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

GSA 2018 Annual Meeting

GSA News

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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 east-central 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 km^2 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; Ivanovic 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 a tributary 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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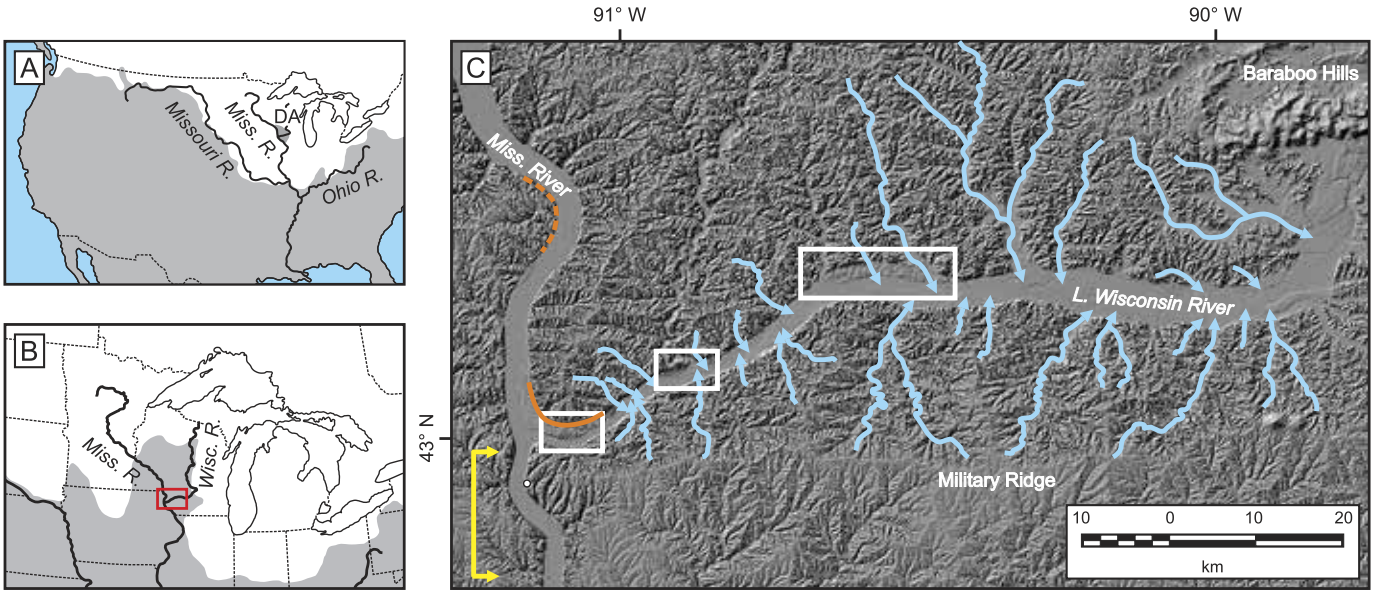

Figure 1. Location maps of study area. (A) Major tributaries of the Mississippi River system in relation to the maximum extent of all Quaternary glaciations, shown in white. The unglaciated Driftless Area (DA) shown in upper Midwest. (B) Location of the upper Mississippi River and Wisconsin River in relation to the maximum extent of MIS 2 glaciation, shown in white. Area of Figure 1C shown by red box. (C) LiDAR-derived hillshade image of the lower Wisconsin River valley and confluence with the Mississippi River. The three remnant segments of the Bridgeport strath are located within the white boxes, identifying areas of detailed maps in Figure 2. The white circle immediately south of the confluence of the Wisconsin and Mississippi Rivers indicates the location of the town of Wyalusing, Wisconsin, USA. Geomorphological features of the lower Wisconsin River valley that indicate drainage reorganization has occurred: barbed tributaries of the lower Wisconsin River (pale blue arrows); the curved inner valley wall at the confluence of the Wisconsin and Mississippi Rivers (solid orange line) more similar to the inside of a bend on a single river (example identified by dashed orange lines); narrow reach of the Mississippi River immediately downstream its confluence with the Wisconsin River (yellow bracketing arrows).

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. 1C 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

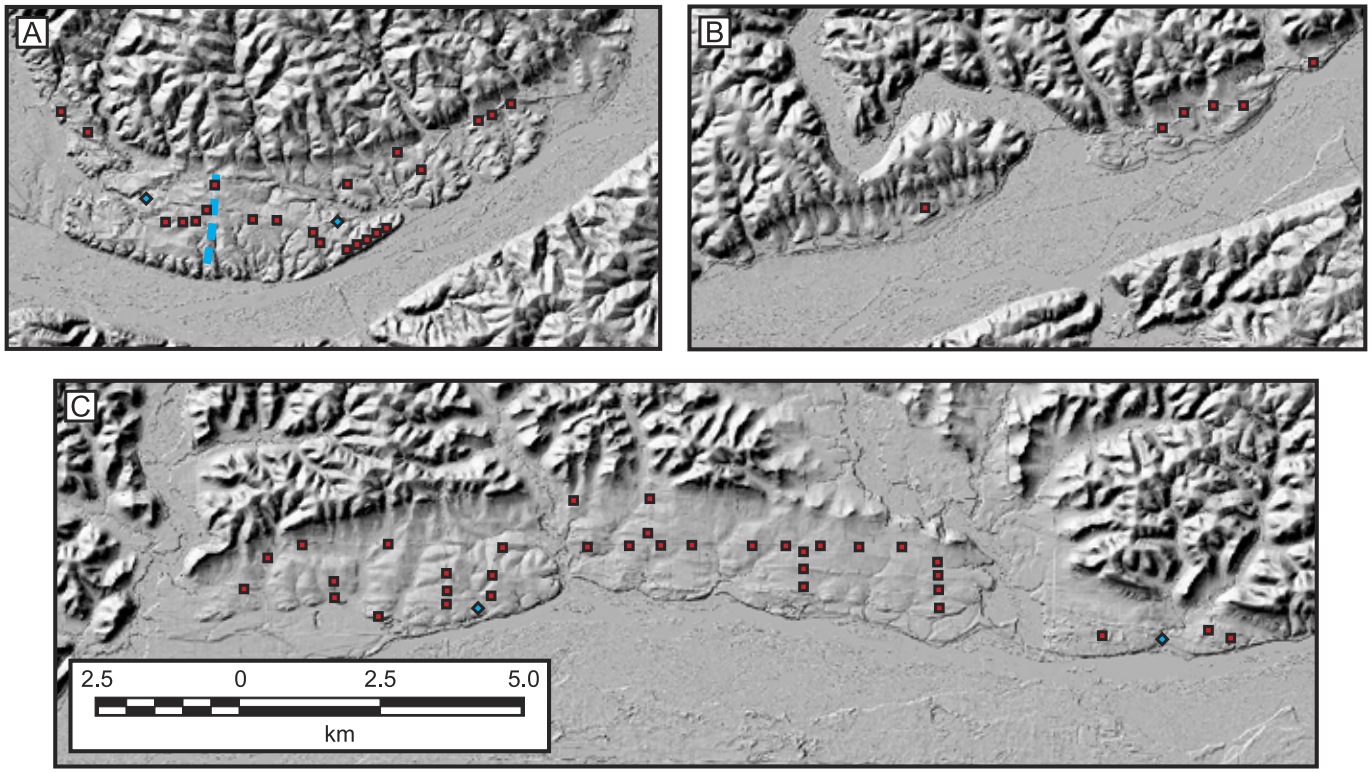

Figure 2. Detailed LiDAR-derived hillshade maps of the three remnant segments of the Bridgeport strath as identified in Figure 1, showing (A) the westernmost segment; (B) the central segment; and (C) the easternmost segment. Red squares identify locations of Geoprobe coring to determine bedrock surface elevations. Blue diamonds identify locations where Paleozoic bedrock crops out, verifying that the surface is a strath terrace. Blue dashed line in (A) identifies the location of the Bridgeport moraine, which represents the farthest west extent of a pre-Illinoian glaciation that advanced out of Minnesota and Iowa (Knox and Attig, 1988). All images are shown at the same scale.

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[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.

[1]GSA Data Repository Item 2017404, supplementary core and well log data and methods used to support interpretations, is online at www.geosociety.org/datarepository/2017/.

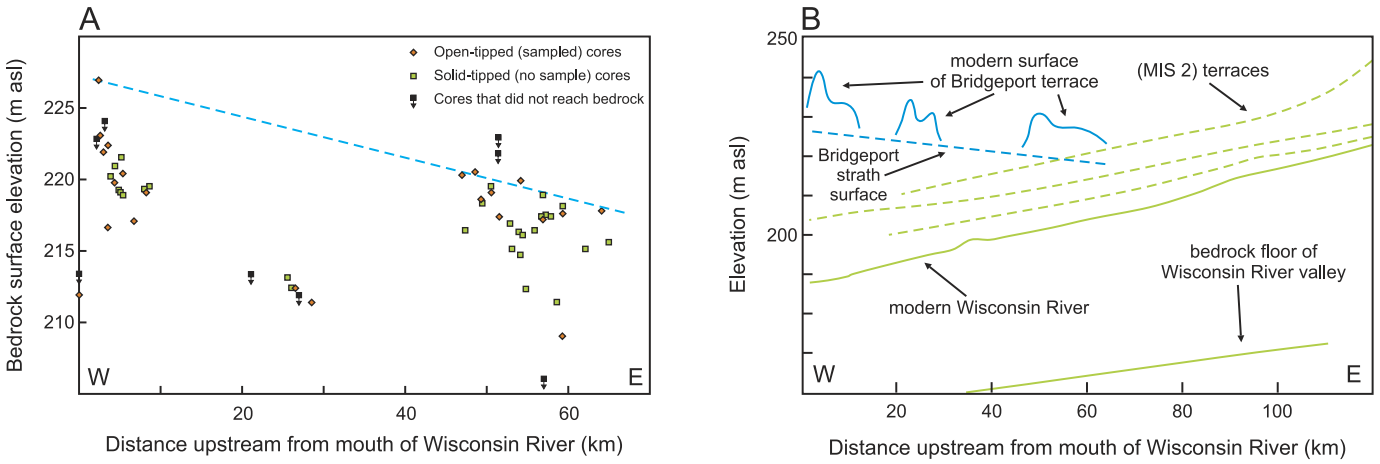

Figure 3. Results of Geoprobe coring to determine dip of strath surface. (A) Elevation of strath surface at each coring site as a function of distance upstream from the mouth of the Wisconsin River. Trendline (blue dashed line) represents original strath surface, dipping to the east with an estimated slope of 0.15 m/km; asl—above sea level. (B) Bridgeport strath surface as resolved from Geoprobe coring (eastward-dipping blue dashed line) in relation to other major (westward-dipping) surfaces in the lower Wisconsin River valley; modified from Knox and Attig (1988).

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

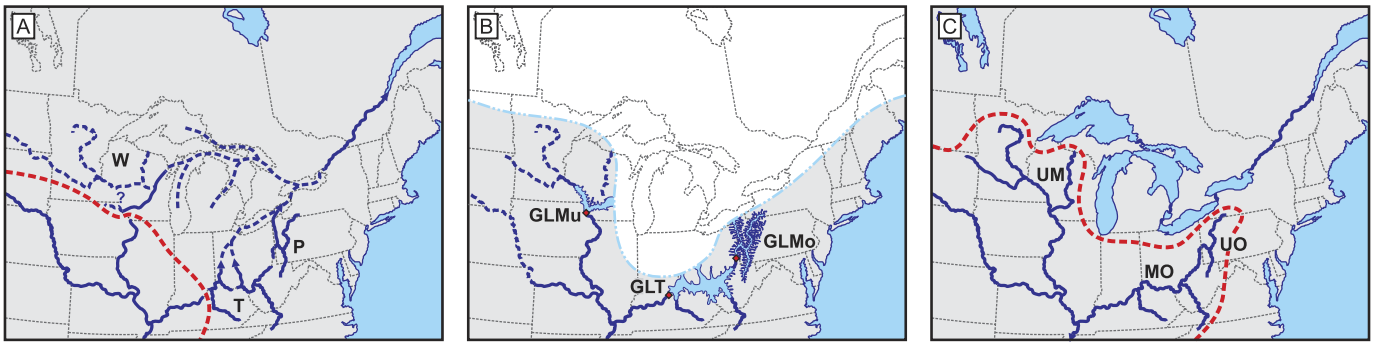

Figure 4. Proposed time series for the common processes that drove stream piracy and reorganization of pre-Quaternary drainage patterns in the North American mid-continent to create the modern Ohio (MO) and upper Mississippi (UM) Rivers. (A) Proposed configuration of the ancestral Wyalusing (W), Teays (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 km^2 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 km^3/year of water (a permanent diversion of nearly 5,000 m^3/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

drainage basin and drained into the Gulf of St. Lawrence to the northeast rather than the Gulf of Mexico to the south.

The data indicate that the entire upper Mississippi/Wisconsin River system upstream of the modern confluence of the Mississippi and Wisconsin River originally developed as an eastward-flowing system. As has been documented for several reaches of the modern Ohio River, we propose that early and/or middle Quaternary glaciations blocked the downstream portions of the St. Lawrence drainage basin, creating an ice-dammed lake in the Wyalusing River valley. Stream piracy at the location that is now the confluence of the Mississippi and Wisconsin Rivers redirected an area of ~205,000 km^2 to the south as part of the greater Mississippi River basin. The stream piracy event caused a permanent reversal of flow along the lower Wisconsin River valley, and adjustment to the new base level drove subsequent incision along the lower Wisconsin and upper Mississippi Rivers and their tributaries, which left only the few remnant segments of the Bridgeport strath that exist today. These data and interpretations are consistent with independent studies of Cenozoic drainage evolution in the North American mid-continent as determined by alluvial sediment in the Gulf of Mexico (e.g., Galloway et al., 2011).

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Geological CO_2 Sequestration Atlas of Miocene Strata, Offshore Texas State Waters, 2017, edited by **Ramon H. Treviño** and **Tip A. Meckel**, Bureau of Economic Geology's Report of Investigations RI0283, 74 p.

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E.B. BURWELL, JR., AWARD
Environmental & Engineering Geology Division
David S. Parks, Washington State Department of Natural Resources, 2015, Bluff Recession in the Elwha and Dungeness Littoral Cells, Washington, USA: *Environmental and Engineering Geoscience*, vol. XXI, no. 2, p. 129–146.

OUTSTANDING CONTRIBUTIONS AWARD
Geoinformatics Division
Stephen M. Richard, Columbia University Lamont-Doherty Earth Observatory

GEORGE P. WOOLLARD AWARD
Geophysics and Geodynamics Division
Greg Hirth, Brown University

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Karen B. Gran, Noah Finnegan, Andrea L. Johnson, Patrick Belmont, Chad Wittkop, and **Tammy Rittenour,** 2013, Landscape evolution, valley excavation, and terrace development following abrupt postglacial base-level fall: *GSA Bulletin*, v. 125, no. 11/12, p. 1851–1864.

LAURENCE L. SLOSS AWARD
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Kenneth G. Miller, Rutgers, the State University of New Jersey

CAREER CONTRIBUTION AWARD
Structural Geology and Tectonics Division
Elizabeth Miller, Stanford University

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

Nominate a deserving colleague with the honor of GSA Fellowship. GSA Fellows are among the best and the brightest geoscientists who have made significant contributions to our science. 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

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 coauthored 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 Hawaii): 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

"... had a significant impact on the field of geology as a researcher, teacher, and member of the GSA community ..."

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

"... an outstanding educator, scientist, and mentor ..."

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 cyclostratigraphy, 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 research contributions in the field of landslide science that have resulted in reduced landslide risk and increased public safety. —Shaul 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

"... service (and) leadership in the GSA Hydrogeology Division ..."

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

"... exemplary dedication to mentoring students and new and practicing geoscience professionals ..."

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
Elisa 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. Knesel
Jonathan J. Kolak
Kent S. Koptiuch
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 Ogasawara*
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. Stofan*
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 M. Best
David D. Bramwell
Robert L. Brenner
Martha Lou Shirley Broussard*
J. David Bukry*
Michael R. Burkart
James L. Carew*
Richard M. Chamberlin
Robert R. Clemons
Mary-Margaret Coates
Arthur D. Cohen*
Ivan P. Colburn*
John C. Crelling*
Andres Duarte
Darrel E. Dunn
George C. Dunne
Linda A.F. Dutcher
G. Nelson Eby*
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
Jane E. Nielson*
Irwin D. Novak
J. Michael Oneill*
Norman J. Page*
James E. Palmer
Douglas C. Pasley Jr.
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!

2018 GSA Research Grant Recipients

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).

Committee members: Alexandra R. Isern (Chair), Robert S. Anderson, James V. Browning, William C. Burton, Cathy J. Busby, Kristin Caddick, Timothy M. Demko, Besim Dragovic, Joshua M. Feinberg, Rebecca M. Flowers, Julie C. Fosdick, Martin B. Goldhaber, Andrew M. Gombos, Jr., Judith L Hannah, Ellen K. Herman, Brian R. Jicha, Sharon L. Kanfoush, Nicholas Lancaster, Rebecca A. Lange, Michelle M. Lorah, Kevin H. Mahan, Bryan A. Oakley, Cindy Palinkas, Stephen J. Piercey, Christopher J. Potter, William Ian Ridley, Jacob O. Sewall, Ellen Thomas, Jennifer A. Thomson, Ben A. van der Pluijm, and Gary Weissmann.

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.

THE GEOLOGICAL SOCIETY OF AMERICA®

GSA FOUNDATION

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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 Weide
Boise State University

Alexander Wood
Northern Arizona University

ExxonMobil

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

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.

GRETCHEN 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 Degraffenried, 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
Shoshauna 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.

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 Kovtun
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
Skyler 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

Georgia State University
Andrea McClure

Harvard University
Gustave Lester
Longfeng Wu

Humboldt State University
Kelly Pfeiler

Idaho State University
Brittany Guzzo Bowman

Illinois State University
Christine Salinas
Nicolette Sheffield

Indiana University
Jeffery Valenza
Matthew Wanker

Indiana University–Purdue University Indianapolis
Fotios Fouskas
Jeremiah Mickey
Harvie Pollard
Matthew Smart

Indiana University Bloomington
Bei Liu

Instituto Politécnico Nacional
Carlos A. Angeles-De La Torre
Julio Velasco

Iowa State University
Juan Carlos Romero Gelvez

Kansas State University
Nina Ataee
Christina Richardson

Kent State University
Mary Plauche
Jeffrey Timmons
Lindsey Yazbek

Lehigh University
Katrina Gelwick
Joshua Gonzales

Loma Linda University
Samuel Andrade Abdala

Louisiana State University
Edwin Bomer
Shoshauna Farnsworth-Pinkerton
Taylor Rowley
Andrew Webb

Massachusetts Institute of Technology
William Shinevar

McGill University
Jenny Ni
Clara Waelkens

McMaster University
Curtis Ferron
Wen Lin

Memorial University of Newfoundland
Matthew Manor

Miami University
Alex Kugler

Mississippi State University
Timothy Palmer

Missouri State University
Conor O'Dowd

Missouri University of Science and Technology
William Chandonia
Edward Duarte
Erdoo Mongol

Montana State University
Neil Seifert
Christopher Steuer

New Mexico Institute of Mining and Technology
Danielle Sulthaus

North Carolina State University
Corbin Kling
Rachael McCaully
Ashly Padgett
Rebekah Rhodes

North Dakota State University
Annaka Clement

Northern Arizona University
Lindsey Gipson
Rebecca Beers
Daniel Conrad
Hannah Davis
Emma Lodes
Ann Wong
Alexander Wood
Samuel Wright

Northern Illinois University
Jason Coenen
Surya Freeman
Jamie Graves
Bailey Kreager

Oklahoma State University
Brandon Chase
Estefanny Davalos Elizondo
Gina Dunseith
Georgina Lukoczki
Alejandra Santiago-Torres
Babak Shabani
Liang Xue

Oregon State University
Elisa Di Meglio
Jordan Lubbers
MacKenzie Mark-Moser
Kali Melby
Erin Rooney
Israporn Sethanant
Kellie Wall
Sophia Wensman

Pennsylvania State University
Erica Pitcavage
Gabriella Rossetto
Judith Sclafani
Elena Stiles

Portland State University
Melissa Carley
Alison Horst
Vanessa Swenton

Purdue University
Angus Moore

Rensselaer Polytechnic Institute
Todd Knobbe
Elizabeth Pettitt

Rutgers, The State University of New Jersey
Bari Hanafi
Maria Makarova
Jacob Setera
Siyao Yu

Saint Louis University
Teresa Baraza Piazuelo
Emily Deeba

San Diego State University
Chelsea Blanton
Joshua Kelly
Mark Korte-Nahabedian
Agnese Lanzetti

Southern Illinois University Carbondale
John Ejembi
Elham Hosseinzadehsabeti

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 Rodríguez

University of Alabama
Souvik Bhattacharjee
Raleigh Koeberle
Lauren Parker
Leah Travis Taylor

University of Alberta
Sophie Norris
Joseph Young

University of Arizona
Walter Afonso
Christopher Clinkscales
Audrey Dunham
Daniel Favorito
Katherine Guns
Susana Henriquez
Mohammad Marza

University of British Columbia
Amy Ryan

University of British Columbia, Okanagan
Iva Lihter

University of Calgary
Mastaneh Haghnazar Liseroudi

University of California, Berkeley
Benjamin Muddiman
Jennifer Natali
Yuem Park
Nicholas Spano

University of California, Davis
Lena Capece

University of California, Irvine
Raisha Lovindeer

University of California, Riverside
Michelle Zill

University of California, Santa Barbara
Nicolas Harrichhausen
Daniel Morel
Lori Willhite
Christina Woltz

University of California, Santa Cruz
Kimberley Bitterwolf
Stephan Bitterwolf
Christina Richardson

University of Cincinnati
Rachel Bosch
Jeffrey Hannon
Adam Jones
Abigail Kelly
Evan New
Nathaniel Norris
Abbey Padgett
Richard Stephenson

University of Colorado Boulder
Anne Fetrow
Rachel Havranek
Simon Pendleton
Charles Shobe
Colin Sturrock

University of Connecticut
Michael Chojnacki
Mark Higgins
Jim Kerr

University of Florida
Cynthia Hotujec Kantner

University of Georgia
Garett Brown
Melanie Callihan
Rachel Rotz

University of Hawai'i at Mānoa
Rebecca Degraffenried
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

University of Michigan–Ann Arbor
Rebecca Dzombak
Rebekah Stein
Kirk Townsend
Bian Wang

University of Minnesota–Twin Cities
Anna Amramina
Kerry Callaghan
Clementine Hamelin
Natalie Raia
Jennifer Taylor

University of Missouri–Columbia
Sarah Smith

University of Missouri–Kansas City
Kadie Bennis

University of Montana
Luke Fisher

University of Nevada–Las Vegas
Toluwalope Bamisile

University of Nevada–Reno
Colin Chupik
Conni De Masi
Drew Levy

University of New Hampshire
Anthony Fuentes
Tamara Marcus

University of New Mexico
Jordan Anderson
Jason Silviria

University of North Carolina at Chapel Hill
Justine Grabiec
Madelyn Percy
Ian Reeves
John Rippe
Joshua Rosera

University of North Carolina Wilmington
James Arnuk
Olivia Koster
Jessica Magolan
Amelia Perry

University of Notre Dame
Audrey Taylor

University of Oklahoma
Folarin Kolawole
Carlos Molinares Blanco

University of Oregon
Paul Barrett
Kevin Gardner
Rachel Hampton
Benjamin Heath
Syu-Heng Lai

University of Ottawa
Renelle Dubosq

University of Pittsburgh
Mary Braza

University of Regina
Dillon Johnstone

University of Rochester
Lisa Grohn

University of Saskatchewan
Romain Gougeon
Maximiliano Paz

University of South Carolina
Aaron Ashley

University of South Florida
Kathryn Dorn
Antonio Luna
Danielle Molisee
Ryan Venturelli

University of Southern California
Ekaterina Larina
Shan Ma

University of Southern Mississippi
Jansen Costello

University of Tennessee
Leah Wenhold

University of Tennessee, Knoxville
Agustin Kriscautzky
Timothy Paton
Maegen Rochner

University of Texas at Austin
Charles Abolt
Grace Beaudoin
Clara Brennan
Kristina Butler
Zachary Foster-Baril
Junwen Peng
Logan Schmidt
Paul Southard
Kelly Thomson
Anna Weiss
Greta Wells

University of Texas at Dallas
Naomi Plummer
Jonathan Stine

University of Texas at El Paso
Victor Garcia
Ezequiel A Moreno Flores

University of Texas at San Antonio
Caleb McBride
Salman Sakib
Jessica Uglesich

University of Utah
Jeremiah Bernau
Jory Lerback
Brendon Quirk

University of Washington
Nicolas Cuozzo
Philip Greene
Sean LaHusen
Jana Meixnerova

University of Wisconsin–Madison
Elizabeth Ceperley
Jonathan Graham
Brittany Hupp
Allison Jones
Jacob Klug
Sarah Shields

University of Wisconsin–Milwaukee
Elizabeth Ives

University of Wyoming
Thomas Ashley
Matt Edgin
Michelle Gess
Madeline Wewer

Utah State University
Leah Houser
Alexander Short
Clara Thomann
Heather Upin

Vanderbilt University
Lydia Harmon

Virginia Polytechnic Institute and State University
Dana Korneisel
Kathryn Krueger
Matthew LeRoy
Selva Marroquín
Alexandra Nagurney
Andrew Parent
Lisa Whalen

Washington State University
Jesslyn Starnes

Western Kentucky University
Rachel Kaiser

Western Michigan University
Mohammed Al-Musawi

Western Washington University
Katherine Clarke
William Duckworth
Amanda Ketting-Olivier
Elizabeth Kimberly
Avery Maverick
Paige Morkner
Lexie Stodden
Jessica Welch
Nyle Weldon
Kimberly Wurth

William Marsh Rice University
Trevor Cole
Tian Dong
Andrew Moodie
Chenliang Wu

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 Indianapolis
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 Faehnrich, 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
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

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.

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
Ogochukwu 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

Geological Society of America FOUNDATION

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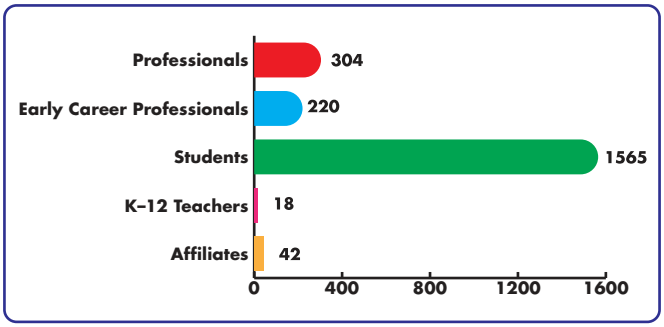
Welcome New GSA Members

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



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 Csutak
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 Noe 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
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 Stimely Gabel
Zhiye Gao
Don Gest
Asma Amjad Ghaznavi
Laura Giambiagi
William K. Gibbs Jr.
Venice L. Goetz
Gary Gomby
Jorge Gomez Tapias
Frank I. González
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
José Carlos Jimenez Escalona
Dann Charles Johannesen
Perry M. Jones
Rosanne Jowitt
Ray Kaczorowski
Tomomi Kani
Keena Kareem
Erin Kay
John Kelliher
Charlie Kerans
Steven M. Killingsworth
Bryn Elizabeth Kimball
Sadie Kingsbury
James T. Kirby
Mads Faurschou Knudsen
Tvrtko 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

Peter MacKenzie-Helnwein
Jaroslaw Majka
Tom Manley
Joseph Mascaro
Bryan Massey
Liviu Matenco
Renee L. Mazurek
Reed McEwan
Michael F. McGroder
Órla McLaughlin
Dan McShane
Leslie Guy McWethy
Arend Meijer
Claudia Cristina Mendoza-Rosales
Gretchen R. Miller
Luke D. Mioduszewski
Arsalan Mohajer
Mohammad F. Mohsen
Craig D. Morgan
Gary Mozingo
Melissa L. Mullins
Alison Jane Munnery
Alison L. Muratore
Arash Nadri
Marcello Natalicchio
Pedro Alexis Navarro
Andrew David Nelson
Kim Ninnemann
Xiaolu Niu
Constance Nutt
Maura Salamah O'Brien
Joseph Noel O'Donoghue
Chang Whan Oh
Florence Ogechi Oparah
Beth N. Orcutt
Anna Marie Orellana
Chris Organ
Ndukwe Nene Otobong
Maria Parente
Christopher Parks
Maura O'Connor Patterson
Nico Perdrial
Katerina Petronotis
Larry Phillips
Andre Ramiro Pierin
Thomas Pike
Orlando Alan Poma Porras
Samantha Price
Keith F. Priestley
Eric Prokocki
Yuping Qi
Thomas J. Quinlan
Ted Kirk Raab
Judith Katherine Radloff
Md. Abdur Rahim
Md. Aminur Rahman
Erik S. Reinert
Liu-dong Ren
Virginie Renson
Rachel Ridgway
Brock Riedell
Christopher Willis Riffe
Jed Roberts
Matthew James Robey
Xavier Roca-Argemi
Rob T. Rohrbaugh
Chris S. Romanek
Pierrick Roperch
Shea Rose
Nic Rosengren
Carlos Alberto Rosière
Jacqueline Rowley
Dina M. Ryan
Simon Sadiq
Frederico Maranzato Scarelli
Darrell G. Schulze
Diane Lynn Schwetz
Dale Ralph Sedler
Antoine Serhal
Jeremy Shakun
Glenn David Shaw
Amber Shinn
Arthur Joseph Simon
Evan Solomon
Bjørn Eske Sørensen
Anthony Soricelli
Lindsay Spigel
Andrew D. Steen
Angela Mildred Suárez Buitrago
Drianto Sudarmawan
Grace Lorraine Sumption
Ziyin Sun
Chris R. Taber
Robert Taerum
Jessica H. Taylor
Yanguo Teng
Frank James Tepley III
Ken Thiessen
Brian Thomson
Veronica Tofani
Emanuele Tondi
Timothy Paul Topper
Julian Watanabe Traphagan
Ted Roy Turner
Nancy A. Van Wagoner
David J. Vance
Jason E. VanHorn
Pedro Vera Sanchez
Oleg Vorobiev
Arun Kumar Wahi
Beverly Walker
Bo Wang
Lu Wang
Wei Wang
Xin Wang
Yan Wang
Karen Wawrousek
Christopher Loren Weaver
Kevin Dean Weberling
Robert Weldon
Stephan van de Wetering
Katherine Lubov Wheeler
Jennifer A. Whisman
Brian M. Whiting
Steve Whittaker
Roy Widrig
Tarka Wilcox
Deborah R. Williams
Matt Williams
Kevin M. Wilson
Rick Wilson
Stephen E. Wood
Connie Woodhouse
Bradley Daniel Worley
Gregory Robert Wrightstone
Feixiang Wu
Mike Wurtz
Wei Yang
Chaolu Yi
Mike Young
Kurt Yuengling
Lindsay Zanno
Laishi Zhao
Ruirui Zhao
Weijian Zhou
Yuyu Zhou
Junfeng Zhu
Keith A. Zimmerman

Early Career Professionals

Aileron Cessna Adyagharini
Sajjad Ahmad
Wazir Alam
Jared A. Aldrich
Mary Alldred
Maria Fernanda Almanza Melendez Jr.
Stephanie Amodeo
Esmail Ansari
Thivanka Sureni Ariyarathna
Hassan Olatunji Ariyibi
Christian Andrew Baker
Natalie D. Baker
Patrick Barrineau
Sergio Bautista
Alyssa Bell
Felicia Bender
Zoë E. Bentler
Nathaniel Bergman
Angela L. Blanks-Bennett
Justin Blumenthal
Robert W. Boessenecker
Bradley J. Boileau
Jacob Lee Bolstad

Adam M. Booth
Ashley N. Boyd
Skyler M. Brooks
Stefanie M. Brueckner
Robin James Butz
Anna C. Campbell
Brandon Kan Carroll
Celso Castro-Bolinaga
Nicholas Alexander Caviglia
Chun Chang
Meng Chen
Feng Cheng
Cole Christiansen
Ian Cisco
Charles Cleveland
Christine Cleveland
Carson Philip Colletier
Laura Cotton
Anders Damsgaard
Anik Dash
Eric Davidoff
Chris Denison
Diana Rose Di Leonardo

John Paul Dibert
A. Alfred James Discepolo
Hanwen Dong
John Douglass
Kristian Drivenes
Megan Dubose
Blake Dyer
Taiwo Monday Edo
Rosario Esposito
Nicole Etzel
David Evans
David Fandel
Tamara Fletcher
Corina Forson
Anna Foster
Bruce C. Frederick
Aaron T. Fricke
Patrick Frings
Keith Gaddis
Timothy Jay Gallaher
Haley L. Gannon
Haiying Gao
Francesco Gerali
Amy K. Gilmer
Abigail Gleason
David Gold
Hillary Goodner
Gabriel Gordon
Krishangi Groover
Tingting Gu
Dev Sen Gupta
Jörg M. Habermann
Steven James Hall
Casey Hallett
Brendan Joseph Hanger
Wilson Carroll Harper
Andrea Dawn Harrington
Evan Hartshorn
Benjamin J. Hatchett
Nathan James Hawley
Justin Alan Hayles
Douglas Hemingway
Shawn Henderson
Megan Hendrick
Ryan Ronald Hennessey
Tyler Hill
Nicholas Donald Holschuh
Alexander Horton
Samuel M. Howell
Kang-jun Huang
John Vincent Hurley
Hyoun-tae Hwang
Connie Ing
Shraddha Jagtap
Caleb Arnold King
Kenneth Kitching
Ádám Tibor Kocsis
Lauren E. Koenig
Liam Koester
Benjamin Kraun
Nathan D. Krohne
Bradley Howard Kurtz
Tian Lan
Michael Landis
Matthew Lariviere
Sophia Katerina Larson
Todd R. Lau
Ashley Lawrence
Zongcheng Ling
Christopher Lowery
Rebecca Lybrand
Pengfei Ma
Xuxuan Ma
Steven Lee Maliner-Colvin
Adam Jeffrey Mancini
Paula Mateo
Serena Matt
Jack J. Matthews
Brett W. Maurer
Justine McCann
Sean Henry McMahon
Anthony Steven Meketa
Katharina Methner
Clement Miege
Bradley Allen Miller
Sadie Mills
Md. Moniruzzaman
Tim Mooney
Rebecca Morris
Kankan Mukhopadhyay Sr.
Bonnie J. Murray
Sarah Evelyn Myhre
Frank Napkora
Abigail M. Nastan
Allison Neumann
Stephen Newman
Mélanie Noury
Noelia B. Nuñez Otaño
Leslie O'Brien
Lujendra Ojha
Chad Christopher Opatz
Brian Ostrom
Ajibola R. Oyebamiji
Gulnihal Ozbay
Robert Page
Julieann Grace Palumbo
Damien Pas
Zachary Paulsen
Melissa Peacock
Matej Pec
Hever Eslí Pérez
Tessa Pettyjohn
Dylan Pierce Philippart
Catherine Pomposi
Summer K. Praetorius
Tammo Reichgelt
Jenny Richter
Jerri G. Roberts
Vanessa Julie Roden
Caitlin F. Roeder
Emily C. Roland
Jonathan Rolland
Torie Roseborough
Gerald T. Rustic
William Schermerhorn
Alexander Sehlke
Katherine Jean Sepulveda
Wondwosen M. Seyoum
Erin Shea
Jun Shen
Mubram Siddiqi
Joshua Francis Snape
Peiping Song
Yang Song
Laura Soul
Blake Stamps
Nathan Stansell
Autumn Stivers-Biscuso
Michael Storozum
Ronda Strauch
Carolyn Marta Streiff
Jennifer N. Strickland
Daniel Joseph Sullivan Jr.
Yang Sun
Yu Sun
David Swider
Drew B. Thomas
Andrea Thomer
Filip Tomek
Christian Pieter Tulungen
Autumn Brooke Turner
Thornton Turner
Jan Erik Ulmius
Maarten Van Daele
Jefferson Vasconcellos
Hou-qi Wang
Quanrong Wang
Rachel C.M. Warnock
David G. Weisz
Emily Grace Wilkinson
Tyler Willey
Kelli A. Williams
Michael John Willis
Julie Mackay Winchester
Yingkui Xu
Xiaotao Yang
Le Yao
Justin Yeakel
Dongxun Yuan
Benjamin Edward Zalisko
Junpeng Zhang
Liwei Zhang
Mingyu Zhao
Jacob Zwart

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 Koenning Joseph
Lance Lee Martin
Katelyn McDonough
Tasneem Basri Neem
John Olechnicki
Desiré Marie Piphus
Kathryn Proctor
Asta Rand
Breanna Reiss
Nicholas Lorne Riddick
Cambria Margaret Patricia Rodriguez
Matthea Wiebe
Sawyer Newton Young
Asif Uz Zaman

Biogeosciences

Sajjad Abdullajintakam
Jake William Andrae
Caroline Behrman
Stephan Bitterwolf
Sarabeth Buckley
Dylan Vincenzo Carlini
Elizabeth Crowther
Clairissa De la Vergne
Christiana Dietzen
Kimberly Du
Sarah Katherine Dunn
Alyssa Henke
Morgan Johannesen
Katherine Johnson
Jennifer Knack
Brandon Nicholas Lajoie
Fangbing Li
Jessica Magolan
Rachael E. McCaully
Jana Meixnerova
Christina J. Moss
Melissa Kay Mulford
Lauren Ashley Mullen
Christopher Joaquín Muñoz
Kyle Michael Nacey
Alexander Naylor
Sarah Newport
Jake Ogata Bernstein
Daniel Bryant Phillipi
James Tyler Price
Andrew Putt
Christina Richardson
John Rippe
Stella C. Ross
Adrianne K. Seiden
Sarah Monroe Smith-Tripp
Shreya Srivastava
Lilja Strang
Audrey K. Taylor
Benjamin S. Teerlinck
Thomas Van der Weide
Guan Wang
Tina Westfall
Angus H. Williams

Climatology/Meteorology

Samantha R. Bour
Mikaela Ann Marie Brown
Joshua D. Charlton
Nathan J. Chellman
Devon R. Dunmire
Jessica Garrison
Mitali Dinesh Gautam
Camaron George
Benjamin H. Hills
Sarah S. Johnston
Eduardo Tolentino Luna III
Wade Mans
Erin E. McDuffie
Holly Olivarez
Kelsie Peters
Makayla Platt
Adria K. Schwarber
Emma Caroline Wu
Boyang Zhao

Economic Geology

Alana Paige Basso
Curtis Michael Bernard
Zeinab Bikienga
Kaelyn Elizabeth Blotz
Andrew Nason Briner
Nicholas Brodeur
Rebecca Joyce Bryant
Koltyn Caricofe
Ryan Chadburn
Mary Elise Bingham Chee
Logan M. Clark
Garrett Crews
Kyle Eastman
Allison T. Emmett-Bailleres
Michael J. Ferraro
Imogen Olivia Heather Fielding
Marc Adrain Garcia
Emily Therese Guiney
Lucy M. Horst
Kenton F. Hoshino
Marcus D. Jones
George Lewis Kerr
Russell Krug
Xiang Li
James Bredin Lowe
Mei Lu
Clark Thomas Mabey
Charles Jacob Malosh
James Laurence Matthews
Kellen Joseph McArthur
Hunter Clayton McRee
Mason Cole Meyers
Arka Ojanian
Sunday Otuokere
Zachary Palmer
Liam Peterson
Chase Glen Poppenhagen
Garret Terhune Rees
Kevin Donald Rupp
Kevin Schmalz Jr.
Collin Schohn
Kenneth Cason Singh
Jessica Maarit Stromberg
Steven Surrusco
Anna Melby Thorson
David Harris Tomlinson Jr.
Yicun Wang
Longfeng Wu

Energy Geology

Oyeleye O. Adeboye
Gilberto Steven Barajas
Austin Duane Bertoch
Mandy N. Brewer
Watsawan Chanchai
Monike Distefano
Malcolm Dorsey
Gina Dunseith
Kaitlin Evans
Joshua M. Florie
Ryan Forrest
Luke Fritz
Maria Angelica Garcia Giraldo
Ian Richard Gorgenson
Tristan Lane Gregory
Alexandra Guzman
Justin Hahn
Anis Hidayah Hishammudin
Cody Holly
Joshua Hudgins
Alvaro Manuel Iglesias
Lars Ryan Jordan
Jd S. King
David Kodokian
Xiangye Kong
Ryan Lee Kraft
Kyle Krajewski
Heather Elizabeth Lawson
Mastaneh Haghnazar Liseroudi
Eli Lopez
Xiaoxiao Ma
Colton Mallett
Caleb Mark McBride
Leanna Marie McLane
John Michael Melnick
Christopher J. Messerich
Kara Meunier
Raza Mir
Mafalda Miranda
Carlos Eduardo Molinares Blanco
Wesley Moots
Seth Nolan
Ratthapon Noosri
Ben Popken
Ahmed Rashed
Christ Romero
Luke Sadergaski
Nurnadira Sazali
Esjay Schroeder
Theodore William Schropp
Anthony R. Skaleski
Troy Garret Stamm
Blake Steeves
Stephen Becker Tabor
Roman Thomas
Anna Thornton
Cody Jean Totten
Hannah Virginia Wacha
Alex Matthew Washburn
Yan Wenyuan
Maximilian Mariusz Witek
Fengyang Xiong
Ning Yang
Leslie Young

Engineering Geology

Sabri Cansu Akbay
Sohag Ali
Ethan Atwood
Alexander Ignacio Avelar
Prosper Evaristus A. Ayawah
Jayson Egan Barker
Nicholas William Blue
Robert Stephen Bolen
Azucena Colin
Ethan W. Colton
Zachary Robert Cornish
Kevin James Cowell
Alison Dahl
Stephen Drop
Nicodemus Rafael Enciso
Juliana M. Flint
Falina Foroughirad
Anna Coaire Foster
Kofi Gleku-Agbeko
Ethan Daniel Guzek
Colin James David Hogg
Md. Kamruzzaman
Kamrun Nahar Kana
Arabe Khan
Kassandra J. Kimmey
Russell Krueger
Christopher Laird
Mitchell J. Laken
Brianna Love
Caleb Ross Madole
Sara Maguire
Devin A. Maloney
Luis Martinez
Katie Mary McKenty
Mark W. Moore
Ian Nichols
Emma Jane O'Hara
Emmnauel Temitope Orilogi
Devon N. Parfait
Charlie S. Parks
James Garrett Rachal
Ben Thomas Roenker
Salman Sakib
Clayton Sansoucie
Joseph F. Schilter
Turki Essam Sehly
Morgan Elise Simon

Kenzley Sparks
Taylor Brooke Steffen
Adam P. Stoyanac
Alicia Sullivan
Hannah Thomas
Steve Tupper
Seiji Luca Ueda
Samuel Carver Wilson
Xiaohui Xu

Environmental Science

David Abrell
Alexandria Lynn Adams
Victoria F. Addorisio
Doyin Micheal Akindotuni
Trevor Armes Sr.
Talia Evelisse Ayala
Teresa Baraza Piazuelo
Angel V. Barnett
Madison Nichole Barrett
Joseph Britton Baxley
Eric Scott Beatty
Kaylyn Cecile Bellais
Katherine Berry
Emmett Gabriel Blau
Morgan Chappell Block
Quincy Lynn Bolender
Joseph Bolla
Victoria Jo Bruck
Aspen Burman
James Paul Byron
Karen Cantu
Nguyen Cao
Jade-Ashley S. Carberry
Dylan David Carpenter
Kimberly Chia Yan Min
Obioha Edward Chikezie
Sara Chojna
Mario O'Shane Christie
Grant Delden Colip
Zach J. Collette
Lisa Katherine Colligan
Steven Davis
Andrew James Dawe
Erin Delmotte
Sarah E. Denny
Kelsey Deporter
Bradley Douglas Dishman
Keara Drummer
Kelsey L. Duffy
Olivia Rose Enriquez
Ash Fairchild
Leticia Augusta Dos Santos Ferreira
James Robert Foltz
Mitchell Vann Freyermuth
Reese Fulgenzi
Kiana Garcia
Summer C. Gibbons
Sara Skye Gibbs Schnucker
Georgina Isabel Gill
Jenna Michele Hammond
Benjamin Hedin
Jessica Hendricks
Taylor Hewett
Isaac Martin Hickman
Jesse Higginbotham
Christopher Lee Hilliard
Kristen Marie Hirst
Sydney Houghton
Corey S. Howard
Lucas Margiotta Howard
Grace Louise Hruska
Cindy Hua
Heather Nicole Hullum
Israth Jahan
Katherine Jones
Dineh Elizabeth Judd
Elizabeth Kimberly
Ava Krahn

Henry David Kramer
Johannes Renke Krause
Dalton W. Langford
Zoe Laughlin
James Lenoir
Jesse Lewis
Isabel Lopez
Kyle J. Lowery
Jacob Luttrell
Ngoc Chi Luu
Tabitha Maevers
Nicole L. Maksymiw
Farjana Zareen Maria
Michael McCain
Nicole Jean McDonald
Melissa McKee
Caroline McKeighan
Shae McLafferty
Sierra Michelle Melton
Aaron Meneghini
Lin Meng
Brett J. Merkley
Alyssa Kristine Merrill
Kathleen Miller
Jacob Charles Murphy
Liam Nangle
Rebecca Nathan
Billie Niznik
Alexandra Nordyke
Natasha Nurjadin
Ifunanya Obidi
Hannah Lorrayne Olonovich
Adam Orcutt
Daniel Ormond
Jennifer Pantelios
Emily Perko
Sajoy Saljit Pottian
Emily Randall
Anthony Bryan Ray
Kelly Rhodes
Andrea Richter-Sanchez
Diana Laura Romo
Eduardo Ruiz Marin
Ashley Sanders
Victor Armín Sanjinez-Guzmán
Megan Nicole Schmidt
Jeffrey Douglas Schroeder
Maeve M. Sherry
Christine Maria Shonnard
Rhodes Smartt
Anna Smith
Kimberly Alexis Smith
Thomas Taylor Soiles
Jason Spence
Adam Storey
Jack Storment II
Tonya Summerlin
Ryan Lea Thomas
Kathleen Thompson
Elizabeth Todd
Juan Tejeda Torres
Mitchell Urlacher
Jenny Vega
Zachary C. Wagner
Hannah Rye Walker
Hannah Weiss
Chloe Anne Whicker
Brady Wieland
Kellie M. Wight
Alma Cecilia Wilcox
Kristina Wolfe
Alexandre Francis Woodward
Michael Wright
Ka wai Wu
Li Zengyi
Matt Allen Zerkle

Geography

Aleesha M. Bakkelund
Remi Bardou
Michael Mulugetta Fratkin
Luis Garcia
Nicole Marie Hethington
Meichen Jiang
Camille Elizabeth Lasley
Jason A. Lobdell
Aynaz Lotfata
Christopher Alan Notto
Joshua Adam Reinhart
Clark Ingermar Skillman
Rachel Sullivan
Kyle M. Vernon

Geoinformatics

Donavan Lewis
Elizabeth Lund
Ashly Padgett
Brandon Wayne Ripple
Heather Nicole Sandvik
Joanna Sydow
Aaron Martin Treston
Ariel M. Wolfman

Geology and Health

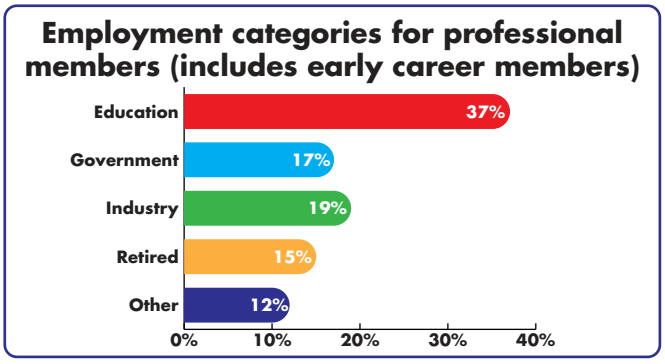
Abiodun Emmanuel Ayo-bali
Samantha Grace Cielski
Caroline Hung
Emma Jackman
Hayley Kwasniewski
Caroline Lewis
Leslie Ann Lopez
Jonas Peterson
Steven William Scheetz
Asma Shethwala
Erika Victoria Valerio
Eric Walker

Geophysics/Tectonophysics

Chelsea Morgan Amaral
Monica Barbery
Rahul Bhattacharya
Roshan Raj Bhattarai
Eric R. Brown
Vanessa Bump
John Paul Butkevicius
Brandon Chase
Anna Chinchilli
Julie M. Coulombe
Vishal Das
Andrew Del Turco
Chondon Kumar Dey
Patrick Dougherty
Tanner E. Eischen
Andrew Eubanks
William Frazer
Benjamin Grober
Jamie Hansen
Zachary Hastings
Benjamin Heath
Mary Humphreys
Tanjina Ferdous Ira
Madeline Marie Jazdzyk
Catherine R. Jeffries
Matthew C. Kintzel
Yoko Kosugi
Samuel Joseph Langelund
Chian-heng Lee
Joshua Lewis
Cong Li
Chunyu Liu
Benjamin Lysak
Rachel Epstein Marzen
Kashauna Mason
Caleb Melancon
Danielle Minteer
Nahid Al Montakim
Eric Montgomery
Henry E. Moore
Alan Morales
Brittany A. Morse
James Scott Neely
Laura Kate Nemeth
Kseniia Nepeina
Alden Netto
Christopher Nixon
Kelly Marie Olsen
Lydia Pehlert
Lenora Diane Perkins
Muhammad Hassan Quddusi
Isaac A. Ramon
Willow Reichard-Flynn
Alexander Roccaro
Brooks Rosandich
Cassidy A. Rowley
Nancy A. Sackman
Kim Shellenberger
David J. Simpson
Matthew Charles Ritchie Sypus
Patrick Henry Szopinski
Somtochukwu Ufondu
Katarina Vance
Andrew Watkins
Hannah Grace Weaver
Emily Madeleine Wilbur
Spencer Franklin Wilbur
Nicholas Wogan
Peiyu Wu
Stephanie Zech

Geoscience Education

Rachel Adamsky
Hashim Mustafa Al Musawi
Jordan Anderson
John Ayers
Casey Beaudoin
Thais A. Carvalho
Ricardo Ignacio Casas
Lexi Chaize
Stephanie Courtney
Benjamin F. Dejarnatt
Jay Dobbs IV
Charles Fredrick Ewing
Elizabeth Foreman
Allison Homler
Jake Ivers
Karys Lillie
Marissa Mahoney
Olivia Marcelli
Alexandra Martinova
Kristen Meade
Ehsan Momeni
Justin W. Moore
Marta R. Moore
Raymond Chad Moore
Jesus Eduardo Moreno
Hafid M. Nanis
Peter Nso
Roger Olson
Davida Pantuso
Tessa T. Peterson
Eleanor A. Rappolee
Katherine Robinson
Erik Ryder
Amir Sepehri
Ellen McGough Smith
Kyson R. Smith
Guy Clark Sturdevant IV
Ning Wang
Robert Douglas Weyher
Jesse C. Winfrey
Kylie Renee Wixted
Israt Zahan



Geothermal

Jacob R. Cytrynbaum
Estefanny Davalos-Elizondo
Maria Isabel Velez Marquez
Evan Renaud
Kent Leland Smith
Julio Roberto Velasco

History/Philosophy of Geology

Anna Amramina
Richard Javier Stephenson

Hydrogeology/Hydrology

Emmanuel Damilola Adedugbe
Arslan Ahmad
Kaitlyn Allen
Michelle Barakat
Sarina Anne Basile
Christopher Baugh
Banu Bayraktar
Mitchell Behnke
Claire Beveridge
Bethanie Boggs
Colter Joseph-Dean Bossel
Jeremy Tyler Bruce
Nicholas Budde
Jeffrey William Buehler
Jordan P. Buffalo
Bethany A. Carder
Kyle James Castillo
Elijah Jeremiah Chandler
Jessie Tse-hua Chao
Shangying Chen
Andrea Chica
James Henry Chisholm
Aaron Claeys
Geoffrey L. Clifford
Tristan A. Coragiulo
Jansen D. Costello
Alison Susan Cramer
Curtis Ryan Crandall
Roger Thomas Craycroft
Christopher Cremer
Travis Joseph Davis
Marissa Danielle De Hoyos
Karaline Deaton
Jillian M. Deines
Kassandra Karrkens Derf
Rachel Jewell Donati
Megan Doughty
Robert Emmens
Tyler Wes Engelbart
Steven Esrey
Kyle J. Fitch
Bailey L. Fitzgerald
Surya Freeman
Joseph French
Haruchika Lawrence Fujiwara
Stephanie Fulton
Aimee Viviana Garcia
Arturo Gregor
Brittany Lyn Griego
Emma C. Hall
Jesse Lee Hall
Peta-Gay Harris
Taylor Venae Hartman
Md. Mahmudul Hassan
Kevin Mabee Helenurm
Kaleb Jordan Henry
Mark A. Higgins
Michael M. Hitzelberger
Jacob C. Hooker
Yibin Huang
Dionne Hutson
Natalie Kathryn Jones
Alison P. Kingston
Chelsey Kipper
David Robert Knauer
Ryann Elizabeth Knowles
Lydia Koropeckyj-Cox
Joseph M. Kuljis
Jack Thomas Lange
Daniel Larocque
William Larsen
Shelby Dianne Litton
Yue Liu
Angela Lucero

Myron Malisse Lummus
Carly Maas
Klajdi Macolli
Lauren Elizabeth Magee
Amanda Nicole May
Joseph Figueroa McConnell
Mathew McNeil
Amanda Mertowski
Bojan Milinic
Andrew Evan Miller
Katherine Ann Mistick
Garrett David Mitchell
Caitlin Monagle
Scott A. Morley
Dedrick Earl Moulton II
Zachary J. Mungia
Clark Maurer Murphy
Samuel Thomas Nelson
Minh C. Nguyen
Andrew Oberhelman
Jordan A. Oefinger
Ryan Ordung
Mario Ortiz
Thomas Ott
Prince Kojo Oware
Blair Walton Packer
Josh Parris
Jacob Percey
Elizabeth Perera
Michael Phillips
Jacob Martin Piper
Mary Plauche
Trevor Pontifex
Ryan F. Puzel
Anonna Rahman
Md. Mahfujur Rahman
Jamar Regis
David Brian Rogers
Martina Rogers
Madison Rosen
Brenna Rosser
Stephanie Ann Roussel
Ian Robert Rusthoven
Sophia Chason Sanders
Reisa San Pedro
Jeff Schindell
Michael Stephan Schroeder
Christina Jane Sehrt
Charles Shama
Tripti Sharma
Luke Jordan Sherer
Jason Simmons
Michael D. Simon
Eric J. Sinner
Judith L. Smith
Rebeka Smith
Zachary James Smith
Daniel Enrique Smith-Salgado
Emmett Andrew Spooner
Haley Carden Springston
Dennis D. Sturtz III
Mackensie Swift
Anneliese Sytsma
Kaitlin C. Taylor
Brandon M. Thomas
Matthew Barker Thomas
Jeffrey S. Timmons
Wesley James Toups
Scarlett Noel Tovar
Brett Russell Trottier
Sabrina Inge Tusa
Bianca I. Valdez
Miguel E. Valencia
Jory Alexander Vaness
Qiming Wang
Madison Elaine Wayt
Julie Fallon Webb
Scott Quinten Wolf
Tara Womack
Hao Wu
Alyssa Lynn Young
Yonghui Zhu

Karst

Suleyman Selim Calli
Heather Jaclyn Dailey
Jenn Davis
Lisa Duong
Giuseppe Lucia
Caroline Mierzejewski
Tessa C. Mills
Cesalea Nichole Osborne
Colby Bryce Reece
Robert Salinas
Robert J. Scharping
Curtis K. Segarra

Limnogeology

Morgann Gordon
Anna Gravina
Elisandra Hernandez
Kathryn Marie Krueger
Ashia Rae Lujano
Brenna Mabry
Mallory Mintz
Erdoo Mongol
Tristan Ness
Vinothan Sri Sivapalan
Wei Wei
Charlotte Wiman

Mineralogy, Geochemistry, Petrology, and Volcanology

Azaz Ahmed Abir
Salim Ahmad
Aristides Jose Alfaro
Suhail Saleh Alhejji
Joshua J. Amrhein
Dustin R. Anderson
Jerad Anderson
Carlos Antonio Angeles
Catherine Armstrong
Michael J. Bagby
Peter Louis Baker
James Richard Ballard III
Rebecca M. Barnett
Natasha Barrett
Roy Bassoo Jr.
Stephanie Bayless
Tristan BeDell
Henry Heath Bennett
Kadie Bennis
Ninad Pradeep Bhagwat
Grayson Steven Bilak
Matthew Bloomfield
Govindarao Boddepalli
Adina Bogatu
Andrea Nichole Bond
Olivia Rose Botting
Antonia Eugenie Bottoms
Alicia Rose Boyer
Clara Jean Brennan
Megan Brennan
Shannon Brink
Eric M. Brinza
Sean Michael Brock
Richard Brydon
Joseph Fenton Burns III
Echo Burrows
Shelley Anne Buth
Vural Burc Cakir
Sahira Monic Cancel Vazquez
Kelby Leon Carambot
Gabriel M. Carbone
Kendra Nicole Carty
Taylor Nicole Cassidy
Amanda Rae Cavazos
Trenton Cerny
Spencer L. Chaney
Joseph Caleb Chappell
Wriju Chowdhury
Ian David Clary
Brenna Cole
Homar C. Colin
Adele Conde
Paul Coviello
Brittney Crisera
Lason Crogh
Laura Ann Cruickshank
Cameron Cummings
Lindsey Davidge
Rebecca Degraffenried
Filipa Catarina Lopes Dias
Elisa Di Meglio
Hannah Faith Dickson
Meg Alden Lorraine Dobinski
Allison Dombrowski
Michelle Dossey
Eugene Doyle III
Tess Drauschak
Jacqueline L. Drazan
Madison Azure Easterbrook
Paige Kristine Elsea
Robert Emo
Emmanuel Escorcia
Cameron Evans
Krista Evans
Yihang Fang
Colleen Mae Fenlon
Christina Ferguson
William Fitzpatrick
Stamatis Flemetakis
María Fernanda Flores
Ben Fox
Fernando Galvao
Victor H. Garcia
Rupam Ghosh
Rebecca Lynne Golia
Gillian Greenberg
Matthew Goulding Guilin
Eugene Adubofour Gyawu
Evan Matthew Hamilton
Mary-Elizabeth Hansen
Ashley Denise Hargrave
David Allen Harvey
Stephen Ashley Hill
Lisa Hlinka
Glenn William Hoffmann
Alexander Recer Hoinville
McKenna Elsie Holliday
William Floyd Hoover
Tianyi Huang
Noah Huftalin
Nicole Hunt
Md. Sahidul Islam
Sarmin Islam
Shelby Lee Isom
Davitia James
Jacob Jenkins
Aleisha Johnson
Shelby Johnston
Nico Kastek
Joachim Katchinoff
Rachel Kelk
Joshuah Klier
Jacob David Klug
Leah Knapp
Hayden Kombrink
Ryan Kroner
Aeryn Krusen
Ashutosh Kumar
Christopher Jesse Lane
James Tyrone Langschultz Jr.
Sarah G. Lapinski
Paige Elizabeth LaPlant

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 Moretto Jr.
Katherine Morris
Sinead Chloe Morris-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 Öztürk
John Barrett Palmerton
Abigail Ann Pashina
Brigitte M. Petras
Elizabeth A. Pettitt
Bailey Dianne Pfitzner
Patrick Richard Phelps
Trisha Janelle Pipchok
Atticus Proctor
James Daniel Quick
Hifzur Rahman
Gabriela Yvonne Ramirez
Robert Anthony Ramirez
Sierra Rhaye 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
Clotilde Q. Sliva
Coley Daniel Smith
Stuart Alan Smith II
Kelli Snyder
Dakota Soderlund
Danielle J. Spencer
Jonathan Spiegelglas
Braxton Spilker
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 Weldeghebriel
Jenelle Wempner
Kevin Alexander Wokosin
Daniel L. Wood
Dan Worcester
Kimberly N. Wurth
Jingjing Yan
Kristy Zalud
Ziqiu Zhang
Scott B. Zylstra

Top professional interests of new students

- ✔ **Mineralogy, Geochemistry, Petrology, and Volcanology**
- ✔ **Hydrogeology and Hydrology**
- ✔ **Environmental Science**
- ✔ **Structural Geology and Tectonics**
- ✔ **Stratigraphy and Sedimentology**

Oceanography/Marine Geology

Tharanath Modika Bandra Ambillapitiya
Benjamin Anthony Anderson
Shannon L. Banks
Kayla Marie Bronzo
Bryanna Ehmke
Mason Norman Frucci
Alexandra Jo Garnand
Kali Ren Gough
George J. Harth
William Hefner
Ryan Jinks
Konstantinos Kasamias
Grace Kim
Dietrich Kuhlmann IV
Anastasia Kyrmanidou
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 Plyler
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 Bookwala
Alexander Bradley
William Brightly
Kane Bruce
Sarah Bruihler
Angelena N. Campisi
Eric James Chameroy
Marley A. Chertok
Anne Renee Ciccariello
Charl Daniel Cilliers
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 Dill
Brandi 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 Gonçalves
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

Universities with the most new student members:

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

Tasnuva Ferdous Ming Khan
Rahab Kinyanjui
Veronica Klein
Damien S. Knight
Dana Elaine Korneisel
Francis Alexander Kovalick
Agnese 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
Amanda Wu Peng
Justine Perrotti
Amber Petrie
Michael Shouta Peyton
Kelly Cathrine Pfeiler
Dianna Price
Andrew B. Rice
Matthew Richards
Benjamin Eli Riddell-Young
Juan Romero
Brooke Alix Roselle
Christopher Michael Schiller
Ryan Earl Shanks
Edward Chase Shelburne
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
Caue 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 Knuttila
Brooke Kubby
Michael Louis Lampron-York
Taryn Ashley Lausch
Alicia Lopez
Sara Ann Lowery
Ian Marrs
Audrey Claire Martin
Rayssa Martins Pimentel
Emily N. McQuarrie
Tyler Meng
Shirley Tsotsoo Mensah
Natalie Moore
Jenny Ni
Cole Nypaver
Jason N. Ott
Nathan G. Pindell
Sara K. Poppa
Nathan William Pulver
Auriol Stephen Prenter Rae
Lennox Matthew Reuben
Amanda N. Rudolph
Steven F. Sholes
Nathan Smith
Jacob Tyler Stid
Patrick Suter
Dylan Terry
Patrick Trent
Daisy May Turnmire
Zoe Elora Wilbur
Lori Nicole Willhite

Policy/Regulatory

Mia McGee
Emmett Werthmann

Quaternary Geology/ Geomorphology

Kailey Adams
Ethan Brett Ader
James Issam Arnuk
Christopher Oscar Bayer
Rebecca Louise Beers
Andrew Bloniarz
Katherine Braun
Jared Ian Brush
William Caffee
Kerry Lee Callaghan
Vicky Chelangat Cheruiyot
Benjamin C. Clemmer
Fiona Clubb
Jolin D. Cordalis
Nathan Roger Delgado
Kathryn Grace De Rego
Parker Devine
Meaghan Dinney
Kieran Bernard Jiamin Dunne
Jordan F. Fields
Madeline Louise Friend
Joshua Michael Gonzales
Tyler Robert Gough
Daniel Guarin
Lindsay Love Gutierrez
Grant William Hagedorn
Nicholas Robert Hawthorne
Garet Jax Huddleston
Keene William Karlsson
Nikul Kumari
Kirsty Mackie
Richard James Mataitis
Nicholas Reilly McCarroll
Jeremiah Lee Mickey
Lauren Elizabeth Miller
John Mills
Evan Dallas Millsap
Alexa Muntz
Zach Nuhring
Harvie Jason Pollard
Nicholas Alexander Potter
Ian Reeves
Julianne Eileen Scamardo
Joanna Scuteri
Ran Shemesh
Peixian Shu
Cora Siebert
Jennifer Leigh Simpson
Mimi Alexandria Smith
George Ramath Snyder
Ankur Srivastava
Tara Evangeline Stahlecker
Alison M. Stallings
Haley Talbot-Wendlandt
Hui Tang
Varqa Tavangar
Judith Ann Taylor
James Thayer
Mark Thompson
Natalie Trivino
Thomas James Vento
Jennifer Villa
Erin Marie Walter
Kathleen E. Wilson
Ann Jade Wong
Amelia Yeager

Seismology

James Atterholt
Brandis Ayres
Kaitlynn Mary Burkhard
Kathryn Margo Dorn
Audrey Dunham
Jenna Lynn Faith
Emeline Frix
Md. Nahidul Hasan
Michael Jay Murrey
Emma Myers
Kim Dale Shollenberger
Eric Donald Szymanski
Phillip Torres Jr.

Soil Science

Casey Marie Braccia
Clarissa Crist
Ellie Marie Ellis
Ian Forbes
Denay Marie Grund
Ross Harvell Jr.
Joshua McDanel
Connor Joseph McFadden
Cynthia Kaye Mitchell
Bryan Moravec
Silas Morgan

Chelsea Sabrina Obeidy
Audrey Jean Rader
Andrea Román-Sánchez
Erin Clarissa Rooney
Ashly Senske
Helen Whitty

Stratigraphy/Sedimentology

Jood Al Aswad
Zuana Alam
Chimira Nicole Andres
Samuel T. Barber
Aerin G. Basehart
Jasmine L. Bates
Hermann Dario Bermudez
Souvik Bhattacharjee
Joyeeta Bhattacharya
Elliot Julian Hattarki Blake
Melanie Bowen
Daniel Calvo Gonzalez
Alexandria Cerpovicz
Keyi Cheng
Victoria Chevrot
Alora Josephin Cruz
Trae Robert Doty
Edward Fernando Duarte
Ripul Dutt
Abdulah Eljalafi
Jessicca Linn Endicott
Curtis Ferron
Angela Fiorito
Joshua Alexander Ford
Daniel Govert
Megan Gross
Sabrina Halli
Brenna Hamilton
Amanda Renee Hartstein
Richard Hess III
Caleb Hoffman
Sidney Grant Huskey
Robert Huxley
Seth D. Irwin
Chayawan Jaikla
Devin Keating
Taylor Kelln
Bryan Kent
Mark Korte-Nahabedian
Agustin Kriscautzky
Montana Lynn Kruske
James Martell
Caleb Mathias
Samantha McComb
Jesse Patrick McGunnigle
Robin L. McLachlan
Scott Romney Meek
Michael Christopher Micucci
Keith Patrick Minor
Juliana Molchanova
Theophile Mugerwa
Udita Mukherjee
Richard Gregory Ness
Jacob David Niles
Matthew Beckes Nix
Hasan Burak Ozer
Lauren Elizabeth Parker
Junwen Peng
Yue Peng
Christopher Perfili
Katie Jo Pevehouse
Ryan Eli Phillip
Simon Poirier
Elisabeth Rau
Benjamin Ellis Rendall
Benjamin Richards
Katharine Grace Rose
Tyler Jacob Rust
Emily Katherine Ryan
Maxwel F. Schiwd
Sara Schreder-Gomes
Yvon Secord
Chen Shen
Victoria Isabel Simoneau
Christopher E. Smith
Vineet Kumar Srivastava
Chris Steuer
Emily Stoll
Charlotte Stone
Colter William Stopka
Brandon Sutter
Noushin Taghizadeh Alamdari
Frank Tamakloe
Alexander Lamar Taylor
Chia Pei Teoh
Valerie Christine Tewell
Fernando Valencia
James Robert Van Eerden
Lochlan Wright Vaughn
Allison Marie Vo
Abdul Wahab
Sarah Walker
Griffin William Warner
Lin Wei
Austin C. Wilkerson
Lizzie Wratten
Yang Yu
Hualing Zhang
Chen Zhao
Mayra Alejandra Zuniga

Structural Geology/ Tectonics

B.C. Aakash
Leilani Adame
Walter Afonso
Liza Akter
Katherine Anne Alexander
Daniel Alonso-Torres
Danielle Anderson
Taylor Murphy Arrowood
Shayna Tawny Avila
Davide Bana
Madelyn Blair
Marie-Pier Boivin
Andrew R. Bolton
Kevin Richard Branigan
Mary Braza
Daniel Ray Butcher
Matthew David Cameron
Derek Caro
Hannah Cunningham
Biraja Prasad Das
Laura Isabel Maria de Sousa
Megan Deabreu
Lindy Dingmore
Rebeccah Dipuccio
Cameron Dorsey
Renelle Dubosq
William Cody Duckworth
Aboubaker Farah
Benjamin Douglas Finley
Spencer Lamar Fuston
Emily Gackstatter
Patrick Gannon
Casey G. Garrigan
Max M. Garvue
David Paul German Jr.
Michelle Gess
Claire Gilder
Tyler Arthur Grambling
Carolina Ortiz Guerrero
Andrew S. Guglielmo
Nicolas James Harrichhausen
Paige Havener
Kathryn Elizabeth Head
Charles Frost Hoffman
Alexander Paul Holmwood
Shlomo Honig
Elham Hosseinzadehsabeti
Jesus Adrian Ibarra
Danica Jablonska
Dillon Daniel Johnstone
Adam Aaron Ketchum
Jordan Kihn-Stang
Patrick Kevin Kilkelly
Jaimie Lynn Kollmorgan
Joshua Joseph Krnavek
Anthony R. Kruzel
Christopher Robert Ladd
Melina Nina Lazar
Stirling Hobgood Lemme
Iva Lihter
James B. Lindgren
Peter Carl Lindquist
Craig Lopiccolo
Huimin Ma
Shan Ma
Christine M. Maher
Marina Marcelli
Christopher Marlow
Evan James Martin
Taylor Methven
Justin Mistikawy
Daniel D. Mongovin
Simone Muller
Emma C. Niedholdt
Jack Nolan
Khrystyna Ortiz
Mackenzie Elle Pangerl
Samuel Patzkowsky
Stephen Pearcey
Nicolas Piette-Lauzière
Arnoldo Pimentel Jr.
Logan Powell
Cesar Alberto Cortes Prado Sr.
Mia Ratino
Andrea Elaine Richardson
Rebekah Riemann
Catherine Ross
Neil Jordan Seifert
Israporn Sethanant
Lauren Shea
Cody Jesse Shell
Jo-el Sidbury Smith
Tyler S. Skelton
Ashley Smith
Alexandra Snell
Natassja E. Sook
Julie Sophis
Andrew Spatz
Andrew Jont Stevens
Lindsey Stone
Veronica Faye Sullivan
Ke Sun
Jennifer Margaret Taylor
Taylor Charles Team
Clara Thomann
Deepshikha Upadhyay
Maria Isabel Vidal Reyes
Rebecca Caroline Waite
Enci Wang
Thomas Stuart Warfel
Abigail Joanna Wesley
Lachlan Wright
Alexandra Zemba
Jingjing Zhang

Other Professional Interests

Heather Alley
Andrew Dustan Baker
Diego E. Balay
Alexander Horace Berner
Claire Browning
Kendall Chilson

Jamie Chong
Richard Chow
Ryan Cole
Gannon Hunt Connors II
Shannon Cope
Liz Corrigan
Aubrey Craver
Aidan Daek
Lane W. Daigle
Mary Donohue
Emily Grace Downs
Stephen Dugas
Reece Elling
Abby Elsperman
Taylor Farmer
Cooper R. Fasulo
Alice Fontaine
Ramona Gomez
Charley Hankla
Larissa Harter
Fernando Hernandez
Benjamin Michael Hockstad
Olivia Housen
Scott Howarter
Chenlin Hu
Dillon Hughes
Sarah J. Izzo
Collin Jensen
Jamie Johnson
Heidi Nicole Krauss
Logan Krehbiel
Michele Lancia
Kameko Landry
David Lankford-Bravo
Rachel Kate Lester
Ashley Lynn
Andrew Madsen
Liam J. Maher
Zach Maupin
Benjamin McDougal
Zach Maxwell McKenzie
Brian Morgan
Matthew Olsen
Callie Pace
Justin Penn
Spring Song Petta
Madison Grace Price
Crystal Pringle
Alexandra Eleanor Pye
Alyssa Quinn
Nichele Raines
Rebekah Rhodes
Loren Richardson
Beatrice Rodewald
Evan Romasco-Kelly
Scott Rowan
Emma L. Salazar
Katelyn Scanlin
Racheal Gabrielle Schrock
Gage Seaux
Michael Sepp
Anna Shampain
Dominique Shore
Brett Smith
Sean Strachan
Addison Jaeger Thompson
Roberta Ann Thompson
Lauren Vandepas
Isaac Eliseo Villalobos
Sara Molly Wagner
Ping Wang
Stephanee Danielle Whitley
Julia Widmer
Sunil Kumar Yadav
Alex Yannello
Jiayi Yu
Zhouqiao Zhao

K–12 Teachers

Debarshi Bhattacharya
Stephanie A. Burns
Tim J. Butler
Margret Dascenzo
Maricel Fee
Rob Greene
Adam S. Grodek
Laura Kathleen Hollister
Susan Meabh Kelly
Caleb Lewis
Andrea Mangold
Richard J. Marshall
Lindsey Montierth
Molly Kristine Pontifex
Bridgette Reynolds
Kathleen Touve
Elizabeth Lurline Wardsworth
Audrey Wronski

Affiliates

David O. Ayeni
Kevin Baldwin
Samuel Biddle
Donald B. Boyd
Susan N. Brand
Matthew Joseph Bula
Casey Burns
Kathleen Callison
Kenneth R. Conger
Kate J. Darby
Paul Edison-Lahm
Godfrey Evans
Charles G. Garland

Fellows

GSA has 2,535 active Fellows

Mark Whitney Garrett
John Guerin
Eneida Hallenborg
Rebecca Nicole Hatcher
Rich Heady
Thecla M. Hill
John Thomas Howald
Teddy Johnston
Carlyle Robin Jones
Rowena Lytle
Linda J. McCall
John T. McLarty
Catherine Meinert
William Michael Montante
Dale Stuart Morrison
Brant Nyborg
Jefren Olsen
Alison Paylor
Jan F. Pels
Lisa L. Phillips
Suzanne Rosser
David Brooks Russ Sr.
Lynn Schott
Susan Lea Smith
Edward Stanclik
Michael James Stovall
Paul Thomsen
Eric Edward Thorsen
Paul J. Williams

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

GSA OFFICERS

Term: July 2018–June 2019

PRESIDENT
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Communication is Key to Success

Melanie R. Thornton

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.

THE GEOLOGICAL SOCIETY OF AMERICA®

USGS science for a changing world

GSA Contributes to Colorado Science & Engineering Fair

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.**

GeoTeachers K–12 Teacher Professional Development Workshops...

...This Summer

Arizona—Flagstaff, 23–27 July

Colorado—Colorado Springs, 30 July–3 August

Look for Progress Reports on the GeoTeachers Blog at **https://speakingofgeoscience.org/tag/geoteachers/.**

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.

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

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

At Indy

GSA 2018

4–7 November

Indianapolis, Indiana, USA

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.

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.

Geoscience Jobs & Opportunities

Ads (or cancellations) must reach the GSA advertising office no later than the first of the month, one month prior to the issue in which they are to be published. Contact advertising@geosociety.org, +1.800.472.1988 ext. 1053, or +1.303.357.1053. All correspondence must include complete contact information, including e-mail and mailing addresses.
Online: www.geosociety.org/jobs.

Rates are in U.S. dollars.

Classification	Per Line for 1st month	Per line each addt'l month (same ad)
Positions Open	$9.30	$9.25
Fellowship Opportunities	$9.30	$9.25
Opportunities for Students		
First 25 lines	$0.00	$5.00
Additional lines	$5.00	$5.00

Positions Open

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COLORADO SCHOOL OF MINES

The Department of Geology and Geological Engineering at Colorado School of Mines is seeking a dynamic, enthusiastic leader to head the Department. We seek a recognized teacher and researcher with a proven track record of leadership, management, vision, and mentoring. Share in our mission to address the challenges of creating a sustainable global society by educating the next generation of leading scientists and engineers, and by expanding the frontiers of knowledge through research. Please visit our website at http://jobs.mines.edu/cw/en-us/job/493021/professor-and-department-head-geology-and-geological-engineering for the complete announcement and instructions on how to apply.

TENURE-TRACK
EARTH SYSTEMS SCIENCE
DEPARTMENT OF EARTH & ENVIRONMENTAL SCIENCES
RENSSELAER POLYTECHNIC INSTITUTE

The Department of Earth & Environmental Sciences at Rensselaer Polytechnic Institute in Troy, NY, invites applications for a tenure/tenure-track position at the assistant, associate or full professor level in Earth Systems Science. The E&ES Department research areas include experimental, analytical and environmental geochemistry, petrology of Earth's systems, environmental informatics, solid Earth geophysics, paleoclimate, origins of life and geomicrobiology. We are seeking applicants whose research will complement and grow these strengths and whose research programs address fundamental problems in Earth Systems science. Disciplinary areas that are of particular interest include, but are not limited to, natural systems and environmental geochemistry, early Earth environments, geochemical proxies for interpreting ancient environments, global ocean-atmosphere-geosphere interactions, and planetary evolution. Additionally, research programs that address fundamental questions in hydrogeology and/or remote sensing will serve to expand the Earth Systems science program at RPI.

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 Department of Geological Sciences at the University of Alaska Anchorage (www.uaa.alaska.edu/geology/) seeks applicants for a full-time, 9-month, non-tenure track position in the field of mineralogy and igneous/metamorphic petrology for the 2018–2019 academic year, with a start date in August 2018. The successful applicant will be required to teach up to 12 contact credits of courses per semester (lecture-based courses are 3 credits and labs are 1.5 credits). These include upper level courses in Mineralogy, Igneous & Metamorphic Petrology, and Geologic Field Methods, as well as other introductory or upper level courses or labs within the applicant's expertise. We anticipate this position will be advertised as a tenure-track opportunity in Fall 2019; should this occur, the successful applicant may also apply for this permanent position if it becomes available.

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 department has 7 full-time faculty, 2 full-time lecturers, and approximately 130 undergraduate majors.

STEPHEN F. AUSTIN
STATE UNIVERSITY
NACOGDOCHES, TEXAS

Structural Geologist

The Department of Geology at Stephen F. Austin State University invites applications for a tenure-track position at the assistant (or associate) professor level. Applicants must have a doctoral degree in geology or a related field with emphasis on structural geology and field camp, a strong commitment to excellence in teaching and a willingness to direct Master of Science geology students in research. Preference will be given to candidates with structural geology and field camp teaching and/or research experience. Teaching responsibilities for structural geology will include introductory courses, upper-level and graduate courses in the applicant's specialty, and occasional weekend field-trip courses. Teaching responsibilities for field camp will include teaching or co-teaching field methods in the spring semester and co-teaching summer field camp. Other expectations include research, university service and continuing professional development.

To apply and submit required documents, please visit: http://careers.sfasu.edu/postings/2803.

Review of applications will begin on September 3, 2018, and will continue until the position is filled. SFA is an equal opportunity employer. This is a security-sensitive position and will be subject to a criminal history check.

Degree options include a BS in Geological Sciences and an MS in Applied Geological Sciences.

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.

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

Geosciences Congressional Visits Day—Bridging the Gap between Research and Policy

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 by the feds 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.

Sylvia Nicovich (center) with Senator Jon Tester (D-MT) (left) and Congressman Greg Gianforte (R-MT).

Plan a Dinosaur Safari with Free GSA Field Guides

First long-necked elasmosaur plesiosaur from the lower Eagle Ford (Britton) at Cedar Hill, Texas (from Shuler, 1950; see also Welles, 1949). This became the holotype of *Libonectes morgani*.

Hunt for dinosaur bones in some of the richest fossil beds of North America. Begin your safari at Dinosaur Provincial Park in Alberta, Canada, where 35 species of dinosaurs have been discovered. Next, take a trip down the Dinosaur Freeway along Colorado's Front Range. Cap off your expedition in northern Texas, where you'll explore sites that have yielded an abundance of terrestrial and marine fossils.

Get free digital access to the following trip guides now through the end of July. Visit the GSA Bookstore at http://rock.geosociety.org/Store/ and search "DinoPass" to download your copy today.

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

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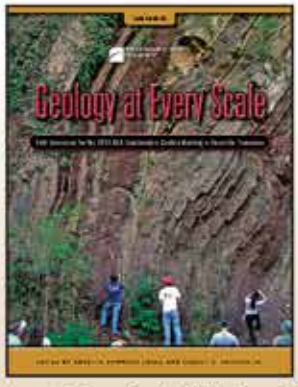

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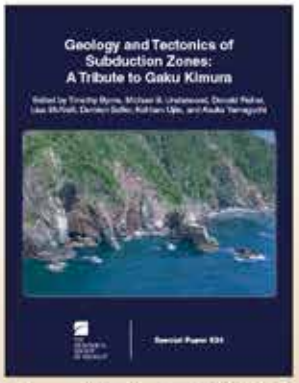

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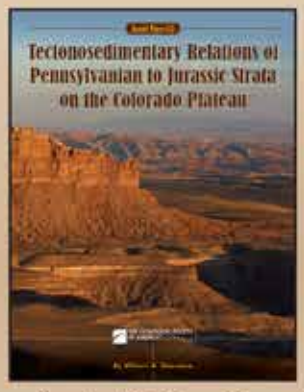

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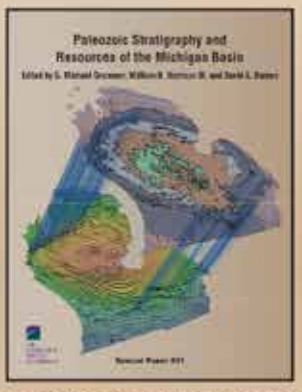

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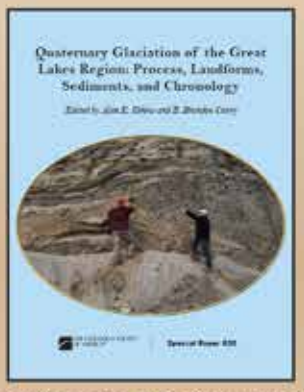

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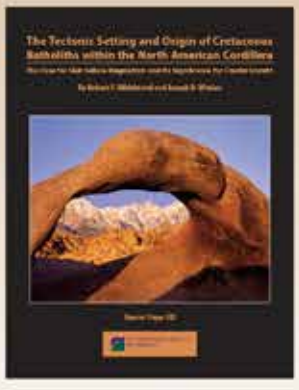

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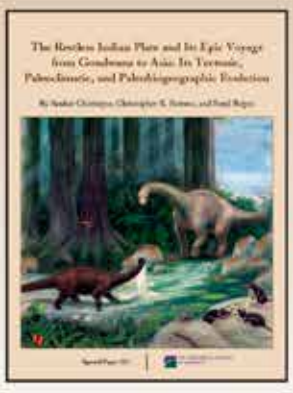

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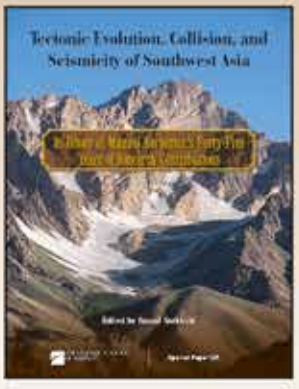

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