mexico. This may provide insight into the effect that reorganization of continental drainage systems may have imparted on the thermohaline circulation in the North Atlantic Ocean, thus providing an alternate explanation, or contributing factor, for the change in periodicity of glaciations associated with the MPT.

CONCLUSIONS

Coring to resolve the elevation of the bedrock surface of the Bridgeport strath along the lower Wisconsin River valley indicates that the strath surface dips to the east at an estimated slope of 0.15 m/km, as opposed to the westward dip of the bedrock floor of the valley, the modern floodplain surface, and all late Quaternary depositional outwash terraces. The direct conclusion drawn from the coring data is that incision of the lower Wisconsin River valley was achieved by an eastward-flowing river during the late Cenozoic, rather than by the westward-flowing modern Wisconsin River. Numerous geomorphic features along the lower Wisconsin River valley support the interpretation of a reversal of flow and reorganization of drainage patterns at some point in the past. Investigation of a buried bedrock valley in east-central Wisconsin confirms that this feature represents the downstream continuation of the river referred to herein as the Wyalusing River. Having been traced into the Lake Michigan basin, we conclude that this river evolved as part of the headwaters of the St. Lawrence.


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History and Philosophy of Geology Division
William R. Brice, University of Pittsburgh

O.E. MEINZER AWARD
Hydrogeology Division
Shemin Ge, University of Colorado Boulder
2018 GSA Fellows

Society Fellowship is an honor bestowed on the best of our profession by election at the spring GSA Council meeting. GSA members are nominated by existing GSA Fellows in recognition of their distinguished contributions to the geosciences. Learn more at www.geosociety.org/fellowship.

GSA’s newly elected Fellows will be recognized at the GSA 2018 Annual Meeting & Exposition Presidential Address & Awards Ceremony on 4 Nov. in Indianapolis, Indiana, USA. We invite you to read some of what their nominators had to say:

Richard Aster (Colorado State University): Dr. Aster has contributed significantly to seismological research via lithospheric studies of continental rifting, internal structures of active volcanoes, and seismic noise studies. —Kevin Mickus

James Sudler Beard (Virginia Museum of Natural History): We nominate Dr. James S. Beard for his creative contributions to understanding the origin and evolution of arc and subduction zone magmas, for his insightful investigations of the serpentinization of the oceanic lithosphere, and for his extraordinary commitment to communicating the results of geological research to the general public. —Howard Day

L. Sue Beard (U.S. Geological Survey): Over her career of 38 years with the USGS, L. Sue Beard has made fundamental contributions to understanding the tectonics and geologic evolution of the southern Cordillera, particularly the region encompassing Lake Mead and the southwest Colorado Plateau. Sue’s work is solid and enduring because it is all field based. —Gordon Haxel

Lori Bettison-Varga (Natural History Museum of Los Angeles): Lori is nominated for her leadership and outstanding contributions toward enhancing public awareness of the geosciences, promoting the integration of research in undergraduate education, and understanding hydrothermal seafloor processes. —Diane Smith

Janice L. Bishop (The SETI Institute): Janice Bishop is an eminent spectroscopist who has used remote sensing to characterize key hydrated minerals on Mars. Her deep knowledge of mineral chemistry allowed her to document quantitative relationships between spectra and mineralogy (e.g., book chapters) and make ground-breaking discoveries (e.g., making clays on Mars during warm climatic excursions). —Raymond Arvidson

Teresa Suter Bowers (Gradient Corporation): Dr. Bowers’ applications of mathematical, geochemical, and exposure modeling coupled with risk-based environmental strategies have been used worldwide to develop site-specific cleanup levels for environmental protection. Her fundamental contributions to understand lead toxicity resulted in her adult blood lead model now being used by the U.S. EPA. —Barbara Dutrow

Nnominate 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. Visit www.geosociety.org/fellowship to make a nomination for 2019.

James V. Browning (Rutgers University): James Browning is a sequence stratigrapher and paleoceanographer. His leadership role as Staff Scientist of the Coastal Plain Drilling Project and Curator of Rutgers-IODP Core Repository is critical to the infrastructure of continental and ocean drilling. His research is crucial to understanding Eocene Antarctic glaciation and 100 Myr-record of sea-level change. —Miriam Katz

Ellen Anne Cowan (Appalachian State University): Ellen Cowan is an exemplary geoscience teacher and researcher who has achieved an outstanding record of inspiring and mentoring students by actively involving them in her research projects, continuously directing senior honors theses, and effectively teaching, while integrating her research experiences into content of her upper-level undergraduate courses. —Fred Webb Jr.

Diana Dalbotten (St. Anthony Falls Laboratory, University of Minnesota): Dr. Diana Dalbotten has been instrumental in collaborating with Native American communities to bring diverse scholars into the geosciences. Her work with the Geoscience Alliance, Tribal Colleges, and K–12 teachers has built bridges between the geosciences and communities historically underrepresented in the field. —Julie Libarkin

Cameron Davidson (Carleton College): He deserves fellowship primarily because of his training of geologists and administration of geological programs. Cam Davidson has improved undergraduate education through his participation in the Science Education Resource Center (SERC) and the Science Board at Carleton. He has also advised or co-advised over 200 undergraduate students for their senior theses on projects funded through the Keck Geology Consortium, where he currently serves as Co-Director. —Darrel Cowan

Carol M. Dehler (Utah State University): Carol is what a geologist should be—an author of more than 20 quality papers, 14 geologic maps, and seven book chapters; a quality colleague; a passionate teacher of both undergraduate and graduate students; and an enthusiastic leader of field trips for the profession and the public. —Linda Kah

www.geosociety.org/gsatoday
Fellowship nominations are submitted in the following categories:

- Publication of the results of geologic research;
- Applied research;
- Training of geologists;
- Administration of geological programs;
- Public awareness of geology;
- Professional organizations;
- Editorial, bibliographic, and library responsibilities; and
- Other.

Hailiang Dong (Miami University): Dr. Dong is a prolific scientist who has published over 200 papers in the discipline of geobiology, has trained many graduate students in this field, and has served as a program director at NSF. His significant contributions are truly interdisciplinary, overarching, and at a global scale.
—Yildirim Dilek

Michael J. Dorais (Brigham Young University): Dr. Dorais has applied novel petrologic and isotopic techniques for over 35 years to help better understand the magmatic and tectonic evolution of continents through his studies in the northern Appalachian Mountains, the Sierra Nevada, and other continental areas, while also providing high-quality mentoring to large numbers of geology students. —Bart J. Kowallis

Peter T. Doran (Louisiana State University): For his seminal work in polar geolimnology and paleoclimatology, and his leadership in the application of polar science to help constrain processes on other icy planets in our solar system. —W. Berry Lyons

André Willy Droxler (Rice University): For understanding neritic carbonate systems across Earth and especially for conveying this information to students, colleagues, and the general public.
—Gerald Dickens

Amy E. East (U.S. Geological Survey): For insightful research contributions that have extended fundamental understanding of landscape responses to changes in sediment supply in modern and ancient sedimentary systems.
—Jon Major

Martha Cary Eppes (University of North Carolina at Charlotte): Martha Cary “Missy” Eppes (Ph.D. 2002) joined University of North Carolina’s faculty in 2003, and was promoted to full professor in 2017. Her specialty is geomorphology, focusing on weathering and soils. She has 27 refereed publications, many co-authored with students.
—Roger Hooke

Josh Feinberg (University of Minnesota): Josh Feinberg is nominated for his groundbreaking studies in mineral and rock magnetism that have resulted in innovative approaches to an array of scientific problems, from ancient geomagnetic field behavior to past records of climate and environmental change to the physical and crystallographic phenomena of magnetic stability.
—John Geissman

Joan E. Fryxell (California State Univ. San Bernardino): Elected to Fellowship as a new GSA Councilor.

Zvi Garfunkel (Hebrew University of Jerusalem): Elected to Fellowship as a 2017 GSA Honorary Fellow.

Allen C. Gellis (U.S. Geological Survey): Dr. Allen Gellis is one of the world’s leaders in understanding, measuring, and modeling sediment erosion and transport, particularly for addressing applied problems.
—Jim O’Connor

David Paul Gillikin (Union College): David Gillikin has had a significant impact on the field of geology as a researcher, teacher, and member of the GSA community. His research focuses on proxy indicators of environmental change preserved in molluscs. David has served our community through his involvement in GSA committees and as a journal editor.
—Donald Rodbell

Joseph A. Gillman (Missouri Geological Survey): As the state geologist of Missouri and the director of the Missouri Geological Survey, and as president of the Association of American State Geologists, Joe Gillman has demonstrated strong, creative, and visible leadership in the geosciences, positioning both organizations for growth and success.
—Rex Buchanan

Michelle F. Goman (Sonoma State University): For outstanding contributions in scholarship, teaching, and service to the fields of paleoecology and geoarchaeology and the energetic, innovative leadership in the limnogeology and paleoclimate research communities.
—Gail Ashley

Cecilia Maria Gonzalez-McHugh (Queens College): Cecilia Maria Gonzales-McHugh is a passionate marine geoscientist and educator. Her work has been foundational in the field of paleoseismology, showing the extent of modern earthquake and tsunami deposits (homogenities) on the ocean floor and their common occurrence in the sediment record.
—Suzanne O’Connell

John A. Grant III (Smithsonian Institution Center for Earth and Planetary Studies): Elected to Fellowship as the 2017 Planetary Geology Division’s G.K. Gilbert awardee.

Mary Beth Gray (Bucknell University): Professor Mary Beth Gray is an outstanding educator, scientist, and mentor as evidenced by her publication record in structural geology, praise for her teaching and for academic and undergraduate research advising, and her administrative work that has contributed to making and keeping the department and university strong.
—Carl Kirby

“... extraordinary commitment to communicating the results of geological research to the general public ...”
Sean P.S. Gulick (The University of Texas at Austin): For leadership in the marine geophysical community, for sustained research in the topics of tectonics and climate interactions, geohazards of convergent margins, and studies of impact cratering.
—Peter Haeussler

Julia Eve Hammer (University of Hawai‘i): For rigorous yet imaginative contributions to understanding how silicate magmas crystallize, evolve, and erupt, as well as for outstanding and innovative training of students in the lab and in the classroom.
—Michelle Coombs

Masaki Hayashi (University of Calgary): Masaki Hayashi’s innovative contributions to the fields of wetland hydrology, vadose-zone processes in cold regions, and alpine hydrology and hydrogeology have greatly advanced these disciplines. His focus on groundwater and its exchanges with other hydrological components has been highly valued by his many colleagues, students, and numerous water-resource managers.
—Donald Rosenberry

Sidney Ann Rasbury Hemming (Columbia University and LDEO): For recognition of fundamental contributions to geologic research, training of geologists, and for development of innovative approaches in detrital geochronology and fundamental insights into the origins and significance of ice-rafted debris and sediments for understanding past climate and physical oceanography.
—Peter Reiners

Charles Murray Henderson (University of Calgary): Dr. Henderson is a leading expert on conodont biostratigraphy and paleobiogeography of the Late Paleozoic and Early Mesozoic. He has been instrumental in developing global biozonation schemes and establishing international stage boundaries for both the Permian and Triassic. He has been a leader of the ICS’s Subcommission on Permian Stratigraphy.
—Thomas Algeo

Gregory Dean Hoke (Syracuse University): Dr. Hoke has made outstanding contributions to the critical analysis and application of cutting-edge clumped isotope and cosmogenic dating techniques to the temporal and spatial evolution and geodynamics of orogenic belts and plateaus of the Andes and SE Asia and leadership of GSA’s International Interdisciplinary Interest Group.
—Jeffrey Karson

Steven Matthew Holland (University of Georgia): Steven Holland has unified sequence stratigraphy and paleobiology, fundamentally changing our understanding of the fossil record and geologic time. A contributor in all senses, he has done this through both excellent scientific research and outstanding training of students, while also serving the field’s institutions and his university in exemplary fashion.
—L. Bruce Railsback

Kurt Hollocher (Union College): From a small undergraduate college, Kurt published outstanding papers on geochemistry of metamorphosed igneous rocks, thereby contributing to understanding of the early Paleozoic paleogeography of Iapetus, northern Appalachians, and Mid Norway. Highly productive undergraduate teaching. Organized NEGSA Meetings. Local water and air pollution problems.
—Peter Robinson

Ganqing Jiang (University of Nevada–Las Vegas): Ganqing Jiang has made major contributions to our understanding of the Neoproterozoic Earth, including its stratigraphy, carbon isotopic record, changing redox conditions, and geochronology.
—Nicholas Christie-Blick

Thomas M. Johnson (University of Illinois): Tom Johnson has made fundamental contributions to the analysis of chromium, selenium, mercury, and uranium isotopes in groundwater, in the context of environmental hydrogeology. In addition, he serves as the head of the geology department at a Research I university, where he is also an admired and innovative teacher.
—Stephen Marshak

Philip L. Johnson (Cotton, Shires and Associates, Inc.): Elected to Fellowship as the Engineering and Environmental Geology Division’s 2017 E.B. Burwell Jr. awardee.

Anthony I.S. Kemp (University of Western Australia): For his contributions to our understanding of granite petrogenesis and the growth and evolution of continental crust.
—Jeffrey Vervoort

Scott D. King (Virginia Tech): For insightful leadership in developing methods to model convection in the interior of the earth and other terrestrial planets and applying these methods to yield new insights into geodynamics.
—Seth Stein

John W. Lane Jr. (U.S. Geological Survey): Dr. Lane is nominated in recognition of his extraordinary work in developing and applying geophysical methods to critical problems in water resources worldwide and his exemplary dedication to mentoring students and new and practicing geoscience professionals in government and academia.
—Denis R. LeBlanc

Thomas John Lapen (University of Houston): Dr. Thomas J. Lapen has an exemplary record of scholarly publications in first-rate geologic journals pertaining to a wide spectrum of geologic problems ranging from metamorphic and tectonic studies to those concerned with isotopic geochemistry of modern hot springs.
—Henry Chafetz

Laura K. Lautz (Syracuse University): Laura Lautz is a leading hydrogeologist interested in interactions between surface and groundwater, focusing on how physical hydrological processes influence water quality and water movement. She also is an innovator in multidisciplinary graduate education in the geosciences.
—Donald Siegel

David Stuart Leigh (University of Georgia): David Leigh is an eminent geoscientist whose specialty area is fluvial geomorphology. He is a long-time member of GSA and active in at least two Divisions of the Society. His scientific contributions together
with his mentorship of future geoscientists makes his nomination to Fellowship an easy and overdue task. —Ervan Garrison

Adrian Lenardic (Rice University): For contributions to our understanding of the geodynamic evolution of Earth and other planets and how planetary interiors and surfaces interact. —Cin-Ty Lee

Yu-Feng Lin (Illinois State Geological Survey): Yu-Feng Lin has a 16-year career as a hydrogeologist with >100 publications, including those on groundwater flow, geothermal exchange, groundwater/surface water interactions, fiber-optics sensing, groundwater recharge/discharge, and applied studies for water-supply planning, natural resources management, and groundwater remediation. He also has provided considerable leadership in several administrative positions. —Richard Berg

Laura Lukes (George Mason University): Elected to Fellowship as the 2017 Biggs Award for Excellence in Earth Science Teaching awardee.

Bruce J. MacFadden (University of Florida): Bruce MacFadden ranks among today’s foremost paleobiologists. His prolific research, published in hundreds of peer-reviewed articles and books, has advanced the fields of vertebrate paleontology, magnetic stratigraphy, isotope geochemistry, paleoecology, and paleoclimatology. Bruce was editor of several geological journals, president of two paleontological societies, and has mentored many graduate students. —Douglas Jones

Mary Ann Madej (U.S. Geological Survey Western Ecological Research Center): In recognition of her significant published geologic and applied research investigations of channel responses to sedimentation, watershed restoration, and the role of carbon dynamics in forest ecology—and for her extensive efforts in training numerous geologists. —Joan Florsheim

Michael E. Mann (Pennsylvania State University): At Pennsylvania State University, Dr. Mann has been Distinguished Professor of Atmospheric Science since 2013 and director of its Earth System Science Center since 2005. He is one of the top climate scientists in the world, and is the leading spokesperson for climate science in the United States. —P. Thompson Davis

Ellen Eckels Martin (University of Florida): Ellen has an impressive combination of a distinguished research program in addition to an assiduous dedication to mentoring and leadership within her department, university, and international scientific community. —Andrea Dutton

Thomas E. McKenna (Delaware Geological Survey): Tom is recognized based on his applied research, his studies of Gulf of Mexico Basin thermal properties and basin evolution, the use of thermal imagery to map submarine groundwater discharge, and his communication of coastal water issues and sea-level rise risks to the public. —John Sharp

Nadine McQuarrie (University of Pittsburgh): A structural geologist who has advanced our understanding of continental tectonics, Nadine McQuarrie has generated bold map-view reconstructions and balanced cross sections that integrate structural, thermochronologic, geophysical, and petrologic datasets across major contractional and extensional systems, particularly in the Andes, Himalayas, Zagros, North American Cordillera, and Basin and Range province. —Brian Horton

Stephen R. Meyers (University of Wisconsin–Madison): Professor Stephen Meyers is an internationally recognized leader in the field of cyclostraigraph, which he has helped to elevate to an unprecedented level of scientific rigor and consequence. He has also inspired new generations of geoscientists through his outstanding classroom teaching and specialist workshops. —Laurel Goodwin

Marti L. Miller (U.S. Geological Survey): For outstanding leadership of the Alaska Science Center Geology Office and publications on the geology, mineral resources, metallogenesis, and tectonic history of southwestern Alaska. Her publications have been key to land-use planning and mineral exploration programs in Alaska. —Cynthia Dusel-Bacon

Francis C. Monastero: Dr. Monastero has had a great impact on the geosciences through leadership and administration of geothermal energy programs and organizations, and research into geothermal systems. He headed the geothermal program of the U.S. Navy, was president of the Geothermal Resource Council, and has guided innovative methods of geothermal exploration. —J. Douglas Walker

Diane E. Moore (U.S. Geological Survey): Dr. Moore is internationally recognized for excellence in high-pressure rock mechanics and innovative experimental studies of the physics and chemistry of active faults. Her meticulous measurements of fault-zone materials provide fundamental observations of fluid-rock interactions that result in fault healing, strength recovery, and permeability reduction. —Patricia McCrory

Augusto Neri (Istituto Nazionale di Geofisica e Vulcanologia): Elected to Fellowship as a 2017 GSA Honorary Fellow.

Sterling J. Nesbitt (Virginia Tech): Elected to Fellowship as the 2017 Young Scientist Award (Donath Medal) awardee.

Eric (Rick) Alan Oches (Bentley University): Rick has demonstrated a unique combination of disciplinary and administrative leadership in the geosciences over the last two decades. His work in earth-science education for non-majors is truly distinctive, building transdisciplinary sustainability curricula and programs that prepare business students for a more sustainable future. —David Szymanski
James B. Paces (U.S. Geological Survey): Recognized for innovative isotopic and Quaternary geochronological investigations of landscape evolution, geohydrologic processes, and hydrologic responses to climate change, through his use of U-series dating and radiogenic isotope tracers (U and Sr) in a diverse variety of materials and environments. —Mark Hudson

Jonathan L. Payne (Stanford University): For contributions to the study of the co-evolution of Earth and life, especially mass extinction and subsequent biotic recovery, through paleontological, sedimentary, and geochemical approaches. —Gordon E. Brown Jr.

Michael A. Phillips (Illinois Valley Community College): Michael Phillips is recognized for his excellence in undergraduate teaching; service to GSA and the North-Central Section as a member of the Geology and Public Policy Committee and to the National Association of Geoscience Teachers; and for raising the public’s awareness of the importance of geology in formulating public policy. —Jonathan H. Goodwin

Jani Radebaugh (Brigham Young University): Jani Radebaugh’s work on Titan and Io has led to fundamental understanding of how these outer solar system objects evolve today. Her efforts to reach a broad audience of non-scientists are also laudable. —Eric Christiansen

Mark E. Reid (U.S. Geological Survey): Mark E. Reid is recognized for his outstanding contributions in the field of landslide science that have resulted in reduced landslide risk and increased public safety. —Shaun Hurwitz

Tammy M. Rittenour (Utah State University): A leading expert in luminescence dating, Quaternary geology, and sedimentology, Tammy Rittenour has shown broad expertise in tackling diverse problems with numerous collaborators. She is exceedingly generous in sharing knowledge through workshops and short courses, and displays outstanding leadership as an enthusiastic chair of the Quaternary Geology and Geomorphology Division. —Grant Meyer

Delores M. Robinson (University of Alabama): Delores M. Robinson is an outstanding researcher and educator and is recognized internationally for her significant contributions to advancing the understanding of Himalayan tectonics and stratigraphy. Her novel integration of geochronology and thermochronology with extensive field investigations provides innovative methods to determine the internal architecture of thrust belts. —Ernest Mancini

Yamirka Rojas-Agramonte (Universidad de los Andes): For fundamental contributions to our understanding of continental crust formation and evolution, using Cuba and China as examples of these processes. —Robert Stern

John C. Schumacher (Portland State University): John Schumacher is one of the leading metamorphic petrologists/mineralogists in the world. He is honored for his seminal contributions to the fields of metamorphic petrology and especially in the metamorphic petrogenesis of amphiboles as well as his outstanding contributions to the education and training of undergraduate and graduate geology students. —Frank Spear

David Selby (Durham University): Selby is one of the leading geochemists exploring applications of the Re-Os system to significant problems in earth science. He is highly productive in publishing results of geologic research in both basic and applied categories, has successfully trained next generation earth scientists, administered geologic programs, and performed significant editorial service. —Bradley Sageman

Kamini Singha (Colorado School of Mines): Dr. Singha is nominated in recognition of her important contributions to fundamental and applied research applying geophysical methods to challenging problems in hydrogeology, and for her commitment to training graduate and undergraduate students. —Frederick Day-Lewis

Michael Elliot Smith (Northern Arizona University): For landmark contributions to our understanding of the timing of Green River Formation lake deposits and the record they provide of Eocene landscape evolution in the western U.S., for his voluminous and inspirational teaching, and for his editorial contributions to helping others reach publication. —Alan Carroll

Robert Bruce Stewart (Massey University): Robert (Bob) Stewart is nominated based on his extensive published international research in physical volcanology, andesite petrogenesis, paleoclimate studies, phytoremediation, and phytomining. He has also had a distinguished 40-year career in teaching earth science at Massey University, New Zealand, with meritorious service to his community, especially in teaching emergency management. —Vincent Neall

Michael C. Sukop (Florida International University): Dr. Sukop’s nomination is for his outstanding research publications and service to the GSA Hydrogeology Division. His research includes using Lattice Boltzman Modeling for investigating complex hydrogeological processes, such as multi-phase flow, movement of droplets, and flow in karst. Dr. Sukop also investigates water management and coastal flooding in Florida. —Larry McKay

Colin D. Sumrall (University of Tennessee): Colin Sumrall has done important research in the early (Cambrian and Ordovician) faunas, especially in early echinoderms (detailing the transformation from early bilateral forms to modern pentameral classes). He has been a pioneer in the use of laser directed X-rays (tomography) in determining three-dimensional internal anatomy of fossil echinoderms. —Ronald Parsley

“... service (and) leadership in the GSA Hydrogeology Division...”
Donald S. Sweetkind (U.S. Geological Survey): For his leadership in the development of non-traditional, three-dimensional geologic framework models for a variety of purposes, from understanding geologic controls on groundwater flow to unraveling the evolution of volcanic fields and sedimentary basins in response to the development of active faulting, and his many cross-discipline collaborations. —Eugene Schweig

Christopher S. Swezey (USGS): Chris is recognized for his research and publications on eolian processes, his framework geologic mapping in the eastern U.S., his dissemination of regional oil and gas assessments to a broad audience, and his contributions to the education of the next generation of geologists via field courses and individual mentoring. —Randall Orndorff

Kenneth Belk Taylor (North Carolina Geological Survey): Outstanding administrator/leader of a state geological survey whose work involves communicating and justifying the value of geology to the NC Legislature and almost continuous outreach activities to the public. Requires familiarity with and understanding of projects being undertaken by his staff. —Robert Hatcher

Jason Thomason (Illinois State Geological Survey): Jason Thomason is deserving of nomination to GSA Fellow based on his outstanding publications in geologic research, applied research and public awareness (especially regarding 3-D mapping of glacial deposits), teaching record and student mentoring, and leadership as a section head of the Hydrology Section at the Illinois State Geological Survey. —Ben Curry

Aradhna Tripati (University of California Los Angeles): Elected to Fellowship as the 2017 Bromery Award for Minorities recipient.

Stephen J. Van der Hoven (Genesis Engineering and Redevelopment): Steve is nominated for his contributions to the field of hydrogeology demonstrated through his publication record, student mentoring, and service in leadership in the GSA Hydrogeology Division. With a perspective from industry, Steve strives to make GSA a professional home for all hydrogeologists. —Eric Peterson

Jorge A. Vazquez (U.S. Geological Survey): For leading research on chronology and petrology of silicic magmatic systems, enabling others to reliably obtain top-quality data from the SHRIMP–RG, and ensuring continued vigor for the Stanford–USGS Ion Microprobe Laboratory. —Charles Bacon

Dorothy J. Vesper (West Virginia University): Dorothy Vesper is nominated for her outstanding contributions to applied research in karst hydrogeology and geochemistry, training and professional development of students, and professional leadership within the karst and hydrogeology community. —Madeline Schreiber

Josef Peter Werne (University of Pittsburgh): For extraordinary accomplishments in developing and using molecular and isotopic paleolimnologic proxies to enable refined reconstructions of past continental climates and to improve understanding of the dynamics of climate, in publication of the results of this important research, and in nurturing and training of young scientists. —Philip Meyers

Jane Kathryn Willenbring (Scripps Oceanography): Dr. Jane Willenbring exemplifies the energy and professionalism expected of fellows who will drive the scientific and community missions of GSA to their highest degree through impactful publication and creative outreach. Her leadership in surface processes geochemistry has been recognized internationally and appreciated by environmentally concerned citizens. —John Gosse

Grant C. Willis (Utah Geological Survey): Few geologists working in Utah today have contributed more to understanding Utah’s geology, both as a working geologist and as a geologic administrator, than has Grant Willis. Grant’s contributions to geologic mapping and deciphering the basic geologic framework of Utah have set a high standard for years to come. —William Lund

Robert C. Witter (U.S. Geological Survey): Over the past two decades, Rob has become increasingly well known for the exceptional quality of his research, his long-term commitment to applied geology and outreach, and his exemplary leadership in earthquake and tsunami hazards assessment, especially in the U.S. Pacific Northwest and southern Alaska. —Alan Nelson

Yigang Xu (Chinese Academy of Sciences): Dr. Yigang Xu is a top igneous petrologist and geochemist in China and has led the world in studying the generation of LIPs (Large Igneous Provinces) and intraplate volcanism in Asia. —Sun-Lin Chung

Yusuke Yokoyama (University of Tokyo): For contributions to our understanding of Quaternary climate, cryosphere studies, and glacial rebound as well as the advancement of geochemical and geochronologic methods in paleoclimate studies. —John Anderson

GSA Council approved at their spring meeting changing the requirements for automatic Fellowship for awardees of the Biggs Award for Excellence in Earth Science Teaching and the Young Scientist (Donath Medal) award. We are pleased to retroactively elect to Fellowship the following member:

Whitney M. Behr (University of Texas at Austin): Elected to Fellowship as the 2016 Young Scientist Award (Donath Medal) awardee.
GSA Celebrates Milestone Member Anniversaries

GSA salutes the following members and Fellows on their 25-year membership anniversaries in 2018. We appreciate their dedication and loyalty to GSA. Asterisks (*) indicate GSA Fellows.

Randall J. Adsit
Timothy T. Allen
Mark K. Allex
Eric Baer
David J. Barclay
Robert C. Barr
Julie K. Bartley
Rebecca L. Beavers
Richard L. Bedell
Karen G. Bemis
Christopher J. Benson
Eliza T. Bergslien
Paul Bishop*
Mark Bordelon
Kenneth R. Bradbury*
Douglas B. Brown
Andrew Browne
Ilya V. Buynevich
Barry A. Carlson
Kevin F. Cassidy
John A. Catalani
Frank C. Chuang
Timothy L. Clarey
Gwen M. Daley
J. Matthew Davis
Ralph K. Davis*
Carol M. Dehler*
Rhawn F. Denniston
Jane F. Denny
Louis A. Derry
Jeffrey C. Dick
David A. Dinter
Ron M. Dixon
Amy L. Ellwein
Jim B. Finley Jr.
Sue A. Finstick
Timothy G. Fisher*
Anthony M. Foyle
Umberto Fracassi
Alan E. Fryar*
Kenneth G. Galli
William M.B. Gavin
Maile Seeger Gee
George M. Gibson
Martha S. Gilmore*
Jonathan M.G. Glen
Russell W. Graymer
John E. Griffin
Stephen W. Grimes
Laura A. Guertin*
Linda C. Gundersen*
Michael Gurnis
Paul C. Hackley
Ralph J. Haefner
Ann M. Hagni
Charles W. Halfen Jr.
Stephen S. Harlan*
Michael J. Harrison
Andrew B. Heckert
Marc J. Hinton
Jefferson P. Hoffer
John T. Hopeck
Robert R. Horning
Timothy J. Horscroft
Patrick B. Hubbard
Richard O. Hughes III
Michael L. Hulver
Manuel A. Iturralde-Vinent*
Steven J. Johansen
David M. Johnson
Sofia M. Kaczor
Carl E. Kamp
Sharon L. Kanfoush
Michael R. Kaplan
John Andrew Karachewski
Simon A. Kattenhorn*
Brian G. Katz*
Eric Kirby*
Urs S. Kloetzli
Kurt M. Knebel
Jonathan J. Kolak
Kent S. Kiptiuch
Walter Kurz
Peter C. LaFemina
Willy LeBihan
Hermann D.W. Lebit
Mary L. Leech
Mike R. Leeder
Varner L. Leggitt
Olav B. Lian
Mian Liu*
Thomas D. Lorenson
Yi Lu
Joyce E. Lucas-Clark
Jinichiro Maeda
Paul E. Malmquist
Michelle J. Markley
L. Lynn Marquez
Kyle R. Mayborn
Vicki S. McConnell*
Jason T. McCuistion
Sally F. McGill
Brett T. McLaurin
James E. McRea
Charles G. Messing
Francis C. Monastero*
Donald H. Monteverde
William R. Moore
Lee H. Morse
Thomas G. Muhich
A. Brad Murray
Christopher J. Murray
Seiichi Nagihara
Anthony R. Norman
Yoshihide Ogawara*
Shunji Ouchi
Jack C. Pashin*
Mark E. Phillips
Scott H. Pike
David Adam Pivnik
Michael C. Pope*
Roger W. Portell
Henry A.M. Rauche
John A. Rayburn
Maureen E. Raymo
Stewart D. Redwood
Paul R. Renne*
Jennifer R. Reynolds
Francisco J. Rodriguez-Tovar
Gary D. Rosenberg*
Dennis R. Ruez Jr.
Michael Patrick Ryan*
Peter E. Schaaf
Elizabeth KT Schamberger
Clark L. Scheerens
Greg Schoenborn
Jennifer Schuetz
Brian N. Shaffer
Philip J. Shaller
Kurt A. Shoemaker
Manuel M.I.A. Sintubin
Barrett L. Smith
Deborah K. Smith
Rasoul B. Sorkhabi
George E. Springston
Daniel F. Stockli*
Ellen R. Stefan*
John W. Storb Jr.
Peter J. Sugarman*
Guenter R. Suhr
Neil S. Summer
Donna M. Surge
Calvin D. Taylor
Friedrich Teichmann
Barbara J. Tewksbury*
Slawek M. Tulaczyk*
Elizabeth C. Turner
Steven W. Veatch
Clifford I. Voss*
Julie K. Vry
Gregory J. Walsh*
Andrew C. Warnock
E. Bruce Watson*
Janine F. Weber
Jennifer A. Weekes-Miller
MaryBeth Wegner
Anne I. Weil
Julia Smith Wellner
Laura Reiser Wetzel
John B. Williams
Jeffrey T. Wilson
Kathleen Woida
Laurel G. Woodruff
Margaret M. Yacobucci
Atsushi Yamaji

Thank you for your membership!
GSA Celebrates Milestone Member Anniversaries

GSA salutes the following members and Fellows on their 50-year membership anniversaries in 2018. We appreciate their dedication and loyalty to GSA. To view a full list of members who have surpassed the 50-year mark, go to http://rock.geosociety.org/membership/50YearFellows.asp. Asterisks (*) indicate GSA Fellows.

John T. Andrews*
Victor R. Baker*
E. Joan Baldwin
Richard N. Benson*
Wolfgang H. Berger*
Archie W. Berry Jr.
David A. Nickey
Irwin D. Novak
James B. Pinkerton
John M. Rensberger
John M. Rensberger
Irwin D. Novak
Jane E. Nielson*
J. Michael Oneill*
John J. Renton

Oscar B. Eckhoff
Douglas W. Edsall
Robert J. Fleck
Donald R. Fowler
Paul J. Fox*
James C. Gamble
James V. Gardner*
Tharwat S. Ghaly
Alan S. Goldstein
Paul K. Grogger
Daniel Habib
Thomas D. Hamilton*
Frank W. Harrison Jr.
George M. Haselton*
Richard F. Holm
Jon D. Inners*
M. Allan Kays
James P. Kennett*
Samir G. Khoury*
Andre K. Lehre
David vondenburg LeMone
Lorance D. Lisle
Brian E. Lowes
Alexander Malahoff*
Jack P. Martin
Garry D. McKenzie*
Robert H. Meade*
Robert K. Merrill*
Andrew H. Merritt*
David M. Mickelson*
James F. Miller*
Alan G. Milnes
Douglas M. Morton*
Frank R. Moulton Jr.
Nilendu S. Mukherjee
Thomas H. Neel*
A. Conrad Neumann*
David A. Nickey
Irwin D. Novak
Jane E. Nielson*
A. Conrad Neumann*
Thomas H. Neel*
Nilendu S. Mukherjee
Frank R. Moulton Jr.
Douglas M. Morton*
James B. Pinkerton
Bernard W. Pipkin*
Carmen J. Pedrazzini*
Douglas C. Pasley Jr.
Norman J. Page*
James E. Palmer
Douglas C. Pasley Jr.
James E. Palmer
Carmen J. Pedrazzini*
James B. Pinkerton
Bernard W. Pipkin*
Anthony F. Randazzo*
John M. Rensberger
John J. Renton
Joseph L. Ritchey
Margaret Anne Rogers
Albert J. Rowell*
John M. Saul
Frederick L. Schwab*
Robert E. Sheridan*
William B. Size*
Ernest T. Solomon
Bernhard K. Sporli*
Randolph P. Steinen
David D. Steller
James B. Stevens
Hugh P. Taylor Jr.*
Harrison L. Townes
James K. Trigger
Mary Emma Wagner
John H. Wall*
James R. Weber*
Leonard S. Wiener
Charles Marsh
Woodruff Jr.*
Jean Ann Gilbert Wylie*

Thank you for your membership!
The 2018 GSA Committee on Research Grants awarded US$778,594 to 381 graduate students (52% of the 730 who applied), with an average grant of US$2,044. The committee also selected 10 alternate candidates in the event that any grantees return all or part of their funds due to a change in their research project or receipt of funds from another source. The GSA Graduate Student Research Grant Program is funded by GSA, the GSA Foundation, GSA Divisions, and the National Science Foundation (Award #1712071).


Alternate committee members: Lyndsay B. Ball, Whitney M. Behr, John Bershaw, Mark J. Caddick, Michelle L. Coombs, Steven G. Driese, Qinhong Hu, Peter J. Modreski, Gregory Nadon, Nathan A. Niemi, Michael R. Rosen, and James D. Wright.

The following awards will be presented at the GSA 2018 Annual Meeting & Exposition in Indianapolis, Indiana, USA.

2018 Outstanding Mentions
(proposals having exceptional merit in conception and presentation)

Jonathan Graham
University of Wisconsin–Madison

Abigail Kelly
University of Cincinnati

MacKenzie Mark-Moser
Oregon State University

Frank Pavia
Columbia University

Madelyn Percy
University of North Carolina at Chapel Hill

Elizabeth Pettitt
Rensselaer Polytechnic Institute

Logan Schmidt
University of Texas at Austin

Nicholas Spano
University of California, Berkeley

Thomas Van Der Welde
Boise State University

Alexander Wood
Northern Arizona University

2018 ExxonMobil/GSA Student Geoscience Grants

ExxonMobil has recognized 10 of the top 30 GSA student research grant proposals with grants of US$5000 each.

Grace Beaudoin
University of Texas at Austin

Matt Edgin
University of Wyoming

Karol Faehnrich
Dartmouth College

Romain Gougeon
University of Saskatchewan

Bari Hanafi
Rutgers, The State University of New Jersey

Brittany Hupp
University of Wisconsin–Madison

Georgina Lukoczki
Oklahoma State University

Kelly Thomson
The University of Texas at Austin

Emily White
University of Idaho

Chenliang Wu
William Marsh Rice University

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2018 Specialized Awards

Sponsored by the GSA Foundation

MICHELE ALDRICH HISTORY AND PHILOSOPHY OF GEOLOGY STUDENT RESEARCH AWARD

Gustave Lester, Harvard University

The Michele Aldrich History and Philosophy of Geology Student Research Award Fund supports research grants through the History and Philosophy of Geology Division for students who conduct historical research within the geosciences. Preference will be given first to doctoral, then master’s level students. Graduates who received their Ph.D. in the previous five years may also be considered. The recipient is determined by the History and Philosophy of Geology Division of GSA.

MARLAND PRATT BILLINGS AND KATHARINE FOWLER-BILLINGS RESEARCH AWARD

Alexandra Nagurney, Virginia Polytechnic Institute and State University

James Lenoir, Boston College

The Marland Pratt Billings and Katharine Fowler-Billings Research Award encourages and promotes geological fieldwork and related research in New England and adjacent regions.

JOHN A. BLACK AWARD

Danielle Molisee, University of South Florida

The John A. Black Award supports graduate student field-based research on coastal processes. All field-based coastal geomorphology research should be located in the USA, Puerto Rico, or Canada. In the event there are no worthy graduate student field-based research projects in coastal geomorphology, the award may be used to support graduate student field-based research in volcanology. All field-based volcanology research should be located in the USA, New Zealand, or Iceland.

GRETCHEIN L. BLECHSCHMIDT AWARD

Agnese Lanzetti, San Diego State University

The Gretchen Louise Blechschmidt Award Fund was established for women in the geological sciences who have an interest in achieving a Ph.D. in the fields of biostratigraphy and/or paleoceanography, sequence stratigraphy analysis, particularly in conjunction with research in deep-sea sedimentology, and a career in academic research.

IAN S.E. CARMICHAEL RESEARCH AWARD

Rebecca Degraffenreid, University of Hawai‘i at Mānoa

The Ian S.E. Carmichael Research Award supports graduate student research and related activities in the fields of igneous petrology and volcanology. The recipient is determined by the Mineralogy, Geochemistry, Petrology, and Volcanology (MGPV) Division of GSA.

ALLAN V. COX RESEARCH AWARD

Amanda Ketting-Olivier, Western Washington University

The Allan V. Cox Research Award supports research grants in geophysics. The recipient is determined by the Geophysics and Geodynamics Division of GSA.

JOHN T. DILLON ALASKA RESEARCH AWARD

Joseph Tulenko, State University of New York at Buffalo

William Kochtitzky, University of Maine

The John T. Dillon Alaska Research Award honors the memory of Dr. Dillon who was particularly noted for his radiometric age-dating work in the Brooks Range, Alaska, USA. Two areas that serve as guidelines for selection of the award are field-based studies dealing with the structural and tectonic development of Alaska and studies that include some aspect of geochronology (either paleontologic or radiometric) to provide new age control for significant rock units in Alaska.

DIVERSITY AWARD

Surya Freeman, Northern Illinois University

This award is presented to help further GSA’s commitment to increasing diversity in the geosciences. The recipient is either a member of an underrepresented group or engages in research that relates geoscience to members of underrepresented groups. Underrepresented is defined by GSA as a person from a diverse background that may include low-income, ethnic minority, first-generation, women, veterans, and students with disabilities. The student chosen for this grant will also have the option to participate in the On To the Future program and receive a partial travel award, full meeting registration, and be recognized at the Diversity in the Geosciences Reception at the GSA Annual Meeting.

ROBERT K. FAHNESTOCK AWARD

Megan Doughty, Colorado School of Mines

The Robert K. Fahnestock Award honors the memory of Dr. Fahnestock, a former member of the Research Grants Committee, who died indirectly as a result of service on the committee. The grant is awarded for the best proposal in sediment transport or related aspects of fluvial geomorphology, Dr. Fahnestock’s field.

GOULD RESEARCH GRANT

Renelle Dubosq, University of Ottawa

The Gould Research Grant supports graduate student research in the geosciences.
ROBERT D. HATCHER RESEARCH AWARD
Jessica Magolan, University of North Carolina Wilmington
The Robert D. Hatcher Research Award supports field-based research and geologic mapping through an annual award to an outstanding graduate student in the earth sciences to conduct research for that student’s master’s thesis or Ph.D. dissertation. Preference may be given to students working in the Appalachian orogeny broadly construed, but is not restricted to this region.

WILLIAM B. & DOROTHY HEROY RESEARCH GRANT
Vural Cakir, California State University, Long Beach
Lena Capece, University of California, Davis
Casey Saup, The Ohio State University
The William B. & Dorothy Heroy Research Grant supports graduate student research in the geosciences.

JOHN W. HESS RESEARCH GRANT
Jenny Ni, McGill University
The John W. Hess Research Grant in Karst Research Studies supports student research involving any aspect of cave and karst studies aimed at providing improved understanding of how caves and karst work, including how these resources can be better managed. The recipient is determined by the Karst Division of GSA.

ROSCOE G. JACKSON II AWARD
Kristina Butler, The University of Texas at Austin
The Roscoe G. Jackson II Award funds one recipient per year in the field of sedimentology.

LIPMAN RESEARCH AWARD
Aaron Ashley, University of South Carolina
Roy Bassoo, Baylor University
Kadie Bennis, University of Missouri–Kansas City
Melissa Chambers, California State University, Fullerton
Shoashauna Farnsworth-Pinkerton, Louisiana State University
Justine Grabiec, University of North Carolina at Chapel Hill
Lisa Grohn, University of Rochester
Rachel Hampton, University of Oregon
Antonio Luna, University of South Florida
Samuel Mitchell, University of Hawai‘i at Mānoa
Bryant Platt, California State University, Fresno
Jacob Setera, Rutgers, The State University of New Jersey
Lorenzo Tavazzani, Southern Methodist University
Samantha Tramontano, The Graduate Center, CUNY
Erin Wales, California State University, Northridge
Kellie Wall, Oregon State University
The Lipman Research Fund was established in 1993 and is supported by gifts from the Howard and Jean Lipman Foundation. The purpose of the fund is to promote and support student research grants in volcanology and petrology. The president of the Lipman Foundation, Peter W. Lipman, was the recipient of a GSA research grant in 1965. The recipient is determined by the Mineralogy, Geochemistry, Petrology, and Volcanology (MGPV) Division of GSA.

JOHN T. AND CAROL G. MCGILL AWARD
Katherine Guns, University of Arizona
Annette Patton, Colorado State University
Julianne Scamardo, Colorado State University
The John T. and Carol G. McGill Award, which is in the memory of John T. McGill, supports graduate student scholarships and research grants in engineering geology and geomorphology.

BRUCE L. “BIFF” REED SCHOLARSHIP AWARD
David Hernandez Uribe, Colorado School of Mines
The Bruce L. “Biff” Reed Scholarship Fund was established to provide research grants to graduate students pursuing studies in the tectonic and magmatic evolution of Alaska, primarily, and also can fund other geologic research.

CHARLES A. & JUNE R.P. ROSS RESEARCH AWARD
Rostislav Kovtun, California State University, Fullerton
Audrey Taylor, University of Notre Dame
John Rippe, University of North Carolina at Chapel Hill
Rebecca Dzombak, University of Michigan–Ann Arbor
The Charles A. & June R.P. Ross Research Award is given to support research projects for graduate students, post-graduate students, and post-doctorate researchers in the fields of biostratigraphy (including, but not limited to, fossil age dating and the study of evolutionary faunal successions), stratigraphy and stratigraphic correlation, paleogeography and paleobiogeography, interpreting past environments of deposition and their biological significance, and the integration of these research areas into better global understanding of (1) past plate motions (plate tectonics and sea-floor spreading); (2) past sea-level events, including their identification and ages; and/or (3) climate changes and effects of those climate changes on Earth’s inhabitants through geologic time. There should be, over time, a balance of money among the awards across these various subject sub-field categories depending on the merit of the annual project proposals.

ALEXANDER SISSON RESEARCH AWARD
Elisa Di Meglio, Oregon State University
Family members of Alexander Sisson established a fund in his memory to promote and support research for students pursuing studies in Alaska and the Caribbean.

PARKE D. SNAVELY, JR., CASCADIA RESEARCH AWARD
William Duckworth, Western Washington University
The Parke D. Snavely, Jr., Cascadia Research Award Fund provides support for field-oriented graduate student research that contributes to the understanding of the geologic processes and history of the Pacific Northwest convergent margin or to the evaluation of its hazard or resource potential.
2018 Specialized Awards

HAROLD T. STEARNS FELLOWSHIP AWARD
Michelle Gess, University of Wyoming
Dr. Stearns established the Harold T. Stearns Fellowship Award in 1973 for student research on aspects of the geology of the Pacific Islands and the circum-Pacific region.

LAUREN A. WRIGHT & BENNIE W. TROXEL STUDENT RESEARCH AWARD
Meredith Swallom, University of Kentucky
The Lauren A. Wright & Bennie W. Troxel Student Research Fund supports two graduate students in master’s or Ph.D. programs conducting field-based research (1) in the region broadly centered on Death Valley National Park, or (2) in the western and southern Basin and Range Tectonic Province. This research grant is associated with the GSA Structural Geology and Tectonics Division.

2018 Research Grant Recipients
(listed in alphabetical order by university)

Acadia University
Sarah Dunn

Arizona State University
Lorraine Carnes
Crystylynda Fudge
Alexandra Pye
Hannah Shamloo

Baylor University
Roy Bassoo
Alden Netto
Elisabeth Rau

Binghamton University, SUNY
Eugene Doyle
Elizabeth Klonowski
Kristian Olson

Boise State University
Charles Becker
Curtis Crandall
Carson MacPherson-Krutsky
Thomas Van Der Weide

Boston College
James Lenoir
Lauren Shea

Bowling Green State University
Brett Merkley

Brigham Young University
Stephen Campbell

Brooklyn College, CUNY
Shannon Brophy

Brown University
Nora Richter

California State University, Fresno
Bryant Platt

California State University, Fullerton
Melissa Chambers
Rostislav Kevtun
Cullen Scheland

California State University, Long Beach
Vural Cakir
Ian McGregor

California State University, Los Angeles
Marissa De Hoyos

California State University, Northridge
Kendra Carty
Erin Wales

Carleton University
Braden Gregory

Central Washington University
Joseph McCosby

Colorado School of Mines
Hannah Cayes
Megan Doughty
Garrett Gissler

David Hernandez Uribe
Pengfei Hou
Haipeng Li
Zachary Palmer
Allison Severson

Colorado State University
Skylar Mavor
Annette Patton
Julianne Scamardo
Nikki Seymour

Columbia University
Frank Pavia

Dalhousie University
Bryan Maciag

Dartmouth College
James Busch
Karol Faehnrich
Rebecca Rossi
Virginia Wala

Drexel University
Johannes Krause

Fort Hays State University
Pike Holman
Edward Shelburne

Georgia Institute of Technology
Amanda Cavazos
Biao Wan
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<th>Georgia State University</th>
<th>Andrea McClure</th>
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<td>Bari Hanafi Maria Makarova Jacob Setera Siyao Yu</td>
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<td>University of British Columbia</td>
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Nathaniel Norris  
Abby Padgett  
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| University of Colorado Boulder | Anne Fetrow  
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Jim Kerr |
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Melanie Callihan  
Rachel Rotz |
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Michael Mathioudakis  
Samuel Mitchell |
| University of Houston | Manuel Paez  
Dustin Villarreal |
| University of Idaho | Emily White |
| University of Illinois Urbana-Champaign | Michael DeLucia |
| University of Iowa | Larkin McCormack  
Justin Rosenblume  
Jacob Siebach |
| University of Kansas | Ashley CocciaDiferro  
Caroline Nazworth  
Ian Thompson |
| University of Kentucky | Brandon Spencer  
Laura Streib  
Meredith Swallom  
Frank Tamakloe |
| University of Maine | William Kochtitzky  
Joseph Mohan |
| University of Maryland–College Park | Kayleigh Harvey  
William Hoover  
Laura Sammon |
| University of Massachusetts Amherst | Justin Mistikawy |
| Southern Methodist University | Lorenzo Tavazzani |
| Stanford University | Mia Flores  
Virginia Isava  
Molly Witter |
| State University of New York at Buffalo | Alexandria Cerpovicz  
Megan Corcoran  
Joseph Tulenko |
| Texas A&M University | Monica Barbery  
Michelle Chrpa  
Maria Pesek |
| Texas A&M University–Corpus Christi | Sajjad Abdullajintakam |
| Texas State University | Aubri Jenson |
| Texas Tech University | Shane Dailey  
Donald Maute |
| The Graduate Center, CUNY | Samantha Tramontano  
John Zayac |
| The Ohio State University | Jeffrey Gunderson  
Deon Knights  
Amelia Nelson  
Kenneth Peterman  
James Price  
Casey Saup  
Devin Smith |
| Tulane University | Abdul Wahab |
| Universidad Nacional Autónoma de México (UNAM) | Emmanuel Escorcia  
Maria Isabel Vidal Reyes  
Nathalia Pineda Rodriguez |
| University of Alabama | Souvik Bhattacharjee  
Raleigh Koeberle  
Lauren Parker  
Leah Travis Taylor |
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<td>Jansen Costello</td>
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<td>University of Tennessee</td>
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<td>University of Tennessee, Knoxville</td>
<td>Agustin Kriscautzky</td>
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<td>Heather Upin</td>
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<td>Vanderbilt University</td>
<td>Lydia Harmon</td>
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<td>Virginia Polytechnic Institute and State</td>
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<td>Selva Marroquin</td>
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<td>Alexandra Nagurney</td>
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<td>Andrew Parent</td>
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<td>Lisa Whalen</td>
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2018 GSA Division, Section, and International Student Research Grants

GSA Divisions, Sections, and the International group have recognized the following student research grant recipients who submitted proposals of exceptionally high merit in conception and presentation in their fields. These students will be honored at the GSA 2018 Annual Meeting in Indianapolis, Indiana, USA.

DIVISION GRADUATE RESEARCH GRANTS

Geophysics & Geodynamics Division
Allan V. Cox Research Award and Supplement
Amanda Ketting-Olivier, Western Washington University
Geophysics Student Research Grant Award and Supplement
Audrey Dunham, University of Arizona

Hydrogeology Division
Hydrogeology Division Student Research Grant Awards and Travel Grants
Mark Higgins, University of Connecticut
Deon Knights, The Ohio State University
Amelia Nelson, The Ohio State University
Mary Plauche, Kent State University
Devin Smith, The Ohio State University

Mineralogy, Geochemistry, Petrology, and Volcanology Division
MGPV Division Student Research Grant Awards
Fotios Fouskas, Indiana University–Purdue University
Jacob Klug, University of Wisconsin–Madison
Bryan Maciag, Dalhousie University
Donald Maute, Texas Tech University
Ezequiel A Moreno Flores, The University of Texas at El Paso
Hannah Shamloo, Arizona State University

Quaternary Geology and Geomorphology Division
Peter Birkeland Soil Geomorphology Research Award
Charles Abolt, University of Texas at Austin
Arthur D. Howard Student Research Award
Nathaniel Norris, University of Cincinnati

J. Hoover Mackin Student Research Award
Ian Reeves, University of North Carolina at Chapel Hill
Marie Morisawa Research Award
Annette Patton, Colorado State University
Stanley A. Schumm Research Grant Award
Rebecca Beers, Northern Arizona University

Structural Geology and Tectonics Division
Structural Geology and Tectonics Division Student Research Travel Grant Awards
William Duckworth, Western Washington University
Bari Hanafi, Rutgers, The State University of New Jersey
Meredith Swallom, University of Kentucky
MacKenzie Mark-Moser, Oregon State University
Karol Fachnrich, Dartmouth College

SECTION GRADUATE RESEARCH GRANTS

Southeastern Section Graduate Research Grants
Elizabeth Avery, University of Kentucky
Laura de Sousa, East Carolina University
Tanner Eischen, East Carolina University
Paula Perillo-Castillo, University of Tennessee–Knoxville
Md Mahfujur Rahman, Auburn University
Cody Shell, East Carolina University
SECTION UNDERGRADUATE RESEARCH GRANTS

Rocky Mountain Section Undergraduate Research Grants
Andrew Del Turco, Stockton University
Michael Ferraro, Utah State University
Corey Flynn, University of Colorado Boulder
Jacob Hooker, University of Northern Colorado
Lauren Miller, Colorado School of Mines
Evan Millsap, Utah State University

North-Central Section Undergraduate Research Grants
Vanessa Bump, University of Indianapolis
Nancy A. Duque, University of Wisconsin–Milwaukee
Duncan Glasford, University of Wisconsin–Milwaukee
Geoffrey Montour, University of Iowa
David Rogers, Missouri University of Science & Technology

Northeastern Section Stephen G. Pollock Undergraduate Research Grants
Morgan Balliet, Wilkes University
Jake Bernstein, Bryn Mawr College
Kendra Bonsey and Allison Curley, Dickinson College
Patrick Fennelly, State University of New York at Buffalo
Sean Frangos, Villanova University
Joshua Foust, Wilkes University
Colin Griffin, State University of New York at Buffalo
Kayla Hollister, State University of New York at Buffalo
Caroline Hung, Williams College–Mystic

Southeastern Section Undergraduate Research Grants
Nicholas Bentley, Florida State University
Nikita Kepezhinskas, University of Florida

GSA International
Farouk El-Baz Student Research Grants
Mary Barlow, University of Houston for “Impact of Climate Change on Channel Geomorphology in Hyper-Arid Polar Desert.”
Audrey Rader, University of Nevada–Las Vegas for “Restoration of Ecological Functions of Soils and Vegetation in the Mojave-Sonoran Ecotone.”

This grant is to encourage and support desert studies by students worldwide either in their senior year of their undergraduate studies, or at the master’s or Ph.D. level.

2018 Cole Awards

The Gladys W. Cole and W. Storrs Cole Memorial Awards for postdoctoral research are funded by the GSA Foundation.

Gladys W. Cole Memorial Research Award
Joan Florsheim, University of California, Santa Barbara, will be awarded US$7,000 from the Gladys W. Cole Fund for research in geomorphology of semiarid and arid terrains for her project, “Quantification of Geomorphic Disturbance and Recovery Following Wildfire.” The award will be presented at the Quaternary Geology and Geomorphology Division Awards Ceremony at the 2018 GSA Annual Meeting in Indianapolis, Indiana, USA, on Tuesday, 6 Nov.

W. Storrs Cole Memorial Research Fund
Dorothy Pak, Marine Science Institute of the University of California Santa Barbara, will be awarded US$6500 from the W. Storrs Cole Fund for research in invertebrate micropaleontology for the project, “Reconstructing North Pacific Ecosystem Response to Climate Transitions of the Past 2000 Years Using Foraminiferal Proxies.” The award will be presented at the Cushman Foundation for Foraminiferal Research award ceremony at the 2018 GSA Annual Meeting in Indianapolis, Indiana, USA, on Tuesday, 6 Nov.

Samantha McComb, State University of New York at Potsdam
Rebecca Nathan, Hartwick College
Telemak Olsen, Skidmore College
Melinda Quock, University of Vermont
Nathan Smail, Skidmore College
Benjamin Teerlinck, University of Connecticut
Frank Tetto, Lehigh University
Hannah Tompkins, Rochester University
Ellen Weber, Wilkes University

South-Central Section Undergraduate Research Grants
Asmara Lehrmann, Trinity University
Laura Taylor, University of Houston

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Get into the Field with GSA!

2018 Field Camp Award Recipients

GSA FIELD CAMP SCHOLARS AWARD
These ten undergraduate students will be awarded US$2,000 each to attend the summer field camp of their choice based on diversity, economic/financial need, and merit.

Tamara Adams, University of Texas at Arlington
Ahmed Al-bedhawi, Edinboro University of Pennsylvania
Cesar Garcia, Indiana University Northwest
Dalila Jesus, University of Oklahoma
Kuzipa Kapayi, University of Texas at San Antonio
Samantha McComb, SUNY Potsdam
Shirley Mensah, Eastern Illinois University
Seyena Simpson, University of South Florida
Delcio Teixeira, University of Oklahoma
Liannie Velazquez Santana, University of Puerto Rico, Mayagüez

GSA/EXXONMOBIL FIELD CAMP EXCELLENCE AWARD
This field camp will receive an award of US$10,000 to assist with the summer field season. This award will be based on safety awareness, diversity, and technical excellence.

Virginia Sisson, University of Houston

GSA/EXXONMOBIL BIGHORN BASIN FIELD AWARD
These 25 awardees will attend a one week field seminar in the Bighorn Basin of north-central Wyoming emphasizing multidisciplinary integrated basin analysis. All costs will be covered.

UNDERGRADUATE STUDENTS
Ariel Boddie, University of Memphis
Rocio Castillo, Fort Valley State University
Samantha Denham, Pacific Lutheran University
Bradley Dowell, Wheaton College
Danielle Gygi, University of Wisconsin–Madison
Kammie Hauger, Central Michigan University
Travis Leach, Boise State University
Jasmine Mason, University of Texas at Austin
Garret Nowakowski, Central Michigan University
Lydia Pehlert, West Chester University of Pennsylvania
Jason Spencer, University of Arkansas at Little Rock
Frank Tetto, Lehigh University
Kelsey Tucker, University of Alaska
Ronita Williams, Arizona State University
Kristie Yager, SUNY Potsdam

GRADUATE STUDENTS
Benjamin DeJarnatt, University of California Santa Cruz
Angel Garcia, Arizona State University
Jeffrey Hannon, University of Cincinnati
Edward Matheson, University of Nebraska–Lincoln
Oguchukwu Ozotta, University of North Dakota
Chilisa Shorten, Syracuse University
Chris Steuer, Montana State University

PROFESSORS
William Jackson, University of South Alabama
Joshua Novello, University of Akron
Amy Weislogel, West Virginia University
Welcome New GSA Members

The following new members joined 24 August 2017–1 March 2018 and were approved by GSA Council at its spring meeting.

Francisco Jose Escandon
Stephen H. Evans
Giacomo Falorni
Guangying Feng
Cyrus W. Field
Yaron Finzi
Lyndsey Fisher
Jonathan Florez
Gwenn Flowers
Bradford J. Foley
Eric Fordham
Efi Foufoula
Douglas Allen Fowler
Ron Frost
Laura Stinely Gabel
Zhiye Gao
Don Gest
Asma Amjad Ghaznavi
Laura Giambiagi
William K. Gibbs Jr.
Venice L. Goetz
Gary Gomby
Jose Gomez Tapia
Frank J. Gonzalez
Dib Goswami
William Gunter
Robert Hairston-Porter
Syeda Jesmin Haque
Daina V. Hardisty
Robin Harrover
Kim Hatch
Philip H. Heckel
Andrew Hein
Jussi S. Heinonen
Patricia Heiser
Kelly Elizabeth Helmer
Andrew Paul Hilt
Jason Hinkle
Leonard D. Hinrichs II
Marc M. Hirschmann
Caleb W. Holyoke III
Mark Scott Hopkins
Albert Horton
Robert Andrew Houston
Kuo-chin Hsu
Jing Huang
Kun Huang
Shichun Huang
Melinda Huff
Rob Humphries
Richard Scott Hutto
Amanda Ibeneme
Mohammed Shabbirul Islam
Kristin Louise Jaeger
Robert David Jarrett
Dushmantha Jayawickreme
Jose Carlos Jimenez Escalona
Dann Charles Johmanesen
Perry M. Jones
Rosanne Jowitz
Ray Kaczorowski
Tomomi Kani
Keena Kareem
Erih Kay
John Kelliher
Charlie Kerans
Steven M. Killingsworth
Bryn Elizabeth Kinball
Sadie Kingsbury
James T. Kirby
Mads Faurshou Knudsen
Tvrisko Korbar
Manish Kumar
Wendy Kurniawan
Craig Kurtz
Brice Lacroix
Diedre Avon Lamb
Thomas Norman Lamb
Guillaume Le Hir
Marion Le Voyer
Li Li
Ronghong Lin
Eric Kurt Lintz
Dongdong Liu
Dennis Livingston
Kevin Patrick Loeb
Maureen Long
Trina Celeste Lubbe
Ann E. Lundberg
Andrew J. Lydyard

Professionals
Ramanathan Al
Khalid A. Al-Ramadan
Zhisheng An
Scott Anderson
Jean Marie Baker
Vinyet Baques
David Barr
Melissa Beaman
Celine Marie Beaucamp
Roberto E. Biaggi
Sevin Bilir
Thom Bogaard
Taiwo A. Bolaji
Robert Bolding
William Boos
Melissa Bowerman
Georgia Bracey
Bryndis Brandsdottir
Carla Brock
John C. Brock
Natalie Burls
Robert Burns
Stephen Burns
Yanjun Cai
Joseph Robert Carbone
Alan Carey
Lupe Carrillo
Nicola Casagli
Jeremiah Catron
Sadhana M. Chatterjee
Qinghua Chen
Pauline W.U. Chinn
Jaeyoung Choi
Piotr Cienciala
Rachel Cleetus
William P. Clement
Martin Clifford
John M. Connor
Julia Cooke
Catherine Cooper
Hilary Corlett
Tom Coulthard
Sean Andrew Crowe
Sebastian Csatak
Nadaya Cubas
Shinta Damayanti
Bruce Kelley Darling
Thomas Lealand Davis
Alejandra De la Rosa
Stephen de Wit
Brian Patrick Demet
Michael D. D’emic
Christina DeVera
Rick Devlin
Dessy Amalia Dharmayanti
Eldar Noy Dobrea
Kevin Donihoo
Yannick Donnadieu
Brent Scott Duncan
Beth Dushman
William Benjamin Egeland
Eric G. Ekdale
Ingrid Ekstrom
Ahmed Niazy El-Barkooky
Bailey Elkins
Andrew Callaway Ellis

Early Career Professionals

Students

K–12 Teachers

Affiliates

The following new members joined 24 August 2017–1 March 2018 and were approved by GSA Council at its spring meeting.

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Students
(Listed by Professional Interest)

Archaeological Geology
Daniel Richard Boldt
Luke Thomas Burds
Eleanor Carrano
Sarah Elizabeth Crabb
Tyler Rose Donaldson
Mark Z. Dudko
Troy M. Ferland
Andrew Garner
Alison Hafner
Kathryn A. Harris
Emily Jo Hartwig
Mariah Jackson
Sarah Ann Jacobs
Lila Jones
Sophie Koennig Joseph
Lance Lee Martin
Katelyn McDonough
Tasneem Basri Neem
John Olechnicki
Desiré Marie Pichlus
Kathryn Proctor
Asta Rand
Breanna Reiss
Nicholas Lorne Riddick
Cambria Margaret Patricia Rodriguez
Matthea Wiebe
Sawyer Newton Young
Asif Uz Zaman

Top reasons new members join GSA
Career development
GSA meetings
GSA publications
Sophia Laroche  
Amalie Larsen–Van Vleet  
Kevin Joseph LeDone  
Ben Lee  
Sophia H. Leiter  
Dustin Andrew Liikane  
Guoheng Liu  
Xiaoyu Liu  
Shasta Longo  
Nathan Scott Loveless  
Antonio Jaime Luna  
Nova Mahaffey  
Brandi Maher  
Nicole Malstrom  
Lameck Maninji  
William A. Matthews III  
Kyle McCarty  
Collin Metz  
Julia Helen Michienzi  
Michelle Christine Mild  
Allison Miller  
Emily Ann Miller  
Hana Mintz  
Meridith A. Miska  
Cameron McClure Moore  
Ariel Quinn Moran  
Michael Morett Jr.  
Katherine Morris  
Sinead Clue Mccorm-McHugh  
Lindsay Leigh Mota  
Andrew Murphy  
Allyson Murray  
Matthew Nadeau  
Timothy Robert Naumann  
Paul Neuberger  
Benjamin Karl Neunsinger  
Steven Paul Newchurch  
Ellen Ng  
Adam Rhys O’Connor  
Elizabeth Oliphant  
Stella Oliveira  
Sercan Ozturk  
John Barrett Palmerton  
Abigail Ann Pashina  
Brigitte M. Petras  
Elizabeth A. Pettitt  
Bailey Dianne Pfister  
Patrick Richard Phelps  
Trisha Janelle Pichok  
Articus Proctor  
James Daniel Quick  
Hifzur Rahman  
Gabriela Yvonne Ramirez  
Robert Anthony Ramirez  
Sierra Rhye Ramsey  
Morgan Remick  
Nicole Rocco  
Nathalia Andrea Pineda  
Rodriguez  
Subhajit Roy  
Anna Cameron Ruefer  
Monika Rusiecka  
Amy G. Ryan  
Jake M. Salanave  
Laura Sammon  
Willa Jean Samuelson  
Corey L. Scandone  
Mallory Scofield  
Alex Hutton Senjem  
Noshin Sharmili  
U Mong Shing  
Cloitilde Q. Silva  
Coley Daniel Smith  
Stuart Alan Smith II  
Kelli Snyder  
Dakota Soderlund  
Danielle J. Spencer  
Jonathan Spiegelglas  
Braxton Spiker  
Elizabeth Marie Spitzer  
Ashley Stewart  
Sarena Tarongoy  
Lorenzo Tavazzani  
Sabrina Tecklenburg  
Michelle Thomas  
Hepeng Tian  
Hannah Timlin  
Leslie Tintle  
Daniel John Tjapkes  
Joseph Tolworthy  
José Guadalupe Cavazos Tovar  
Kathryn Turner  
James S. Uroff  
Duabchi Vang  
Tom Varner  
Cecilia Santillana Villa  
Ali Jo Vinke  
Christian Hemlock Vizza  
Kathryn Ruth VonSydow  
Bryan Lynn Wahls  
Erin Wales  
Paul Anthony Wallace  
Biao Wan  
Kenneth James Watson Jr.  
Mackenzie A. Wegmann  
Guangyi Wei  
Christopher David Weiman  
Mebrahtu Fisseha  
Weldegebriel  
Jenelle Wemper  
Kevin Alexander Wokosin  
Daniel L. Wood  
Dan Worcester  
Kimberly N. Wurth  
Jingjiang Yan  
Kristy Zalud  
Ziqui Zhang  
Scott B. Zylstra

Oceanography/Marine Geology

Tharanath Modika Bandra  
Ambillapitiya  
Benjamin Anthony Anderson  
Shannon L. Banks  
Kayla Marie Bronzo  
Bryanna Ehmkne  
Mason Norman Frucci  
Alexandra Jo Garand  
Kali Ren Gough  
George J. Harth  
William Hefner  
Ryan Jinks  
Konstantinos Kasamias  
Grace Kim  
Dietrich Kuhlmann IV  
Anastasia Kyrmandidou  
Vera Lawson  
Michelle Lee  
Christopher Lopez  
Raisha Lovindeer  
Avery Maverick  
Macie E. McCallion  
Claire Cecelia McKinley  
Puspita Paul  
Frank Pavia  
Kylie Nicole Piper  
Brittany Nicole Plyer  
Isa Marie Richardson  
Junghyung Ryu  
Marie Salmi  
Serena Mercedes Smith  
Brittany M. Stolfus  
Noah Eric Strom  
Brittany Theilen  
Valerie Nicole Voisin  
Chelsea Anne Volpano  
Peter T. Wallace  
Sophia Wensman

Paleo Sciences

Ariel Dawn Adolphsen  
Brandon Christopher Albright  
Lydia Albright  
Oscar Martinez Armengolt  
Marion Attanasio  
Cathleen Virginia Baker  
Sophia Bautista  
James D. Beech  
Pieter Gibbs Bonin  
Kamal Sarah Bookwal  
Alexander Bradley  
William Brightly  
Kane Bruce  
Sarah Bruhler  
Angela N. Campisi  
Eric James Chamerooy  
Marley A. Chertok  
Anne Renee Cicciariello  
Char Daniel Cilless  
Timothy Clark  
Brandy Coats  
Macy Alaina Conrad  
Nora Deni Soto Contreras  
Nathan Daniel  
Gavin J. Davidson  
Austin Michael Deans  
Sarah Dendy  
Daniel Gerard Dick  
Alex Dil  
Brandt Dimitroff  
Kira Joy Eaton  
Caitlin Feay  
Brenden J. Fischer-Femal  
Holley M. Flora  
Adlai Nathanael Reuel Fonseca  
Michael Elijah Ford  
Saul U. Galvez Jr.  
Duncan Glasford  
Gabriel Stedman Goncalves  
Romain Claude Gougeon  
Jamie Lynn Graves  
Eric Robert Hagen  
Curtis Halliday  
Megan Kathleen Heins  
Tyler Helm  
Siân Howard  
Colin Jones  
Anthony Michael Joyce  
Angela Kaup

Top professional interests of new students

- Mineralogy, Geochemistry, Petrology, and Volcanology
- Hydrogeology and Hydrology
- Environmental Science
- Structural Geology and Tectonics
- Stratigraphy and Sedimentology
Universities with the most new student members:

University of Washington
Texas A&M University
Western Washington University
Oregon State University
Missouri University of Science & Technology

Tasnuva Ferdous Ming Khan
Rahab Kinyanjui
Veronica Klein
Damien S. Knight
Dana Elaine Korneisel
Agneze Lanzetti
Tatiana Rose Marrone
Timothy Curt McClure Jr.
Corbin Michael McColloch
Larkin McCormack
April Miller
Jennifer Brianna Miller
Joseph J. Moffitt
Chiza Ngachize Mwinde
Rebecca Naprstek
Samantha B. Ocon
Adrian Overly
Ryan Paterson
April Miller
Jennifer Brianna Miller
Joseph J. Moffitt
Chiza Ngachize Mwinde
Rebecca Naprstek
Samantha B. Ocon
Adrian Overly
Ryan Paterson
Amanda Wu Peng
Justine Perrotti
Amber Petrie
Michael Shouta Peyton
Kelly Cathrine Pfeiler
Dianna Price
April Miller
Benjamin Eli Riddell-Young
Juan Romero
Brooke Alix Roselle
Christopher Michael Schiller
Ryan Earl Shanks
Edward Chase Shellburne
Jason Sterling Silviria
Robert Spencer
Brittney Elizabeth Stoneburg

Sierra Kristine Swenson
Cristian James Swoish
Shawn Taylor
Rose Telus
Ryan Alf Kevin Tengelsen
Leah Marie Travis Taylor
Peter Vittorio Valenti
Prescott James Vayda
Kevin Ian Vélez-Rosado Sr.
Franco Aaron Villegas-Garin
Chris Hang-bok Weer
Seth Patrick Weinberg
Sophie Westacott
Brenen Wynd

Planetary/Space Science
Michael Glade Baird
Cauê Sciascia Borlina
Joseph Budnovitch III
Samuel F.A. Cartwright
Neeraja Chinchalkar
Jeng hann Chong
Justin Cowart
Byron Christopher Cragg
Evan Davis
Sietze Jan De Graaff
John Dominic Defelice
Minda Dettman
Steven Daniel Dibb
Chad Lawrence Dodge
McKenzie Elliott
Gregory Brian Emery
Al Emran
Talor Galloway
Justin Todd Germann
Anthony Glanovsky
Sean Patrick Hartman
Kathleen M. Hoza
Emily Brownyn Hughes
Brendt C. Hyde
Marianna Karagiannis
Megan R. Kelley
Sakiko Knuttita
Brooke Kubby
Michael Louis Lampron-York
Taryn Ashley Lausch
Alicia Lopez
Sara Ann Lowery
Ian Marrs
Audrey Claire Martin
Rayssa Martins Pimentel
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Mia McGee
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Eric Edward Thorsen
Paul J. Williams

GSA has 2,535 active Fellows
In Memoriam

The Society notes with regret the deaths of the following members (notifications received between 1 March 2018 and 30 April 2018).

Kevin Burke  
Rockport, Massachusetts, USA  
Date of death: 21 Mar. 2018

Don U. Deere  
Gainesville, Florida, USA  
Date notified: 6 Mar. 2018

Robert H. Dott Jr.  
Madison, Wisconsin, USA  
Date notified: 27 Feb. 2018

James H. Fisher  
East Lansing, Michigan, USA  
Date notified: 4 Apr. 2018

David Graham Hardy  
Mesa, Arizona, USA  
Date notified: 30 Mar. 2018

Lukas Harvey  
Canton, New York, USA  
Date of Death: 31 Mar. 2018

Erle G. Kauffman  
Bloomington, Indiana, USA  
Date notified: 1 Mar. 2018

George Devries Klein  
Barragada, Guam, USA  
Date of death: 30 Apr. 2018

George E. McGill  
Amherst, Massachusetts, USA  
Date of death: 13 Mar. 2018

Curtis R. McKinney Jr.  
Miami, Florida, USA  
Date notified: 23 Apr. 2018

M. Ann Molineux  
Bee Cave, Texas, USA  
Date of death: 1 Feb. 2018

Joseph S. Rosenshein  
Virginia Beach, Virginia, USA  
Date of death: 21 Apr. 2018

John Shaw  
Edmonton, Alberta, Canada  
Date of death: 9 Mar. 2018

Lorin R. Stieff  
Sarasota, Florida, USA  
Date notified: 1 Mar. 2018

Lawrence A. Taylor  
Knoxville, Tennessee, USA  
Date of death: 18 Sept. 2017

Maurice J. Terman  
Falls Church, Virginia, USA  
Date of death: 22 Mar. 2018

Walter L. Youngquist  
Eugene, Oregon, USA  
Date of death: 20 Feb. 2018

Contact: Becky Sundeen, bsundeen@geosociety.org

www.geosociety.org
Communication is Key to Success

My interest in earth science began at a young age, as family trips involved visiting national parks and appreciating conservation efforts. Yet I can’t deny my passion for being outside and in nature may have been the subtle influence that sparked joy in wanting to learn more about the natural environment. I recognize how my early experiences affected my understanding of our responsibilities toward a sustainable future. Realizing that I could influence natural resource policies needed in our communities, I felt compelled to shape science advocacy. I knew that working in Washington, D.C., would provide first-hand experience about policy making at the federal level. The dream I had of becoming a fellow seemed to be a necessary step after completing my academics, since I wanted a chance to learn how I might impact a changing world through legislation.

As the 2017–2018 GSA-USGS Congressional Science Fellow, I arrived in Washington, D.C., in August 2017 just a few months after receiving my doctorate and ready for orientation and placement. I am one of 35 Science Policy Congressional Fellows in a program organized and run by the American Association for the Advancement of Science (AAAS). In addition to GSA, other scientific and engineering professional associations support Ph.D. scientists as fellows to work on the Hill. I serve my fellowship in the Office of Senator Tom Udall (D-NM), where I’m engaged in policies and issues related to water, natural resources, biofuels, fisheries, and science. The access to research, collaborative decision making, and stakeholder engagement has increased my appreciation for the political process. Thus far, this year-long fellowship has provided ample experience to communicate complex scientific issues and policies, understand the inner workings of Congress, and learn the importance of relationships and collaboration.

It did not take long for me to realize that success as a congressional staffer is driven by effective communication. When I first started as a fellow, I was amazed at the ability of congressional staffers to quickly digest, distill, and clearly communicate complex policy issues to colleagues, constituents, and particularly to the member of Congress. A common exercise for a new congressional fellow is to summarize a broad scientific policy topic into one page or less. I was tasked with drafting a memo to summarize the Renewable Fuel Standard, a complicated biofuels policy with so much jargon it would make your head spin. I started by summarizing the policy to two pages, then distilled it further to one page, cut it down to a paragraph, and ultimately ended with a few bulleted sentences. Oftentimes congressional staffers will be lucky to get the member of Congress to read the first paragraph of a memo, given the demands of their schedule, therefore it is important to be straightforward, concise, and relevant in all forms of communication.

The pace of work and the interactions with colleagues and stakeholders are quite different from an academic environment. My most notable experience thus far was having to write Senator Udall a vote recommendation memo for a bill in under two hours. Senator Udall is a member of the Commerce, Science, and Transportation Committee, and must be well-prepared for executive session. Since a number of bills and nominations are voted on, members of his staff research, review, and compile draft vote recommendations into a staff memo prior to the committee meeting. There was a controversial ocean fisheries bill on the agenda of one particular meeting, and since this agenda item was added at the last minute, I did not have ample time to complete this task. I quickly conferred with ocean policy experts, Committee staff, and ocean fisheries stakeholders. I grasped as much as I could about ocean fisheries policy, including the Magnuson-Stevens Fishery Conservation and Management Act so that I could adequately inform the Senator. Ultimately, I learned that picking up the telephone is much faster than researching a topic solo. This experience illuminated the importance of communication and that synthesizing information quickly and succinctly is a requirement in working as a legislative staffer on the Hill.

As I reflect on the experience halfway through the GSA-USGS fellowship, I think of the number of benefits that this fellowship has provided. I have had a front row seat in shaping science policy, learning from many experienced congressional staffers and serving the public and geoscience community. My congressional science fellowship has broadened my worldview, deepened my understanding of how public policy works, and changed my perceptions of science and environmental advocacy. I have learned the importance of strengthening and fine-tuning my own communication and scientific policy writing skills. Regardless of the level of education and knowledge a person holds, the ability to communicate well can provide advantages in careers and experiences going forward.

The manuscript is submitted for publication by Melanie R. Thornton, 2017–2018 GSA-USGS Congressional Science Fellow, with the understanding that the U.S. government is authorized to reproduce and distribute reprints for governmental use. The one-year fellowship is supported by GSA and the U.S. Geological Survey, Department of the Interior, under Assistance Award Number G17AP00132. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. government. Thornton works in the office of Senator Tom Udall (D-NM) and can be contacted by e-mail at Melanie_Thornton@tomudall.senate.gov.
Colorado GSA members Donald Runnells (consultant) and John Dedecker (Ph.D. student, Colorado School of Mines) volunteered as geoscience judges at the Colorado Science & Engineering Fair, hosted by Colorado State University in Ft. Collins, USA, on 5–7 April. GSA Awards in Environmental Geology are presented each year to the best Junior or Senior Division exhibits relating some aspect of the geosciences to environmental issues. GSA sponsors prizes for its special award winners: a US$100 gift certificate for first place, US$75 for second place, and US$50 for third, plus a plaque for each winner and some GSA memorabilia. Winners of the state competition go on to represent their regions at the prestigious Intel International Science & Engineering Fair.

Our judges reported that:

1. “All five GSA winners were female.”
2. “Our first-place winner was in the 7th grade (12 years old). Her work was remarkable for its innovative and technical quality. Truly remarkable.”
3. “Our first-place winner had won five other awards by the time I (Don) had to leave the ceremony, which was about halfway through the evening.”
4. “Both of us agreed that the second- and third-place winners successfully completed projects that were easily of college-level quality and complexity.”

GSA would like to thank our volunteer judges and give hearty congratulations to our winners:

**First-place project title:** Detection of Chemical Contaminants in Water Using Carbon Nanotube Sensors (STEM School Highlands Ranch, Highlands Ranch, Colorado, USA).

**Second-place project title:** Using 3D Drone-Based Digital Models to Investigate the Fluvial Geomorphology of an Eroding Arroyo (Palmer High School, Colorado Springs, Colorado, USA).

**Third-place project title:** The Alamosa River Watershed: A Unique Proving Ground for Natural Selection (Monte Vista High School, Monte Vista, Colorado, USA).

All GSA winners are listed on page 16 of this press release: www.csef.colostate.edu/2018_Press_Release.pdf.

We also applaud all of the participating young scientists—in Colorado and around the nation.

We encourage all practicing geoscientists to engage in public outreach whenever possible. If you are volunteering time with your state or regional science competitions, let us know. GSA would like to get a sense of the scope of members’ involvement in this type of activity and think about how this outreach might fit into GSA’s strategic planning initiative. Share your experience in the GSA Open Forum at community.geosociety.org, on Twitter mention @geosociety, or email communications@geosociety.org.
...This Summer

Arizona—Flagstaff, 23–27 July
Colorado—Colorado Springs, 30 July–3 August


For workshop details, prices, and registration, check the GeoTeachers website at www.geosociety.org/geoteacherspd, or contact Dean Moosavi, smoosavi@geosociety.org, +1-303-357-1015.

Indiana—Indianapolis: Annual Meeting Mini-Workshop, 2–4 November

Highlights of the Indiana Workshop:
• Day field trip to Turkey Run State Park
• Post-glacial entrenchment of streams in Mississippian sandstones
• Keynote presentation on Indiana geology
• Sunday Annual Meeting Technical Session attendance

For workshop details, prices, and registration, check the GeoTeachers website at www.geosociety.org/geoteacherspd, or contact Dean Moosavi, smoosavi@geosociety.org, +1-303-357-1015.

At Indy

GSA 2018
4–7 November
Indianapolis, Indiana, USA

Garden of the Gods and Pikes Peak, Colorado, USA. Photo by Dean Moosavi.

Big Stump, Florissant National Monument, Colorado, USA. Photo by Dean Moosavi.

Groundwater discharge from Mississippian Sandstones, Turkey Run State Park, Indiana, USA. Photo by Dean Moosavi.

Crossbedding in Mississippian Sandstone, Turkey Run State Park, Indiana, USA. Photo by Dean Moosavi.
The Department of Geology and Geological Engineering at Colorado School of Mines is seeking a recognized teacher and researcher and dynamic, enthusiastic leader to head the Department of Earth & Environmental Sciences.

The position requires a Ph.D. in geological sciences or a related field at the time of initial appointment and university teaching experience. The salary range for this position is $51,000–$60,000, depending on experience. The position includes a standard benefits package. Please submit a cover letter, curriculum vitae, a statement of teaching philosophy and interests, contact information for at least two references, and unofficial academic transcripts by email to Simon Kattenhorn, Director of Geological Sciences, at skattenhorn@alaska.edu. Review of applications will begin on June 18th 2018 and will continue until a suitable applicant is found.

The University of Alaska Anchorage (UAA) is the largest of three universities in the University of Alaska system, serving over 18,000 students in the Anchorage and satellite campuses. The university has 7 full-time faculty, 2 full-time lecturers, 2 part-time lecturers, and approximately 130 undergraduate majors.

The successful candidate will have duties that include teaching graduate and undergraduate courses in the Department of Earth & Environmental Sciences, engaging in the Environmental Sciences undergraduate program, developing and maintaining robust programs of research and scholarship, and providing service to the department, the School of Science, and to Rensselaer.

The successful candidate will have a Ph.D. or foreign degree equivalent in geoscience or related discipline, along with the ability to demonstrate, through accomplishments, a record of excellence in research and scholarship, evidence or the promise of future distinction in high quality educational activities including teaching and advising, and a proven commitment to professional service. The rank at the time of hire will be commensurate with the candidate’s experience and accomplishments.

We welcome candidates who will bring diverse intellectual, geographical, gender, and ethnic perspectives to Rensselaer’s work and campus communities. Rensselaer Polytechnic Institute is an Affirmative Action/Equal Opportunity, Race/Gender/Veterans/Disability Employer.

9-MONTH FULL-TIME INSTRUCTOR POSITION, MINERALOGY & IGNEOUS/METAMORPHIC PETROLOGY UNIV. ALASKA ANCHORAGE

The position requires a Ph.D. in geological sciences or a related field at the time of initial appointment and university teaching experience. The salary range for this position is $51,000–$60,000, depending on experience. The position includes a standard benefits package. Please submit a cover letter, curriculum vitae, a statement of teaching philosophy and interests, contact information for at least two references, and unofficial academic transcripts by email to Simon Kattenhorn, Director of Geological Sciences, at skattenhorn@alaska.edu. Review of applications will begin on June 18th 2018 and will continue until a suitable applicant is found.

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Hiring?

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UAA is an AA/EO Employer and Educational Institution. Applicant must be eligible for employment under the immigration Reform and Control Act of 1986 and subsequent amendments. Your application for employment with UAA is subject to public disclosure under the Alaska Public Records Act.

For more information regarding this position, please contact the department director, Dr. Simon Kattenhorn: skattenhorn@alaska.edu.

GSA Member Community

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*Get Connected …*

“What a great discussion.” —Andrew Cullen

“Thank you for joining in. I believe this type of discussion is exactly what was intended by GSA for this open forum.” —Michael Tarullo

“I would like to add to this very interesting discussion.” —Georges Pardo

… in the Community

GSA Members:

Lend your voice to your community community.geosociety.org
As geoscientists, we know how geoscientific research shapes our society. A challenge facing our profession is learning to distill and share this knowledge with a broader audience, especially policymakers, whose decisions impact our science and our country. The Geological Society of America is committed to encouraging and supporting geoscience communication to better serve the societies in which we live, and an important way we do this is through Geosciences Congressional Visits Day (GEO-CVD).

GEO-CVD is an annual event sponsored by GSA in conjunction with other earth-science societies to increase the visibility of and support for the geosciences in Congress. Over two days, participants take workshops covering congressional procedure, relevant legislation, and strategies for effective constituent meetings. Accompanied by scientific society staff members, participants spend a day making congressional visits, during which they discuss a planned “ask” or message with congressional members and staffers. These can include requesting support for legislation, increasing or maintaining the budgets for funding geoscience research, or offering expertise to an office in the future.

“GEO-CVD is a great opportunity for GSA members to begin to engage with policymakers in Washington, D.C.,” explains Kasey White, GSA’s Director for Geoscience Policy, because “these interactions have an impact on policy.” Recent studies by the Congressional Management Foundation found that constituents who personally communicate with their political representatives are more effective than lobbyists or news editors. As Kasey notes, “94% of respondents found in-person constituent visits make a difference on an undecided member—the highest rated activity.” At the same time, Kasey observes that these visits are impactful for participants, helping GSA members and students bridge the gap between research and policy: “GSA members also find GEO-CVD valuable for improving communication skills, networking, and seeing first-hand the difference they can make in policy.”

For Sylvia Nicovich, a Ph.D. candidate from Montana State University and Rocky Mountain Section GEO-CVD representative in 2017, GEO-CVD was an opportunity to connect her academic studies with her political passions, introducing her to “significant legislation with respect to federal science funding, dispersal of data, and science adopted to reason regulation, or science negated to relinquish regulation,” and giving her an opportunity to voice these issues with Rocky Mountain state delegates, include Senator Jon Tester (D-MT) and Congressman Greg Gianforte (R-MT) from her home state of Montana.

The experience strengthened Sylvia’s belief that “my voice (and all those I came to represent) really does matter. The GEO-CVD experience was very empowering and rekindled the flame I have for political activity. Beyond the utility and purpose of bringing federally funded science to the forefront of our Rocky Mountain state delegates, this opportunity also illuminated my personal options for a more politically active future within the geosciences.” Moreover, Sylvia encourages geoscience students to participate in GEO-CVD, noting the importance of understanding the legislative process on Capitol Hill and potential legislation that affects the sciences, as well as how to engage effectively with policymakers on legislative concerns.

Will you help students like Sylvia to bridge the gap between research and policy? Your support of GSA’s policy office helps us provide these opportunities and strengthens our collective geoscientific voice on Capitol Hill. Contact Clifton Cullen at +1-303-357-1007 or ccullen@geosociety.org to learn more.
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- **Late Cretaceous geology and fossils of Dinosaur Provincial Park**
  2017, v. 48, p. 47–70

- **Walking with dinosaurs (and other extinct animals) along Colorado’s Front Range: A field trip to Paleozoic and Mesozoic terrestrial localities**
  2004, v. 5, p. 219–234

- **Late Cretaceous strata and vertebrate fossils of North Texas**
  2013, v. 30, p. 1–13

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- **Rock Stars**: Into science bios? Each Rock Stars article, managed by GSA’s History and Philosophy of Geology Division ([www.geosociety.org/RockStarGuide](http://www.geosociety.org/RockStarGuide)), provides a two-page profile of a notable geoscientist whose contributions have impacted geoscience in a significant way.

[www.geosociety.org/gsatoday](http://www.geosociety.org/gsatoday)
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Edited by Gregory R. Wessel and Jeffrey K. Greenberg

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