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Synoptic View of Lithospheric S-Wave Velocity Structure in the Southern United States: A Comparison of 3D Seismic Tomographic Models

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ABSTRACT
The southern U.S. continental margin records a history spanning ca. 1.2 Ga, including two Wilson cycles. However, due to a thick sediment cover, the paucity of significant local seismicity, and, until recently, sparse instrumentation, details of this passive margin’s tectonomagmatic evolution remain disputed. This paper compares recent S-wave tomography and crustal thickness models based on USArray data to help establish a framework for geodynamic interpretation. Large-scale patterns of crustal velocity anomalies, corresponding to major regional features such as the Ouachita orogenic front and the Precambrian margin, are generally consistent between the models. The spatial extent of smaller-scale tectonic features, such as the Sabine Uplift and Wiggins block, remains poorly resolved. An inverse relationship between crustal thickness and Bouguer gravity across the continental margin is observed. This model comparison highlights the need for additional P-wave tomography studies and targeted, higher density station deployments to better constrain tectonic features.

INTRODUCTION
The southern U.S. margin (Fig. 1) ranges from the stable Laurentian craton beneath Oklahoma to a stretched and thinned passive margin to oceanic lithosphere in the deep Gulf of Mexico, recording within it a geologic history that includes two complete Wilson cycles (Thomas, 2006). Due to its extensive hydrocarbon reserves, the southern U.S. has been the focus of intensive seismic exploration. However, until recently, studies of its deep structure trailed those of other U.S. continental margins. The result is that the tectonomagmatic evolution of the southern U.S. margin remains poorly understood. The primary contributing factors to this status quo are (1) the presence of a thick sediment cover that obscures crustal structure through most of the region, (2) the paucity of significant local seismicity, and, until recently, (3) sparse seismic instrumentation in the region. Earthscope’s USArray temporally densified the set of broadband seismographs available for studies of the region’s lithosphere (http://www.usarray.org/researchers/obs/transportable). Approximately 435 stations occupied a total of 1830 locations in the continental U.S., for two years each, at a nominal spacing of 70 km. In USArray’s wake, there has been a surge in the number of continental-scale tomographic studies presenting snapshots of the compressional and shear wave velocities of the region’s crust and upper mantle. Although the volume of seismic data available for studies of the region has increased dramatically and sampling of the sub-surface has improved as well, the presence of a thick layer of sediments and relatively low levels of seismicity (with the exception of Oklahoma) continue to challenge efforts to image the lithosphere.

The collection of models for the southern U.S. region represents the state-of-the-art of seismic tomography: a broad range of approaches, the inclusion of various types of data, and different choices of solution schemes. These seismic velocity models can be used to study the mineralogical, compositional, and thermal state of the current crust and upper mantle, and thereby provide critical constraints on geodynamic models, as well as serving as a foundation to launch further investigations. They also showcase the various techniques and innovations of seismic tomography. But, first, robust tectonic features must be identified. Well-constrained features should appear consistently across models. Differences between models could be due to (1) types of data incorporated, such as body wave arrival times, surface wave dispersion, receiver functions, or combinations of two or more data types; (2) measurement techniques employed; (3) the theoretical basis of the forward calculation, such as ray theory versus finite difference versus finite frequency; (4) the initial model and parameterization used; (5) regularization choices (“damping” and “smoothing” schemes and parameter values); and (6) inversion methods, such as gradient-based local minimization versus global optimization techniques.

The purpose of this study is to provide a systematic analysis of similarities and differences between recent shear wave tomographic models with respect to the lithospheric structure of the southern U.S. continental margin. Similar comparisons have been conducted for the western U.S. by Becker (2012) and Pavlis et al. (2012).

TECTONIC SETTING
The region that now comprises the southern U.S. has witnessed two complete Wilson cycles of orogeny and rifting (Fig. 1). These cycles can be chronologically split into four major tectonic events, beginning with the closing of an ocean and assembly of the Rodinia supercontinent. 1. The Mesoproterozoic Grenville orogeny along the southern margin of Laurentia is a result of continent-continent and continent-arc-continent collision, a result of which is the ca. 1.2 Ga granitic core of the Llano uplift (Fig. 1) (e.g., Culotta et al., 1992; Mosher et al., 2008).
2. The Grenville orogeny was followed by a Neoproterozoic rifting episode that resulted in the breakup of Rodinia and the subsequent opening of the Iapetus Ocean. The resulting passive margin, outlining the southeastern continental margin of Laurentia, is widely thought to be composed of a series of rift and transform segments (Hatcher et al., 1989; Thomas, 1991, 2011).

3. The closing of the Iapetus Ocean and the consequent assembly of the Pangaea supercontinent during the late Paleozoic included a collision between Laurentia, Gondwana, and enclosed island arcs, which resulted in the Ouachita orogeny. Contemporaneous terranes that participated in the Ouachita orogeny, the composition and origin of which are widely debated, are associated with basement highls, such as the Sabine and Monroe uplifts in Louisiana and the Wiggins Arch in Alabama and Mississippi.

4. Finally, Late Triassic rifting episodes, during the breakup of Pangaea, led to the opening of the Atlantic Ocean and the Gulf of Mexico (Dickinson, 2009; Thomas, 2011; Huerta and Harry, 2012). Continental extension, followed by mid-Jurassic seafloor spreading, produced the current configuration of an arcuate wedge of oceanic crust beneath the deep Gulf of Mexico surrounded by transitional continental crust of variable width (Christeson et al., 2014).

Although there is general agreement on the sequence of tectonic events that formed the present-day crustal structure of the southern U.S. continental margin, several details of its evolutionary history remain unresolved. These include, but are not limited to, the geometry of the Precambrian rift-transform margin, depth and spatial extent of the allochthonous terranes that participated in the Ouachita orogeny, and variations in continental stretching and magmatic activity across the northern Gulf of Mexico during Mesozoic rifting.

**VELOCITY MODELS**

The following eight models are compared in this study: DNA13 (Porritt et al., 2014); PLH15 (Porter et al., 2016); PM15 (Pollitz and Mooney, 2016); SR16 (Shen and Ritzwoller, 2016); SLK15 (Schmandt et al., 2015); NA07 (Bedle and van der Lee, 2009); SL14 (Schmandt and Lin, 2014); and YFCR14 (Yuan et al., 2014). Our comparison is limited to shear wave velocity (Vs)
models because only a few P-wave velocity models span the southern U.S. Table 1 presents pertinent details about models that include the crust: SR16, DNA13, PLH15, PM15, and SLK15. The latter four models were generated via an iterative, linearized inversion algorithm. The global optimization technique used to generate SR16 makes it unique within our set of models, allowing for more formal estimates of uncertainties. An extended review of data types and methods used to generate all eight models examined in this study is presented in the GSA Data Repository; for further details readers are referred to the original publications.

**CRUSTAL THICKNESS MODELS**

Crustal thickness varies substantially across passive margins, including the northern Gulf of Mexico, and hence serves as an important parameter in reconstructing the tectonic evolution and pre-rift geometry of such regions (Reston and Morgan, 2004; Huismans and Beaumont, 2011; Sutra and Manatschal, 2012). To evaluate crustal thickness variations across the study region, four models were considered: SLK15, SR16, PnUS2016, and LITHO1.0. PnUS2016 (Buehler and Shearer, 2017) uses Pn arrivals, which are P waves that refract just below the Moho and are the first arrivals at regional distances, to constrain crustal thickness. PnUS2016 utilizes the seismic velocities from SR16 to map crustal thickness. LITHO1.0 (Pasyanos et al., 2014) is constructed by perturbing an initial model parameterized vertically as a series of geophysically identified layers, that is, a combination of the CRUST1.0 model (Laske et al., 2012) and the LLNL-G3D model (Simmons et al., 2012), to fit surface wave dispersion maps over the 5–40 mHz frequency band. Additionally, Moho depths from velocity models based on results from the 2010 GUMBO experiments, consisting of four long-offset seismic refraction profiles in the northern Gulf of Mexico (Fig. 1) (Eddy, 2014; Christeson et al., 2014; Eddy et al., 2014; Van Avendonk et al., 2015), were digitized and added to the comparison. With 11–12-km station spacing and the incorporation of coincident seismic reflection data, crustal thickness estimates from the GUMBO lines have the highest resolution in this study.

**DATA AND METHODS**

Model comparisons with original figures are complicated by the different choices authors make with respect to presentation: color scales and ranges, color palettes, and perturbations with respect to a model average or a global standard, etc. Here we plot all models on the same scale, in terms of perturbations with respect to the average of all models, using a consistent color scale. Most models used in this study were downloaded from the IRIS Earth Model Collaboration (http://ds.iris.edu/ds/products/emc); others were received via private correspondence. Using MATLAB, each velocity model was linearly interpolated onto a three-dimensional (3D) grid with 0.2° × 0.2° uniform lateral spacing and 0.5-km depth spacing. For the southern U.S., the domain of interest was bounded latitudinally between 26°–37° N and longitudinally between 78°–102° W. Using the interpolated shear velocity models, the lateral root-mean-square velocity, \( V_{\text{rms}} \), for each model was calculated and compiled to create average one-dimensional (1D) velocity individual models, and an average 1D model for the study area (SUSavg; Fig. 2A). This procedure was repeated to create

![Figure 2](image-url)
similar 1D shear velocity models for the western U.S. (WUS), 28°–50° N by 102°–130° W; the central U.S. (CUS), 36°–50° N by 90°–102° W; and the eastern U.S. (EUS), 36°–50° N by 70°–90° W (Fig. 2B).

In addition to the original data set, models by Schmandt and Humphreys (2010), James et al. (2011), Obrebski et al. (2011), and Chai et al. (2015) were used for the western U.S.; results from Chen et al. (2016) were used for the central U.S.; and the model by Savage et al. (2016) was used for the eastern U.S.

Figure 3 displays model perturbations with respect to SUSavg at four depths: 5 km and 15 km plus 5 km above and 5 km below the Moho, with cooler colors (blue and green) representing faster regions and warmer colors (red and yellow) representing slower regions. Authors of each model indicate their best guess of the Moho depth throughout their model, so the last two panels represent different absolute depths for each model. Perturbations of models at depths of 75 km, 150 km, 400 km, and 415 km are presented in the GSA Data Repository (see footnote 1).

RESULTS AND INTERPRETATIONS

Velocity Models for the Southern U.S. and Comparison to Other Regions

Root-mean-square velocities ($V_{rms}$) as a function of depth for the 3D models introduced above are shown in Figure 2A. The models fall into two distinct groupings: (1) PLH15, SLK15, SR16, and SL14 and (2) PM15, NA07, YFCR14, and DNA13, with as much as ~0.75 km/s difference between the two groups at upper mantle depths. The average of all models is shown in red (SUSavg), Comparable regional averages for the eastern, western, and central U.S. are shown in Figure 2B, along with the SUSavg, and the 1D reference models, ak135, and PREM.

All four average regional models (Fig. 2B) show the Moho at deeper depths than the reference 1D models. CUS has the highest velocities in the crust and upper mantle, which is consistent with the fact that it largely represents the cratonic core of Laurentia. Due to the presence of thick sedimentary basins in the southern U.S., SUSavg has the lowest velocities in the uppermost crust. In the upper mantle, however, the western U.S. (WUS) is the slowest of all models. Despite the lack of recent tectonism in the southern U.S. margin, the SUSavg model is more similar to the WUS model for the tectonically active western U.S. than any of the other models. Interestingly, Gulf Coast $Q$-values ($Q$ at 1 Hz) are also considerably lower than mid-continent values but similar to those in the western U.S., with boundaries that correspond to the Oklahoma-Alabama Transform and Ouachita thrust (Cramer, 2017).
SUSavg model is also distinctly slower than the EUS model at all depths.

**Geologic and Tectonic Patterns**

In the upper crust, large-scale patterns of anomalies are consistent between all the models, matching the geometry of major features in the region; i.e., the Ouachita orogenic front and the Precambrian margin (Fig. 3 with locations in Fig. 1). Areas to the north of the Precambrian margin, which comprise cratonic continental crust, are faster at shallower depths than in the region enclosed between the Alabama-Oklahoma transform and Texas Rift segments, which is covered by thick sediments. This latter region displays a reversal in anomalies in three of the five models (PLH15, SR16, and SLK15) at depths around the Moho. This fast velocity zone could correspond to the base of the Sabine block, as proposed by Clift et al. (2018). The Southern Oklahoma Aulacogen is consistently represented in the models by a slow anomaly, although with varying size, geometry, and location. Conversely, the Llano Uplift is represented by a fast anomaly that is especially prominent at shallow depths. A large proportion of the seismic data used to generate the models derives from the USAArray’s Transportable Array (TA), which has a nominal station spacing of ~70 km. The resulting relatively low horizontal resolution of these models makes it difficult to constrain effectively the exact geometry of small-scale geologic features in this region.

Amplitudes of anomalies vary significantly between models (note the different ranges in the color bars). There are at least two reasons to expect such variations. First, constraints imposed by data on model parameters usually range from over-determined to under-determined in tomography, so additional regularization is needed to stabilize the inversion numerically. Choices of values for regularization parameters are largely subjective and will therefore differ between authors. Second, only a portion of the travel time variance is explained by the 3D structure to be resolved. Other components of the variance include random and systematic errors in the data, inaccuracies in the model parameterization’s representation of Earth, and oversimplifications in the physical theory that relates Earth’s structure to travel time observations. Again, differences between individual choices will map into differences in anomaly amplitudes, although patterns should be robust between techniques and parameterizations.

PM15 shows the least change in anomaly pattern from 5 km depth to 5 km below the Moho, reflecting its decreasing resolution with depth. DNA13 has a relatively small range of anomaly amplitudes at depths of 5 km and 15 km, with less consistent anomaly patterns compared to the other models (Fig. 2). This difference, with respect to other models, is likely due to the lack of surface wave data in DNA13.

**Crustal Thickness Variations**

Figure 4 shows the Bouguer gravity anomaly, topography, and crustal thickness along the L1-GUMBO1 and L3-GUMBO3 profiles (onshore extensions of GUMBO1 and GUMBO3; see locations in Fig. 1) based on the models discussed above. Similar profiles for L2, GUMBO2, and GUMBO4 are shown in GSA Data Repository Figure DR2 (see footnote 1). A general trend exhibiting crustal thinning toward the Gulf of Mexico basin, corresponding to a steady increase in Bouguer gravity anomalies, is consistent among the models. SLK15 and SR16 are consistent along the L1-GUMBO1 profile, while a crossover with PnUS2016 is observed around the 400-km profile distance, in the vicinity of the San Marcos Arch. The LITHO1.0 model has the largest deviations from the other models; due to its sparse parameterization, LITHO1.0 is not a reliable benchmark in regional studies.

There is a lack of general agreement between models concerning the landward limit of oceanic crust in the Gulf of Mexico (arrows in Fig. 4). Along GUMBO3, the majority of the proposed locations are coincident with a sharp increase in Bouguer gravity, which is not the case along GUMBO1 in the western Gulf of Mexico, where the large Louann salt province complicates geophysical interpretation.
DISCUSSION AND CONCLUSIONS

The general consistency of large-scale anomaly patterns between models within the upper crust suggests that data selection is more important than model parameterization, forward modeling and inversion methods, and other methodological differences. However, disparities in anomaly amplitudes and the fact that the velocity models fall into two distinct groups (which is discussed in the GSA Data Repository [see footnote 1]) present a challenge for geodynamic interpretations of the margin, for understanding the margin’s magmatic evolution, and for reconstructions of its pre-rift crustal and lithospheric thickness. It is clear that current 3D velocity models are unable to resolve the geometry of some smaller-scale tectonic features of this region, such as the spatial extent of the Wiggins block, or smaller arches (e.g., Luling, Waco, San Marcos), and to test the extent to which magmatic input facilitated rifting in the northern Gulf of Mexico.

This comparison serves as a baseline for future geological and geophysical investigations in the southern U.S. by providing a comprehensive assessment of currently available S-wave tomographic models. There is a need for additional P-wave tomography studies within this region which, given the lack of regional seismicity, is difficult but essential.

ACKNOWLEDGMENTS

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REFERENCES CITED

Becker, T.W., 2012, On recent seismic tomography studies within this region which, given the lack of regional seismicity, is difficult but essential.


Eddy, D.R., 2014, Mesozoic rifting along the eastern seaboard of North America: Insights from the seismic velocity structure of the Newfoundland margin and the northern Gulf of Mexico [Ph.D. thesis]: The University of Texas at Austin, 318 p.


Message from GSA President Donald I. Siegel

I invite you to GSA’s 2019 Annual Meeting & Exposition on 22–25 September in Phoenix, Arizona, USA. This will be an inspiring meeting and I thank all the organizers and sponsors. It’s the 100th anniversary of the iconic geologic wonder, Grand Canyon, becoming a U.S. National Park, and so having the meeting in Phoenix seems very appropriate indeed. We trust you will attend some of the 28 field trips, 200 topical sessions and specialty lectures, and six Pardee Symposia covering the gamut of our subdisciplines and dealing with geoscience topics ranging from applications to curiosity-driven research. Students and young professionals will have ample opportunities to take advantage of GSA mentoring and programs to get career advice and interview for jobs in our expanded recruitment programs. Visit the GSA GeoCareers Center to mingle, meet mentors and potential employers, or just find a relaxing place to discuss the meeting with friends. Indulge in the smorgasbord of cuisines, museums, and entertainment venues in Phoenix.

I also encourage you to attend and celebrate GSA’s awards ceremony. There, I will offer my vision of the geosciences in a future profoundly perturbed by climate disruption. Geoscientists will have great opportunities to contribute to how the world adapts to the changes as well as building out non-carbon and minimal carbon emission fuels. Multidisciplinary opportunities logically should abound for those geoscientists who choose to participate in these efforts.

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Katharine Hayhoe is an atmospheric scientist whose research focuses on developing and applying high-resolution climate projections to understand what climate change means for people and the natural environment. She is a professor and director of the Climate Science Center at Texas Tech University and has a B.Sc. in physics from the University of Toronto and an M.S. and Ph.D. in atmospheric science from the University of Illinois. Hayhoe has served as a lead author for the second, third, and fourth U.S. National Climate Assessments. She has also received the National Center for Science Education’s Friend of the Planet Award, the American Geophysical Union’s Climate Communication Prize, the Sierra Club’s Distinguished Service Award, and the Stephen H. Schneider Climate Communication Award.
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O.E. Meinzer Award
Hydrogeology Division
Bridget Scanlon, The University of Texas at Austin
2019 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 current 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 2019 Annual Meeting Presidential Address & Awards Ceremony on 22 Sept. in Phoenix, Arizona, USA. We invite you to read some of what their nominators had to say:

**Robert S. Anderson** (University of Colorado): Recognized for developing rigorous, quantitative approaches to the study of earth-surface processes, and for making sustained and highly influential contributions across the entire spectrum of geomorphology. —John Pitlick

**Suzanne P. Anderson** (University of Colorado): For her contributions to our understanding of the geomorphology and geochemistry of the critical zone, her thoughtful teaching of undergraduates and graduate students, and her sustained leadership of the Boulder Creek Critical Zone Observatory. —David Dethier

**Margaret E. Berry** (U.S. Geological Survey): For her outstanding contributions in applied research through surficial geologic mapping throughout the western USA, Dr. Berry exemplifies the best in the great USGS tradition of detailed fieldwork to generate high-quality geologic maps for the American people. —Daniel Muhs

**Emily E. Brodsky** (University of California Santa Cruz): Dr. Brodsky is an innovative leader who has made foundational discoveries regarding the mechanics and hydrogeologic nature and behavior of fault systems, based on field, laboratory, and numerical studies. —Andrew Fisher

**Roger Buick** (University of Washington): Roger Buick has made significant contributions to our understanding of Precambrian geology, biology, oceans, and atmosphere. His contributions arise from forty years of geological field work in Archean and Proterozoic terrains, particularly in Australia, Greenland, South Africa, and Canada, prospecing for relics of the earliest life and its environment. —George Bergantz

**Devon M. Burr** (University of Tennessee): By combining laboratory experiments with mapping and analysis of spacecraft imagery and topography and of terrestrial analogues, Devon Burr’s research on planetary geomorphology has enhanced understanding of fluvial and aeolian processes and landforms on Mars, Titan, and icy bodies. —Harry McSween

**Wayne K. Camp** (Anadarko Petroleum Corp.): Wayne Camp has contributed significantly to both geoscience and the profession through his many publications and editing of several proceedings from the conferences he has organized or helped organize. He is recognized as a thought leader and global expert in unconventional resources by U.S. DOE, SEPM, SEG, and AAPG. —Richard Bishop

**Susan M. Cashman** (Humboldt State University): For fundamental contributions utilizing structural geology and tectonic analyses to unravel the plate tectonic evolution of the western margin of North America and its current deformational behavior, while providing exemplary mentoring of several generations of well-trained geologists and serving as a role model for women in science. —Kevin Furlong

**Duane E. Champion** (U.S. Geological Survey): Duane Champion’s contributions in documenting and understanding geomagnetic secular variation, his application of paleomagnetic studies to volcano hazard assessment, and his stature in the field of paleomagnetism deserve recognition with election to fellowship in GSA. —Charles Bacon

**Renee M. Clary** (Mississippi State University): For the breadth and depth of her service to professional societies both international and domestic, especially for her service to the GSA History and Philosophy of Geology Division, and for distinguished public outreach and teaching of geology that have enhanced geoscience literacy in an underserved area of our nation. —Gary Rosenberg

**David R. Cole** (The Ohio State University): Professor Cole has been a global leader in geochemistry and mineralogy. His work includes seminal studies of subsurface fluid-mineral interactions. In addition, he has taken a leadership role in the understanding of carbon in the deep subsurface. —W. Berry Lyons

**Craig M. dePolo** (Nevada Bureau Mines & Geology): Dr. dePolo is widely recognized by his peers in the areas of neotectonics, paleoseismology, and earthquake preparedness. He has published numerous reports and maps at the NBMG and in peer-reviewed journals. Dr. dePolo has been a driving force for earthquake preparedness in Nevada for more than 30 years. —William Lund

**Diane I. Doser** (The University of Texas at El Paso): Dr. Doser has made numerous contributions to earthquake seismology including source mechanics in the western U.S., Alaska, New Zealand, and East Africa, and trying to understand the nature of earthquakes in different tectonic environments. —Kevin Mickus

**Anne E. Egger** (Central Washington University): Dr. Egger is an associate professor of geological sciences and science education at Central Washington University. Her contributions to geology have included the creation of exemplary educational resources, direction of professional development programs, leadership in a national professional organization (NAGT), and contributions to our discipline through the publication of research. —David McConnell
Susan C. Eriksson (Eriksson Associates LLC): Susan Eriksson deserves GSA fellowship for almost 40 years of service to the geologic profession through a career in industry and academia as a research scientist, faculty, administrator, and independent consultant. The hallmark of her career is selfless leadership in broadening participation through increasing equity and access particularly for underrepresented groups. —Shanaka de Silva

Carol Denison Frost (University of Wyoming): Carol Frost, a professor at the University of Wyoming, has served GSA through many capacities. She has been the director for earth sciences at NSF and has held a range of administrative positions at Wyoming. She has mentored many students, received several teaching awards, and coauthored a popular petrology textbook.

—James Anderson

Robert R. Gaines (Pomona College): Dr. Robert Gaines helped revolutionize the study of Lagerstätten (exceptionally preserved fauna) through innovative integration of process-oriented sedimentology, geochemistry, taphonomy, and diagentic. His work sheds light on the manner in which soft-bodied fauna are preserved and how these remarkable fossil sites have radically changed our understanding of early biological evolution. —Paul Myrow

Eduardo Garzanti (University of Milano–Bicocca): Elected to fellowship as a 2018 Honorary Fellow.

Daniel Goldman (University of Dayton): Dr. Goldman is a leading expert on graptolites and Paleozoic stratigraphy. His contributions span biogeography, biodiversity, and systematics of graptolites, modeling graptolite macroevolution, improving Ordovician time-scale resolution by integrating graptolite, conodont, and chitinozoan zonal schemes from clastic to carbonate systems, training geologists, and professional service to IUGS and GSA. —Stephen Leslie

Carlos M. González-León (Universidad Nacional Autónoma de México): The attainment of fellowship by Dr. Carlos M. González-León recognizes his important contributions to the fields of regional geology, stratigraphy, and tectonics of Sonora, Mexico, and adjoining regions, his training of Mexican geologists, and his service to the geological community of Sonora and all of Mexico. —Timothy Lawton

Karen B. Gran (University of Minnesota Duluth): Elected to fellowship as the 2018 Kirk Bryan awardee for research excellence.

Russell W. Graymer (U.S. Geological Survey): Russell W. Graymer is nominated for GSA fellowship for his fundamental contributions to the geology and tectonic evolution of the western Cordilleran margin in studies spanning the late Paleozoic to present, application of geology to earthquake and landslide hazard analysis, and effective science management and communication of geology to the public. —Robert McLaughlin

Steven J. Hageman (Appalachian State University): Steven J. Hageman merits GSA fellowship based on publication of his internationally regarded research on fossil bryozoans with important implications for evolution, paleoecology, and sedimentology; dedicated teaching and mentoring of geology students with impacts beyond his institution; and service to the profession, particularly as editor of Journal of Paleontology. —Patricia Kelley

James W. Handschy (Indiana University): Jim is recognized for superb applied research in tectonics and sedimentation in over 100 basins and all tectonic environments in every continent except Antarctica while rising to the rank of Global Chief Geoscientist at ConocoPhillips; in addition, he has made important contributions to service and geoscience education, particularly field camps. —Virginia Sisson

Matthew T. Heizler (New Mexico Bureau of Geology): Dr. Matt Heizler has made significant research and educational contributions to earth science and our understanding of Earth’s history through advancing argon geochronology, providing intercalibrations for multiple geochronological methods, advancing technological innovations in related dating methodology, and training to new generations of students in geochronological investigations. —Stephen Wells

Ingrid Hendy (University of Michigan): For outstanding research on rapid climate change of the past 60 ky along the Pacific coasts of North America, detailing complex relationships between ocean chemistry, sea surface temperature, precipitation, and sediment delivery. The first researcher to identify Dansgaard/Oeschger cycles in the Pacific, correlating them with the Greenland ice core record. —John Barron

Mary S. Hubbard (Montana State University): Mary Hubbard pioneered the combined application of structural geology, metamorphic petrology, and thermochronology both to the Himalaya and to the deeply exhumed Norumbega strike-slip fault in Maine, and she has been a leader in helping geologists in developing countries escape the isolation intrinsic to their workplaces. —Peter Molnar

Gary Huckleberry: Elected to fellowship as the 2018 Rip Rapp Archaeological Geology awardee.

Robert B. Jacobson (U.S. Geological Survey): Robert Jacobson is nominated for publication of the results of his basic geologic research in geomorphology and his applied research that uses geomorphology toward policy and management of fluvial systems. —Joan Florsheim

Allan James (University of South Carolina): An active GSA member for 35 years, Dr. James published research on floodplain sedimentation, sediment budgets, Sierra Nevada Quaternary glaciation, water resources, urban flooding, and GIScience. His work on Gilbert’s sediment wave, hydraulic mining, and legacy sediment has been widely read. He taught geomorphology and watershed science over three decades. —Anne Chin and Mary Ann Madej

Claudia C. Johnson (Indiana University): For her contributions to the understanding of past paleoenvironments and the links
between those environments and broader earth systems, in particular to our understanding of late Cretaceous events and threats of environmental changes to living reef communities. For her pedagogic research on methods of teaching complex geological concepts to students. —Chen Zhu

Michael R. Kaplan (Columbia University): Mike Kaplan began research on the glacial history of northeastern North America but soon refocused his research into the Southern Hemisphere where he has generated fundamental contributions that enhance understanding of changes in the cryosphere during the late Quaternary, mentored students, and developed strong collaborations with Chilean and Patagonian researchers. —Gifford Miller

Nazrul Khandaker (CUNY–York College): Elected to fellowship as a 2018 recipient of the GSA Distinguished Service Award.

David L. Kimbrough (San Diego State University): David Kimbrough has integrated geological fieldwork with geochronology, geochemical, and isotopic analyses focused on the evolution of continental magmatic arcs, crustal exhumation, and basin evolution across four continents. His distinguished career is a model of scientific integrity and achievement coupled with a deep devotion to his students, department, university, and the geoscience community. —J. Mahoney

J. Steven Kite (West Virginia University): Dr. Kite has had an exemplary career as a geologist/physical geographer. In addition to a fine balance between research, teaching, and administration at WVU, during his 40 years as a GSA member he has held all QG&G Division elected positions. —David Mickelson

Jeffrey R. Knott (CSU Fullerton): For research on Late Cenozoic paleoenvironmental change and landscape evolution. In particular, contributions to the understanding of the Cenozoic evolution of Death Valley and the surrounding regions. In addition, for exceptional training of numerous undergraduate and graduate students in both pure and applied aspects of geology. —Lewis Owen

Nicole LaDue (Northern Illinois University): Elected to fellowship as the 2018 recipient of the Biggs Award for Excellence in Earth Science Teaching.

Laurel G. Larsen (University of California Berkeley): Elected to fellowship as the 2018 recipient of the Young Scientist Award (Donath Medal).

Norman S. Levine (College of Charleston): Dr. Norm Levine is a veritable “good-will ambassador” with infectious enthusiasm for increasing public understanding of geology. His commitment to applied science is reflected in the >50 master’s students that he has advised, all with projects designed to “make a difference” regarding specific earth hazard and environmental issues.

Sarah L. Lewis (Oregon Dept. of Geology and Mineral Industries): Sarah Lewis is nominated for fellowship for her exceptional service to the geological community; administering and contributing to multi-faceted geomorphic research programs; organizing ongoing activities that foster communication, education, and engagement; sustained service to the QG&G community; and helping students at all stages of their careers. —Gordon Grant

Joseph Licciardi (University of New Hampshire): Dr. Joseph M. Licciardi has made distinguished, sustained, and wide-ranging contributions to Quaternary geology and geomorphology that have significantly advanced our understanding of the geomorphology of late Cenozoic glaciers and ice sheets and their implications for climate change. —Peter Clark

Shannon Mahan (U.S. Geological Survey): Shannon Mahan is internationally recognized for her applications of luminescence techniques to research questions related to earthquake activity, paleoclimate conditions, and geoarchaeological and Quaternary faunal records in the western U.S. and globally. Moreover, she is a strong advocate for the advancement of women in science and student education and training. —Tammy Rittenour

Paul J. McCarthy (University of Alaska): Dr. Paul McCarthy has a demonstrated career commitment to furthering the geosciences through technical publication and mentoring students. Because of his enthusiasm for his profession, Paul is a highly effective advocate for the geosciences not only to the scientific community but to the global lay community as well. —Anthony Fiorillo

Eric McDonald (Desert Research Institute): Prof. Eric McDonald is nominated as a Fellow of the GSA for research that elucidates the interplay of dust, hydrology, and climate during the evolution of desert landscapes and surfaces, for his application of these findings to questions of military importance, and for his training of professional geologists. —Eric Kirby

Jennifer C. McIntosh (University of Arizona): Jennifer McIntosh is a recognized leader in the field of hydrogeochemistry. Her work has greatly advanced our knowledge of basin fluids (gas and water) and critical zone interactions. She has led multiple cross-disciplinary research teams, prepared her undergraduate and graduate students well, and performed outstanding service for our community. —Anna Martini

Virginia T. McLemore (New Mexico Bureau of Geology): Dr. Virginia McLemore, throughout her career, has demonstrated a sustained record of distinguished contributions to the field of geoscience research. She has also been notably productive in applied geoscience and training of geologists. Her exceptional record makes her perfectly suited to receive the honor of GSA fellowship. —Nelia Dunbar

Jonathan S. Miller (San Jose State University): Jonathan Miller’s publications are important contributions to the understanding of magmatic processes, and he is an acknowledged expert in the use of the mineral zircon for study of silicic magmatism. His extraordinary service to GSA includes being chair of the Cordilleran Section and general chair for the 2005 Section Meeting. —Robert Miller
Thomas M. Missimer (Florida Gulf Coast University): Dr. Missimer’s geologic work record makes him exceptionally qualified for GSA fellowship. He published 100+ peer-reviewed papers, authored, co-authored, or edited 11 books, and is Groundwater executive editor. He directed much applied research and was appointed by three Florida governors to positions, including Board of Professional Geologists chair.
—Michael Sukop

David P. Moecher (University of Kentucky): Dr. David P. Moecher is nominated on the basis of significant and diverse contributions to understanding the metamorphic petrology of the lower crust, including the discovery of the extreme zircon fertility of Grenvillian granitoids. —Claudia Mora

Jeffrey M. Moore (NASA–Ames Research Center Space Sciences Division): Elected into fellowship as the 2018 recipient of the G.K. Gilbert Award.

Jean Morrison (Boston University): Dr. Jean Morrison, provost and chief academic officer at Boston University, is nominated for Fellowship in the Geological Society of America based on her academic leadership, her research into the role of fluids during metamorphism, and her mentorship of students.
—John Valley

Jeffrey S. Munroe (Middlebury College): We recognize Dr. Jeff Munroe for an outstanding 20-year career excelling in both undergraduate education and Quaternary paleoclimate research. His work utilizes a wide range of techniques across many diverse landscapes. He has successfully integrated dozens of undergraduate students into cutting-edge, collaborative, field and laboratory research.
—David West

Barbara P. Nash (University of Utah): In recognition of contributions to the study of the Earth through geochemical and mineralogical investigations of igneous rocks, characterization of new minerals formed only in the Anthropocene, correlation of volcanic Neogene and Quaternary ashes and obsidians, and LGBT advocacy and service to GSA.
—Thure Cerling

Gerald Osborn (University of Calgary): Gerald (Jerry) David Osborn is a leading authority on the glacial history of the Canadian Rocky Mountains, demonstrated by his many seminal review papers in top peer-reviewed journals, along with his co-organizing of topical sessions for international conferences and co-editing of journal volumes on latest Pleistocene and Holocene glacial fluctuations.
—P. Thompson Davis

Jeffrey G. Paine (The University of Texas Bureau of Economic Geology): Dr. Jeffrey Paine’s research centers on application of near-surface geophysics to address environmental issues, including coastal erosion, groundwater salinization, and land subsidence. His work has substantially advanced the applications of electromagnetic induction to address environmental problems. His publications in these fields provide critical input to decision makers in managing natural hazards.
—Bridget Scanlon

David S. Parks (Washington Dept. of Natural Resources): Elected into fellowship as the 2018 recipient of the E.B. Burwell Jr. Award.

Mark E. Patzkowsky (Pennsylvania State University): Professor Mark Patzkowsky has advanced the field of paleobiology by establishing ground rules for rigorous interpretation of the field and database paleontological record and applying them to further our understanding of extinction, radiation, function, and habitability of the whole ecosystem in deep time. —Timothy Bralower

Keith D. Putirka (California State University, Fresno): Dr. Putirka’s distinguished career includes (1) a strong publication record; (2) becoming a world leader in the development, testing, and application of igneous thermobarometers; (3) revitalizing American Mineralogist while editor; and (4) GSA service through publications of field guides, running GSA meetings, and as a mentor to many GSA student members.
—Scott Paterson

Eric J. Pyle (James Madison University): Eric Pyle is a nationally recognized teacher and researcher, and is a leading voice on geoscience education. He has been recognized for helping lead national efforts to update science education. He is also a leader in field-based education, pioneering assessment tools as well as statistical methods for field data collection.
—Steven Whitmeyer

Sara L. Rathburn (Colorado State University): Nomination based on the categories of education, applied research, and professional service. Rathburn excels at undergraduate teaching, as recognized in multiple university teaching awards. Her research focuses on resources management on public lands, particularly hazard mitigation. GSA Division chair and panel member, along with numerous proposal and manuscript reviews.
—Ellen Wohl

Maureen E. Raymo (Columbia University): For fundamental, groundbreaking, scientific contributions toward our understanding of the causes of Cenozoic climate change, our understanding of Earth’s natural ice age climate variability and accompanying sea-level fluctuations, and outstanding science communication.
—Howard Spero

Gary A. Robbins (University of Connecticut): Gary Robbins has developed seminal analytical solutions governing solute transport in groundwater and novel and important methods to characterize groundwater quality and aquifer material properties from monitoring wells. His work has advanced both the scientific understanding of contamination fate and transport as well as how best to remediate it in the future.
—Donald Siegel

Brad S. Singer (University of Wisconsin–Madison): Brad Singer has made major contributions to a wide variety of important problems through the innovative use of radiotrace geochronology. He has also trained dozens of geologists at the undergraduate, graduate, and post-doc levels, and has tirelessly served as associate editor and science editor of GSA Bulletin.
—Alan Carroll

Kathleen B. Springer (U.S. Geological Survey): Kathleen Springer is nominated for GSA fellowship for her work on the
stratigraphy, chronology, and paleohydrology of geologic deposits associated with springs and desert wetlands, establishing the geologic context of paleontologic resources, and acting as a lifelong geoscience educator and communicator, specializing in climate change and earthquake science messaging. —Jeff Pigati

**George Thomas Stone:** George Stone has a sustained record of distinguished contributions to the geosciences and to GSA, primarily through his teaching, public outreach, and organization of GSA topical sessions and Pardee Keynote Symposia. He has become one of the strongest voices in the geoscience community in raising the awareness of global warming. —Rolfe Mandel

**Kathleen DeGraaff Surpless** (Trinity University): Kathy’s research on detrital zircons has provided important insights to provenance, paleotectonic, and paleogeographic models for sedimentary packages of the North American Cordillera. She has been a strong mentor and educator of undergraduates and has been greatly involved with GSA service activities. —Diane Smith

**Glenn David Thackray** (Idaho State University): Glenn Thackray has made insightful contributions to the understanding of glaciation and climate across the Pacific region. He also provided effective leadership for GSA’s Quaternary Geology and Geomorphology Division, as well as for his academic department, and has been an inspirational mentor to many successful students over his career. —Grant Meyer

**Ellen Thomas** (Yale University): Ellen Thomas is being recognized with fellowship in the Geologic Society of America for her pioneering contributions to micropaleontology and paleoceanography, and distinguished editorial service to the journal *Geology.* —James Zachos

**Woodrow B. Thompson** (Maine Geological Survey): “Woody” Thompson is nominated to honor his continued surficial mapping in Maine and New England that documents the nature of the last glaciation. Woody has improved geology from continued reporting of results and leading numerous field trips. —Thomas Lowell

**Jeffrey M. Trop** (Bucknell University): Jeffrey Trop is a prominent researcher on the sedimentary/tectonic evolution of Alaska. He has also published on the geomorphology of alpine icy debris fans and paleoecology/environmental deposition of eurypterids and tetrapods in the Appalachians. Trop is an award-winning teacher who has mentored over 20 research students. —R. Craig Kochel

**Bishal Upreti** (University of Zambia): Elected into fellowship as a 2018 Honorary Fellow.

**James W. Vallance** (U.S. Geological Survey): Jim Vallance is nominated for his exceptional insights and accomplishments interpreting volcanic deposits in the U.S. and internationally, leading to substantial improvements in public safety and advances in the science of volcanology. —Thomas Sisson

**Peter J. Vrolijk:** Dr. Vrolijk’s scientific contributions to structural geology and deep-earth fluid flow are integrative across multiple disciplines and have influenced the research of many others. He is exemplary in bridging industry and academia, in sharing results through publications, short courses, and mentoring students and colleagues, and in service to GSA and ODP/IODP. —Kevin Bohacs

**Alan D. Wanamaker Jr.** (Iowa State University): Alan Wanamaker is an outstanding geoscientist, educator, and community member as evidenced by his meaningful contributions to paleoclimate research, mentorship of his students, and efforts in organization of GSA meetings. —David Gillikin

**Rich Whittecar** (Old Dominion University): Rich Whittecar has conducted fundamental research on landscape evolution of the southern Appalachian provinces and on groundwater flow in wetlands. After 40 years of teaching geology, Rich has a legacy of professional geologists working across the United States. —Nora Noffke

**Hong Yang** (Bryant University): We nominate Dr. Hong Yang for his creative contribution to understanding the evolution of terrestrial ecosystems, for his outstanding accomplishments in developing and using molecular and isotopic proxies to investigate the impacts of past climate changes on terrestrial plant communities, and for his extraordinary commitment to training of young scientists. —Yang Wang

**Pinar O. Yilmaz** (ExxonMobil Exploration Company): Pinar Yilmaz—advocate for global geological collaboration—has organized 40–50 international forums bringing science and leadership together to educate professionals and students. She contributes to programs in GSA, AAPG, GeoConferences, IPTC, EAGE, and SEG and is dedicated to providing support to students as she manages the interface between professional societies and ExxonMobil. —Robbie Gries

**Adolph Yonkee:** Adolph Yonkee’s seminal work on the tectonic evolution of the northern and southern Cordillera provides a better understanding of fold-thrust belts and foreland uplifts, fluid-rock interaction and deformation, geologic hazards, martian weathering processes, and Snowball Earth. He is also an outstanding teacher, mentor, and colleague. —Carol Dehler

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; and
- Editorial, bibliographic, and library responsibilities.
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GSA Celebrates Member Milestone Anniversaries

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

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Ronald P. Zurawski
GSA Celebrates Member Milestone Anniversaries

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

William H. Abbott
John B. Anderson*
Thomas F. Anderson*
Earl William Behrens*
Donald D. Biederman
Kelsey L. Boltz
Emanuel G. Bombolakis
John C. Bowman Jr.
Edwin H. Brown*
Michael E. Brownfield
Caryl Edward Buchwald*
M. Raymond Buyce
Stephen I. Chazen
Eric N. Clausen
Walter Coppinger
Darrel S. Cowan*
John William Creasy
Pierre-Michel Crepeau
Charles G. Cunningham*
Norbert E. Cygan*
Heinz H. Damberger*
Rene A. De Hon*
Edmond G. Deal*
Patricia Wood Dickerson*
Terry Engelder*
Murray Felsher*
Robert H. Fickies*
Neil J. Gilbert*
Paul Goldberg*
Jonathan H. Goodwin*
Joseph L. Graf Jr.
Harry J. Graff
Robert C. Greene
Edward S. Grew*
Robbie R. Gries*
R.H. Groshong Jr.*
Larry E. Hall
Albert C. Hine
David A. Holmes
Dolores Mary Hughes
Christoph W. Hulbe
Donald W. Hyndman*
Michael S. Johnson*
Ralph O. Kehle*
Harley J. Knebel*
James E. Lacey
Edwin E. Larson*
Robert I. Lewellen
Stephen T. Lofthouse
Richard B. Loring
Paul C. Lyons*
Ian G. Macintyre*
Charles F. Mansfield III
Walter V. Maresch*
Robert K. Mark
Michael S. Miller
Peter H. Molnar*
Bruce Franklin Molnia*
James T. Neal*
Robert S. Nelson*
John L. Nold
Richard R. Parizek*
Tom S. Patty
Michael T. Roberts
Richard E.A. Robertson*
C. Eugene Ronco
Peter R. Rose*
William I. Rose*
Robert T. Ryder
Richard A. Schweickert
Vernon P. Scott
Roy J. Shlemon*
Eli A. Silver*
Edwardas K. Simonis
Charles S. Smith
Eugene I. Smith*
Minze Stuiver*
M. Ray Thomasson*
Thomas L. Thompson
Dennis F. Unites
Kenneth J. Van Dellen
Stephen P. Vonder Haar
Jesse R. Wagner
Roger H. Wallis
Ronald R. West*
Robert C. Whisonant*
John W. Williams*
Larry D. Woodfork*
Richard E. Wright
The 2019 GSA Committee on Research Grants awarded US$812,000 to 392 graduate students (~52% of the 748 who applied), with an average grant of US$2071. 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 no. 1712071).


Alternate committee members: Zeynep Oner Baran, Whitney M. Behr, John Bershaw, Mark J. Caddick, Michelle L. Coombs, Martin B. Goldhaber, Judith L. Hannah, Qinhong Hu, Sharon L. Kanfoush, Gregory Nadon, Mohammad Hassan Rezaie-Boroon, and Ellen Thomas.

The following awards will be presented at the 2019 GSA Annual Meeting & Exposition in Phoenix, Arizona, USA.

Adele Conde
University of Vermont

Malcolm Hodgskiss
Stanford University

Iva Lihter
University of British Columbia Okanagan

Corrie Lucchesi
Northern Illinois University

Trista Mckenzie
University of Hawaii at Mānoa

Catherine Ross
The University of Texas at Austin

Claire Ruggles
Iowa State University

Christopher Svoboda
Michigan State University

Chia Pei Teoh
Texas A&M University

Sara Warix
Idaho State University

2019 ExxonMobil/GSA Student Geoscience Grants

ExxonMobil recognized 10 of the top 30 GSA student research grant proposals with a grant of US$5,000 each.

Kyle Henderson
McGill University

Siyan Liu
University of Kansas

Scott Pantaleone
University of Alaska Anchorage

Catherine Ross
The University of Texas at Austin

Claire Ruggles
Iowa State University

Ben Suranovic
University of Alaska Anchorage

Logan Tegler
Massachusetts Institute of Technology

Liannie Velazquez Santana
Miami University

Sara Warix
Idaho State University

Joshua Zimmt
University of California Berkeley
Michele Aldrich History and Philosophy of Geology Student Research Award
Joseph Moffitt, Mississippi State 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 GSA History and Philosophy of Geology Division.

Marland Pratt Billings and Katharine Fowler-Billings Research Award
Ian Hillenbrand, University of Massachusetts Amherst
Joshua Zimmt, University of California Berkeley
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
Katya Jay, Oregon State University
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 United States, 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 United States, New Zealand, or Iceland.

Gretchen L. Blechschmidt Award
Rebecca Smith, University of Massachusetts Amherst
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
Allison Pease, University of Michigan
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 GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.

Allan V. Cox Research Award
Ogochukwu Ozotta, University of North Dakota
The Allan V. Cox Research Award supports research grants in geophysics. The recipient is determined by the GSA Geophysics and Geodynamics Division.

John T. Dillon Alaska Research Award
Joseph Biai, California Institute of Technology
Caitlin Meadows, The University of Chicago
Scott Pantaleone, University of Alaska Anchorage
Ben Suranovic, University of Alaska Anchorage
Matthew Trembath, University of Iowa
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.

Robert K. Fahnstock Award
Ian Armstrong, Indiana University Bloomington
The Robert K. Fahnstock Award honors the memory of Dr. Fahnstock, 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. Fahnstock’s field.

Gould Research Grant
Alan Seltzer, University of California San Diego–Scripps Institution of Oceanography
Michelle Valkanas, Duquesne University
The Gould Research Grant supports graduate student research in the geosciences.

Robert D. Hatcher Research Award
Michael Say, University of Nevada, Reno
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 it is not restricted to this region.

William B. & Dorothy Heroy Research Grant
Michael Frothingham, University of Colorado Boulder
Megan Saalfeld, Montana State University
Christina Seeger, Western Washington University
Rachelle Turner, University of Wisconsin–Madison
The William B. & Dorothy Heroy Research Grant supports graduate student research in the geosciences.

John W. Hess Research Grant
Jonathan Wilson, University of Kentucky
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 GSA Karst Division.

Roscoe G. Jackson II Award
Adrian Broz, University of Oregon
The Roscoe G. Jackson II Award funds one recipient per year in the field of sedimentology.

Lipman Research Award
Kirkland Broadwell, Virginia Polytechnic Institute and State University
Richard Chow, Dalhousie University
Seth Coursey, Northern Illinois University
Rose Gallo, Northern Arizona University
Brenna Halverson, University of Missouri Columbia
Coleman Hiett, Utah State University
Jordan Lubbers, Oregon State University
Alex Maruszczak, University of South Florida
Suzanne Mulligan, University of Nevada, Las Vegas
Tyler Schlieder, University of California Davis
Jesse Scholpp, Utah State University
Marie Takach, Oregon State University
Jennifer Thines, University of Iowa
Karissa Vermillion, New Mexico State University
Dani Vitarelli, New Mexico 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 recipient of the Lipman Foundation, Peter W. Lipman, was the recipient of a GSA research grant in 1965. The recipient is determined by the GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.

John T. and Carol G. McGill Award
Joel Leonard, Arizona State University
Eyal Marler, Colorado State University
Seth Williams, University of Washington
Nicholas Wondolowski, University of Pittsburgh
The John T. and Carol G. McGill Award, which is in memory of John T. McGill, supports graduate student scholarships and research grants in engineering geology and geomorphology.

On To the Future (OTF) Research Grant
Elisandra Hernandez, Missouri University of Science and Technology
The purpose of this grant is to recognize an excellent student research proposal and connect the student to GSA's On To the Future (OTF) program. OTF is a grassroots initiative that addresses GSA's overall strategic commitment to building a diverse geoscience community by engaging groups traditionally underrepresented in the geosciences. The student chosen for this grant will be invited 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.

Bruce L. “Biff” Reed Scholarship Award
Michael Hudak, University of Oregon
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
Troy Ferland, Pennsylvania State University
Scarlette Hsia, The University of Texas at Austin
Elena Robakiewicz, University of Connecticut
Jesus Robles, California State University, Bakersfield
Logan Tegler, Massachusetts Institute of Technology
Tyler Winkler, Texas A&M University
Boyang Zhao, University of Massachusetts Amherst
The Charles A. & June R.P. Ross Research Fund is awarded 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, paleoecography 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 seafloor 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 subfield categories depending on the merit of the annual project proposals.

Alexander Sisson Research Award
Maximilian Barczok, Kent State University
Family members of the Alexander Sisson family established the 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
Katherine Lang, 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
Christopher DeFelice, University of Nevada, Las Vegas
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

Nadine Reitman, University of Colorado Boulder
Elijah Turner, University of Nevada, Las Vegas

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.

2019 GSA Graduate Student Research Grant Recipients

([Listed in alphabetical order by university.)

<table>
<thead>
<tr>
<th>University</th>
<th>Recipients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acadia University</td>
<td>Jackson Malone, Alison Franco, Rachel Hohn</td>
</tr>
<tr>
<td>Arizona State University</td>
<td>Jisoo Kim, Joel Leonard, Logan Raming, Zack Levinson, Theron Sowers</td>
</tr>
<tr>
<td>Boise State University</td>
<td>Mayara Fernanda Cizina, Scott Ducar, Anna Roser, Allison Vincent, David Bruce</td>
</tr>
<tr>
<td>Boston University</td>
<td>Justin Holcomb, Jackson Malone, Alison Franco, Rachel Hohn</td>
</tr>
<tr>
<td>Brandon University</td>
<td>Janelle Vachon, Jisoo Kim, Joel Leonard, Logan Raming, Zack Levinson, Theron Sowers</td>
</tr>
<tr>
<td>Brown University</td>
<td>Brendan Anzures, Sarah Cooley, Christopher Kremer, Sarah McGrath, Nora Richter, Ningli Zhao</td>
</tr>
<tr>
<td>California Institute of Technology</td>
<td>Joseph Biasi, William Aertker, Mark Hansford, Haipeng Li, Logan Powell, Ariel Rickel</td>
</tr>
<tr>
<td>California State University, Bakersfield</td>
<td>Toni Ramirez, Jesus Robles, Cindy Rodriguez, John Kemper, Eyal Marder, Brianna Rickel</td>
</tr>
<tr>
<td>California State University, Chico</td>
<td>Alexis Lopez, Clara Chang, Sarah Giles, Aristides Alfaro</td>
</tr>
<tr>
<td>California State University, Long Beach</td>
<td>Clay Kelty, Shaomin Chen, Richard Chow, Yuquisi Zhao</td>
</tr>
<tr>
<td>California State University, Northridge</td>
<td>Anthony Downey, Jordan Fields, Jonathan Fields</td>
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<tr>
<td>Drexel University</td>
<td>Johannes Krause, Michelle Valkanas</td>
</tr>
<tr>
<td>Duquesne University</td>
<td>Daniel Govert, Nevin Kozik</td>
</tr>
<tr>
<td>Florida International University</td>
<td>Kimberly Beck, Daniel Govert, Nevin Kozik</td>
</tr>
<tr>
<td>Florida State University</td>
<td>Patience Bosompemaa, Sara Warix</td>
</tr>
<tr>
<td>Georgia College &amp; State University</td>
<td>Idaho Ngoma, Shellby Miller</td>
</tr>
<tr>
<td>Georgia State University</td>
<td>Longfeng Wu, Patience Bosompemaa, Sara Warix</td>
</tr>
<tr>
<td>Harvard University</td>
<td>Derek Gibson</td>
</tr>
<tr>
<td>Indiana University–Purdue University Indianapolis</td>
<td>Derek Gibson</td>
</tr>
<tr>
<td>Indiana University Bloomington</td>
<td>Ian Armstrong, Sarah Burgess, Clarke Delisle, Marissa Schorr</td>
</tr>
<tr>
<td>Instituto Politécnico Nacional (IPN)</td>
<td>María Flores, Violeta J. Marcial, Mario Martinez Yáñez, Pablo Jaramillo</td>
</tr>
<tr>
<td>Iowa State University</td>
<td>Hannah Carroll, Claire Ruggles</td>
</tr>
</tbody>
</table>

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Sarah Katz
Nikolas Midttun
Mara Page
Allison Pease

University of Minnesota Duluth
Samuel Duncanson
Collin Murphy

University of Minnesota Twin Cities
Hannah Blatchford
Kathryn Hobart
Christine Newville
Natalie Raia

University of Missouri–Columbia
Grace Allison
Brenna Halverson

University of Missouri–Kansas City
Joseph Nolan
Kaylee Thomas

University of Nebraska–Lincoln
Robert Gillham

University of Nevada, Las Vegas
Shaimaa Abdelhaleem
William Barba
Christopher DeFelice
Emily Dektar
Deborah Morales
Suzanne Mulligan

University of Nebraska, Reno
Scott Feehan
Ann Hanson
Michael Say
Elijah Turner

University of New Hampshire
Maria Fahnestock
Douglas MacLeod

University of New Orleans
Jessica Villers

University of North Carolina Wilmington
Adam Collins
Frank Marshall
Jack Nolan
Benjamin Snyder
Elizabeth Yanuskiewicz

University of North Dakota
Chioma Onwumelu
Ogochukwu Ozotta

University of Northern Colorado
Haylie Brown

University of Notre Dame
Keith O’Connor

University of Oklahoma
Evan Hamilton
Dalila Jesus

University of Oregon
Adrian Broz
Michael Hudak
Brooke Hunter
Marian Tate-Jones

University of Pittsburgh
Rebecca Forgrave
Nicholas Wondolowski

University of Puerto Rico–Mayagüez
Brian Minkin

University of Rochester
Wriju Chowdhury
Fabiana Richter

University of Saskatchewan
Hoang Anh Tu Nguyen

University of South Florida
Robert Constantinescu
Abigail Martens
Alex Maruszczak
Danielle Molisee
Surui Xie

University of Southern California
Tarryn Cawood
Alison Cribb
Amanda Godbold
Abigail Wesley

University of Tennessee
Maggie Limbeck

University of Tennessee, Knoxville
Jake Alexander
Jacob Cecil
Jeremy Leierzapf
Anthony Maue

University of Utah
Jeremiah Bernau
Benjamin Breeden
Robin Fults
Courtney Wagner

University of Vermont
Adele Conde

University of Victoria
Sandy McLachlan

University of Washington
Joel Gombiner
Michael Kipp
Alexander Lowe
Kelsay Stanton
Seth Williams
Paige Wilson

University of Waterloo
Jillian Kendrick

University of Wisconsin–Madison
Naomi Barshi
Lisa Haas
Dougal Hansen
Aaron Kufner
Emily Mixon
Nicholas Sullivan
Rachelle Turnier

University of Wyoming
Cole Messa
Nathan Swaim

Utah State University
Matthew Ellison
Coleman Hiett
Cayla Kennedy
Rebekah Riemann
Jesse Scholpp
Dominique Shore
Kayla Smith

Vanderbilt University
Cameron de Wet

Villanova University
Nicole Marks

Virginia Polytechnic Institute and State University
Kirkland Broadwell
Graydon Konzen
Morrison Nolan
Maxwel Schwid
Michael Vadman
Hao Wu
Yezzi Yang

Washington State University
Nolan Blackford
Ross Salerno
2019 GSA International, GSA Division, and GSA Section Student Research Grants

GSA International, GSA Divisions, and GSA Sections 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 2019 GSA Annual Meeting in Phoenix, Arizona, USA.

GSA International

Farouk El-Baz Student Research Grants
Nicholas Mccarroll, Utah State University, for “Evolution of the Book Cliffs Dryland Escarpment in Central Utah—Testing Models of Dryland Escarpment Retreat.”
Rachel Rotz, University of Georgia, for “Investigation of Linear Dune Erosion and Lacustral Events in the Simpson Desert of Australia during the Late Quaternary.”

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.

Division Graduate Research Grants

Continental Scientific Drilling Division
Continental Scientific Drilling Division Student Research Grant
Samuel Duncanson, University of Minnesota Duluth
Collin Murphy, University of Minnesota Duluth
Marissa Spencer, Missouri University of Science and Technology
Caroline Studnick, Utah State University

Geophysics & Geodynamics Division
Allan V. Cox Research Award and Supplement
Ogohchukwu Ozottta, University of North Dakota
Geophysics Student Research Grant Award and Supplement
Evan Hamilton, University of Oklahoma

Hydrogeology Division
Hydrogeology Division Student Research Grant Awards and Travel Grants
Patience Bosompemaa, Illinois State University
Frank Marshall, University of North Carolina Wilmington
Haley Talbot-Wendlandt, University of Maryland
Allison Vincent, Boise State University
Valerie Voisin, Northern Illinois University

Mineralogy, Geochemistry, Petrology, and Volcanology Division
MGPV Division Student Research Grant Awards
Mayara Fernanda Cizina, Boise State University
Maria Fahnestock, University of New Hampshire
Mebrahtu Weldeghebriel, State University of New York at Binghamton

Quaternary Geology and Geomorphology Division
Peter Birkeland Soil Geomorphology Research Award
Evan Thaler, University of Massachusetts
Arthur D. Howard Student Research Award
Zena Robert, University of Alaska Fairbanks
J. Hoover Mackin Student Research Award
Joel Gombiner, University of Washington
Marie Morisawa Research Award
Tess Walther, University of Maine
Stanley A. Schumm Research Grant Award
John Kemper, Colorado State University

Sedimentary Geology Division
Sedimentary Geology Division Student Research Grant Award
Eve Lalor, Western Washington University

Structural Geology and Tectonics Division
Structural Geology and Tectonics Division Student Research Travel Grant Awards
Michael Frothingham, University of Colorado Boulder
Katherine Lang, Western Washington University
Iva Lihter, University of British Columbia Okanagan
Claire Ruggles, Iowa State University
Elijah Turner, University of Nevada, Las Vegas
Section Graduate Research Grants
Southeastern Section Graduate Research Grants
Cristopher A. Alvarez Villa, University of Kentucky
Alexandra Bridges, University of Georgia
Mohammed Harthy, University of Mississippi
Eva Lyon, University of Kentucky
Md Sharif Mustaque, Auburn University
Jasmin Naher, Auburn University
Nicholas Smith, The University of Tennessee, Knoxville
Lisa Tanh, University of Miami
Alireza Valian, University of Kentucky
Elizabeth Vitale, University of Mississippi
Kristan Watkins, The University of Tennessee, Knoxville

Section Undergraduate Research Grants
Rocky Mountain Section Undergraduate Research Grants
Kaitlyn Crouch, Utah State University
Kofoworola Fadeyi, The University of Texas at El Paso
Rudolph Hummel, Montana State University
Alec Martin, Brigham Young University
Andrew Perkins, Utah State University
Megan Tarmichael, University of Montana Western

North-Central Section Undergraduate Research Grants
Shannon Brink, University of Wisconsin Oshkosh
Stephanie Connell, University of Winnipeg
Kaella Gollob, Iowa State University
Mary Humphreys, Missouri State University
Alexis Parkinson, University of Winnipeg
Catherine Seguin, University of Michigan
Nathalie Turenne, University of Winnipeg
Hannah Veldhuizen, Indiana State University
Joshua Weimer, University of Wisconsin Oshkosh

Northeastern Section Stephen G. Pollock Undergraduate Research Grants
Jeng Hann Chong, University of Maryland
Evan Filion, Bucknell University
Kyle Fouke, Bucknell University
Sabrina Koetter, Wesleyan University
Edward Ruger, Lafayette College
Landon Williamson, University of Vermont
Jonnathan Zuna, Kingsboro Community College

South-Central Section Undergraduate Research Grants
Christopher Jones, Oklahoma State University
Skylar Kaminski, Oklahoma State University
Wade Leibach, University of Kansas
Erin Roark, Oklahoma State University
Tristan Tompkins, University of Arkansas
Joshua Wynn, Wayland Baptist University

Southeastern Section Undergraduate Research Grants
Emily Fischer, Georgia Southern University
Anna Foster, Tennessee Technological University
Meredith Helmick, Concord University
James Melton, Concord University
Jane Wadham, Florida State University
Annelise Waling, Clemson University
Marie White, Murray State University
Matthew Yandle, Clemson University

2019 AGeS2 (Awards for Geochronology Student Research2) Grants
AGeS offers opportunities for graduate students to develop the scientific rationale for projects involving geochronology and then provides them with hands-on experience acquiring data in labs, all while being mentored by geochronologists. This grants program is available to GSA student members and is separate from, but complementary to, GSA’s longstanding Graduate Student Research Grants program. In 2019, 78 students submitted proposals, and awards were made to 20 students. The average award amount was US$8,186. These AGeS2 awardees will participate in teleconferences with the cohort of funded AGeS students over a two-year interval. Each awardee will also receive an additional US$500 to attend an AGeS cohort workshop preceding the 2020 or 2021 GSA Annual Meeting, and will be encouraged to present their results at the meeting. For more information, see the AGeS2 homepage: www.geosociety.org/ages. The AGeS2 program is supported by the National Science Foundation under the following awards: EAR-1759200, EAR-1759353, and EAR-1759201.

Francisco Apen, University of California Santa Barbara
Joseph Biasi, California Institute of Technology
Tarryn Cawood, University of Southern California
Johanna Eidmann, Colorado State University
Karol Faehnrich, Dartmouth College
Joel Gombiner, University of Washington
Lisa Grohn, University of Rochester
David Hernandez Uribe, Colorado School of Mines
Ellen Lamont, Oregon State University
Drew Levy, University of Nevada, Reno
Madeline Lewis, California Institute of Technology
Craig Martin, Massachusetts Institute of Technology
Kirsty McKenzie, Pennsylvania State University
Nikolas Midttun, University of Michigan
Erin Peck, Oregon State University
Logan Powell, Colorado School of Mines
Maria Alejandra Rodriguez Mustafa, University of Michigan
Jennifer Thines, University of Iowa
Kirk Townsend, University of Michigan
Karissa Vermillion, New Mexico State University
Gladys W. Cole Memorial Research Award
Glenn Thackray, Idaho State University, will be awarded US$8,750 from the Gladys W. Cole Fund for research in geomorphology of semiarid and arid terrains for his project, “Stream capture, glacier capture, and the Big Lost River Flood(s), east-central Idaho.” The award will be presented on Tues., 24 Sept., at the Quaternary Geology and Geomorphology Division Awards Ceremony at the 2019 GSA Annual Meeting in Phoenix, Arizona, USA.

W. Storrs Cole Memorial Research Award
Ashley Burkett, Oklahoma State University, will be awarded US$8,000 from the W. Storrs Cole Fund for research in invertebrate micropaleontology for the project, “Using cutting-edge technologies to analyze the morphology and geochemistry of foraminifera for comprehensive oxygen proxy development.” The award will be presented on Tues., 24 Sept., at the Cushman Foundation for Foraminiferal Research Awards Ceremony at the 2019 GSA Annual Meeting in Phoenix, Arizona, USA.

GSA Minority Scholarships

GSA has awarded six undergraduate students from minority backgrounds scholarships in the amount of US$1,500 plus one-year GSA memberships and full meeting registration to the GSA 2019 Annual Meeting & Exposition.

Natalea Cohen, Fort Lewis College
Brianna Mellerson, James Madison University
Gabriela Ramirez, Missouri University of Science and Technology
Katherine Garcia, Franklin and Marshall College
Lazaro Garza, Oxnard College
Julie Coulombe, University of Tennessee, Knoxville

Watch Your Email for An Important Opportunity to Add Your Voice to the Discussion

In the coming months, GSA will replace its aspirational Code of Conduct—adopted in the 1970s—with a new enforceable Code of Ethics. GSA’s new Code of Ethics will describe the professional ethical standards of conduct we expect of our members together with examples of prohibited behavior that may result in a member’s discipline, suspension, or termination from the Society.

An ad hoc committee has begun drafting the new Code of Ethics based on an outline approved by the GSA Council. Once the committee has completed an initial draft, members will be invited to review and submit comments before it is finalized. Look for an email this month with further details.

Recent, Rare, and Out-of-Print Books
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Welcome New GSA Members

The following new members joined between 6 Sept. 2018 and 6 Mar. 2019 and were approved by GSA Council at its spring meeting.

PROFESSIONALS
Ahmed K. Abdelraof Abdelaal
Daniel Bruce Abrams
Warren Fred Agena
Masud Ahmed
Bjarne Almqvist
Alberto O. Alvarado
Jennifer Anderson
Michael K. Anderson
Linda M. Angeloni
Brian Atkinson
Muhammad Babar
John Bacheller III
Janet Bader
Jeffrey W. Bader
Eric Christopher Beam
Timothy John Beck
Asmeret Asefaw Berhe
Jacob G. Berman
Kim M. Bishop
Daniel R. Blake
Dawnika Blatter
Roger B. Bloch
Aurora C. Bouchier
James Brasington
Bruce Braswell
Eckart Buhlmann
Daniel Bulger
Bill Burgel
Katherine Burgess
Amanda Burtt
Tom Byl
Leonardo Arias Cardona
Adam R. Carr
Samuel Raul Chama
Katarzyna Charzynski
Ting Chen
Zhonghong Chen
Andrey Cheremisin
Eric Chojnowski
Philip Cohlich
Jennifer Rivers Cole
Michael Cornyn
Thomas Carter Craford
Shane Jason Cronin
Grant W. Cushing
Youssef Daafi
Tais W. Dahl
Nicolas Dauphas
Lawrence Diko Makia
Eric Richard Dott
Allison S. Drouin

Mayra Dudrenova
Holly Marie Duff
Brian J. Dunst
Rifaat S. El-Mallakh
Mohamed Elsadany
Jonathan Erez
Alfred Espinosa
Xiang Fang
Iskhak Farkhutdinov
Muhammad Ahmed Farooqui
Joshua Field
Shawn Fiore
Robert Andrew Foley
Danielle J. Ford
Everett Howard Fortner III
Francis Fosu
James Franklin
Cristina Garcia Lasanta
Vicki Anne Garlington
Ian Richard Gendall
Auriele Germa
Garry Lynn Getz
Thomas Giachetti
Carol Gibson
Deborah Glickson
Larry Gore
Jerry Grant
Katherine Grote
Brian Hamilton
Trinity L. Hamilton
Sarah Hammer
Dwight W. Harbaugh
Kevin J. Harmon
Clay D. Harris
Shannon K. Hayes
Charles Head
Erin Heard
Kelly Heid
R. Chadwick Holmes
Wendy Holtom
James A. Honert
Lauren M. Humphreys
Robin R. Humphreys
A.T.M. Shakhatwat Hyossain
Manavi Jadhav
Andrew Jalbert
Anish D. Jani
Judith Ann Johnson
Brandon Jones
Donald Jones
Clark Jorgensen
Ulrich Kamp

Valerie Keinath
Lauren Kelley
Pavel Kepezhinskas
Steve Knollmeyer
Lindsay Marie Kolbus
Martha T. Kopper
Jun Korenaga
Anthony Kramer
Adam J. Kuban
Jennifer Maciejewski Kugler
Julie E. Laity
Hannes Leetaru
Haibing Li
Claudio Coelho de Lima
Shaofeng Liu
Yvonne Sena Akosua Loh
William Lovis
Raul Ernesto Lugo Zazueta
Prasun Mahanti
Safwan Saber Mandeeli
Richard Ernest Mansker
Jonathan D. Marcot
Raleigh L. Martin
Kenji Marc Raymond
Matsuzaki
Mika McKinnon
Kevin McNichol
Gopal Mohapatra
Nicholas Alexander Moran
John Mundell
Charles Musiba
Zachary Neal
Craig Nelson
Ryan Newton
Claire O’Neal
Phil Odenkirk
Lydia Olaka
Davide Oppo
Rick E. Otto
Ibrahim A. Oyediran
Andrés Pardo
Yoram Paz II
John M. Pazel
Marco U. Perez
José Noel Pérez-Asensio
Rose Marie Petefish
Gregg M. Petrie
James Spencer Phelps Jr.
Mark Pleasants
Maria-Serena Poli
Jason C. Poole
Mike Power
Niklas Henry Putnam
Cheryl Emerson Resnick
Matthew Elliot Richards
Kelly Rose
Teresa Ann Rose
James Robert Rustad
Shawki Mahmoud Salem
Seriwat Saminpanya
Judd Sampson
Dan Sayre
Thomas Scaife
Marco Scambelluri
Urs Schaltegger
Amina T. Schartup
Wouter Pieter Schellart
Naomi Scher
Gregory P. Schrader
Richard David Schulerbrandt
Gragg III
Krystina R. Scott
Thomas Serenko
Peter C. Smith
Paul Spahr
Kevin Spindler
Aleksandr Sasha Stepanov
Seiji Sugita
James H. Sullivan
Rjefrey Swope
Nicholas David Tailby
Daniel M. Tartakovsky
Patrick Toth
Ozan Unsalan
Shelby Ray Valenzuela
Alexander Van Geen
Leon Van Paassen
Paul Vellom
Jessica Vieira
Channon Visscher
Otis H. Walter
Yu Wang
Stephen Warren
Matthew N. Waters
Heather Watson
Paula V. Welander
Karlyn Sara Westover
Christine B. White
Paul Barry Wignall
Scott Wilkinson
Donna Caraway Willette
Ben D. Williams
Jason Williams
Amos Winter
Top 3 reasons for joining GSA

1. GSA Meetings
2. Career Development
3. Research Grants

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Maximilian Barczok
Samantha Marie Barnett
John Reges Marshall Beck
Jeremy Ryan Bekis
Charity G. Betters
Bridget Marie Bittmann
Sarah Patrice
Bonnelle-Roberts
Jainel Bowen
Caitlin M. Bristol
Miles Gordon Brooks
Victoria Brown
Zoe Kristen Brown
Marlo Cabannes
Adolfo Eberhard Calero
Nicholas Cancalosi-Dean
Caleb Carlton
Jessica Chamberlin
Chasalin T. Cobb
Sarah Cooley
Clayton M. Davis
Stuart Davis
Jonathon Deeter
Carly Dellis
Kendra Devereux
Lynn Marie Dietrich
Alexander Marshall Dombeck
Mitchell Dorsk
Anthony Downey
Jarod A. Drummond
Andriana Eley
Adedugbe Damiola Emmanuel
Reza Ershadnia
Madeline P. Ess
Kenan Estes
Michael Evans
Madelyn Renae Flores
Sullivan Bishop Ford
Cameron French
Ian Ray Pikula Gallagher
Madyson Hunter Gilbert
Myrna Nicole Girald
Chase Braden Glass
Isbel Gonzalez
Dennis Alexander Gordon
Seth Lee Gorman
Joceлин Noemi
Gregorio-Alarcon
Pedro E. Gutierrez
Julia Hageman-Petitt
Madeline Hall
Jevon V. Harding
Madison M. Hays
Hashindra Kumari Herath
Hunter Edward Hershey
Rachel Hohn
Zachary Daniel Hoyer
Kenna Hunter
Yasmin Jamalia Jackson
Micah Jaffe
Louise Wilma Jean Jennings
Hansheng (Max) Jin
Carson Olivia Jones
Melissa M. Joseph
Kathryn Eldora Kehler
Harrison Patrick Kelly
Madeleine Becker Killough
Kendall R. King
Victoria Henry Langham
Megan Larson
Sydney Laubscher
Jayece Lazuhrcatt
Jianghanyang Li
Spencer Lindgren
Molly Lohss
Soely E. Luyando-Flusa
Lucas Karl Mangold
Jaclyn Rose Manker
Abby L. Marcotte
Joel V. Marcotte
Nicole Kristine Marks
Frank Moser Marshall
Emily Grant Martin
Melanie Ann
Martin-Capestany
Connor James Mayhack
Cait Mazzoleni
Anastasia Marie Cox
McClanahan
Alyssa McClung
Michael McCullough
Andrew T. McGrady
Alexander Melean
Meagan Meier
James Dean Melton
Marcos Mendez
Megan M. Miller
Dustin Joseph Minnaugh
Lindsey Monito
Lucas Hunter Monroe
Chelsea Moore
Elizabeth Mary Morehead
Grant Morey
Megan Morgan
Benjamin Arthur Morris
Nicole Mueller
Dillon Murphy
Kevin Nosiglia
Nick Nweea
Timothy Ohlert
Megan Kathleen O’Leary
Amy Olgers
Eric Parker
Amanda Pechacek
Sonasha Perera
Victoria Phillips
Paula Pletnikoff
Kaelyn Marie Quinlan
Victoria Race
Shaundra Rasmussen
Simone Rawal
Rowann Remie
Uziel Rendon
Suzanne Ruth Rice
Tracy Marie Roberts
Virginia Rodriguez
Sally Louise Roscoe
Jesus Alfonso Sancen
William Reed Sanchez
Katharine Scanlan
Nadia Schenck
Riley Schmitter
Elino Scholtz
Rhiannon Scott
Juwon Louis Lee Shabazz
Abigail Cook Sheehan
John T. Shukle
Erin Siebert
Camila Silva
Kacie Marie Silver
Mary Sirgo
Lillian Slajus
Alexandra Nicole Smith
Cody J. Smith
Matthew Smith
Jessica A. Snow
Yi Song
Anthony Jake Spinella
Liana Catherine Stachowicz
Matthew Wesley Stevens
Selsey Stribling
Jakob Q. Suri
Seth Swearingen
Anthony L. Taylor
Julie Alicia Torres
Jacob Paul VanderRoest
Sean Vanzeeland
Mariana Velazquez
Hannah J. Veldhuizen
Alison Veresh
Daniel Ryan Wade
Jordan Walterman
Melissa Ward
Adam Michael Weinzapfel
Jessie Wheeler
Rachel Whiteman
Natalie Wiger
Andie Celeste Wilkerson
Paul Wilkerson
Jacob Ryan Williams
Sheri J. Williams
Ryan Patrick Wizner
Caralena Wren
Rachel Morgan Wright
Crystal Wu
Ryan Wysocki
Yiruo Xu
Yiding Zhang
Murodjon Zubaydov

Geography
William Benfield
Jacob Cecil
Barrie Chileen

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Universities with the most new student members

1. California State University
2. SUNY Geneseo
3. Georgia State University
4. College of Charleston
5. Oklahoma State University

Geoinformatics
Ryan T. Cox
Cindy Hendry
Bryce Johnson
Michael Aaron Lipkowitz
James Matlock
Hoang Anh Tu Nguyen
Anirudh Prabhu
Jonathan Teboul

Geology and Health
Tokunbo Clara Akinrinbola
Gianna Antunovich
Sophie Bernstein
Roman Gabriel Carrion
Michael Chucko
Daniel Chavez
Rachel Marylee Coyte
Jennifer Freeman
Lauren Elizabeth Hansen
Jill Morgan Johnson
Changho Kim
Micaela Nicole Pedrazas
Kalia Jade Richardson
Gus Wusin
He Zhao

Geophysics/Tectonophysics
Stephen Beresh
Jayson Dreshon Blankenship
Brandon Boring
Jimmy Bradford
Julia Elaine Brazo
Joshua Alexander Burstein
Yuexi Che
Guo Cheng
Elaine Collins
Matthew Couchman
Jordan Croll
Franklyn Dunbar II
Vlada Filipova

Geophysics/Tectonophysics
Michael Foust
Jared M. Fox
William P. Gapasin
Yiwen Personal Gong
Natalie M. Harmon
Heather Hingst
Owen Huff
Hannah Keane
Kyle P. Kosalke
Patrick G. Lachapelle
Jaewook Lee
Dominique Luna-Joyce Martinez
Jacob Ray Miller
Balam Molina De Artola
Keith Alex Nolte
Israel Olayo
Justine Overacker
Scott Thomas Pantaleone
Nicholas Priehs
Kaleb Punzalan
Rodrigo Correa Rangel
Pranshu Ratre
Sarah Elizabeth Robinson
Rush Lee Rodwan
Audra Sawyer
Md Zonaed Hossain Sazal
Derek Travis Scott
Francesca Settanni
Joseph Skutca
Holly Jessica Staley
Maya Kh Talukdar
Chelsea Lauren Thibodeau
Hannah Marie Thornton
Janet Tran
William Alynz Trubey
Steffany Wire
Surui Xie

Geoscience Education
Joseph A. Ayers-Irusota
Leesi Bright Barinem
Richard T. Bex II
Cindy Mhay Borja
Tim Brau
Landon Grey Breeding
Brittany Brelle
Gizel D. Brewer
Muhammad Nawaz Bugti
Mariko Cappello
Patrick Chandler
Zachary Clowdus
Jessica J. Cruz
Alyiah Davis
Clare L. Decelles
Michael Delligatti
Megan Helene Doorlag
Benjamin Fellows
Andrea N. Floyd

Michelle Frankel
Andrew Garcia
Lane Cooper Hluch
Estefania Salgado Jauregui
Amanda Jo Key
Rebecca Kleinman
Camryn Kozachek
Harkjun Lee
Jade Mclaughlin
Isabelle Moore
Abdelhak Moumou
Mara Lynn Nasiatka
Victoria Ng-Breckwoldt
Emily M. Passmore
Brianna A. Payne
Julian Christian Perez
Brooke Peritore
Oluwarotimi Akindele Popoola
Rebecca L. Richards
Sriparna Saha
Emily Scribner
William Segura
Shawn Alan Steckenfinger
Garrett Walker Sullivan
Sarah G. Thompson
Catherine Anne Trewhella
Silou Willis
Brianna Delaney Wilson

Geothermal
Kurt Otto Kraal
Laura Varone

History and Philosophy of Geology
Ronald Chichester

Hydrogeology/Hydrology
Bidisha Faruque Abesh
Dominic Aluia
Gare Ambrose-Igho
Ryan Apfel
Sebastian Dominic Barkett
Fern Beetee-Moorcroft
Julio Beltran
Nicholas D. Benton
Riley Lucas Blais
Joseph Patrick Blass
Patience Bosompemaa
Erin Nicole Boulger
Jacob M. Bradley
Christopher Brown
Morgan A. Brown
Austin Bruckner
Austin Douglas Bruner
Trevor Richard Burns
Richelle Carney
Cameron Robert Chambers
Anne Chase

Jacqueline M. Chisholm
Lily Conrad
Bennett Conway
Sarah B. Cook
Julia Irene Corradino
Olivia Lynn Costantino
Aaron Coutino
Raymond Craddock
Owen Daly
Alan Jared Deglmann
Cansu Demir
Ivy Doo
Michael Dollar
Couy Ivan Dorn
Hailey Dorner
Mikayla Drost
Jameka Alexandria Durrough-Pritchard
Donald J. Enos
Jacqueline J. Epperson
Alexander Feroe
Juliani M. Fiallos
Michael David Flowers
Ashley Fox
Joel Frisch
Gabrielle R. Garcia
Ricki Garden
Daulton Geyer
Gordon O. Gianniny
Ian Godwin
Katherine Haile
Jenny Ann Hambleton
Andrew Hardman
Dru-Ann Elizabeth Harris
Md Rizwanul Hasan
Meredith Elise Helmick
Kimberly Jei Henning
Mark E. Heyer
Michael Hodges
Sarah Nicole Hoffmeier
Rachel Humes
Rania Khelfi IV
Ji-Hyun Kim
Erina Babirye Kironde
Jerome Michael Komas
Graydon Konzen
Joseph M. Krienert
Dongjae Kwon
Top professional interests of new student members

1. Mineralogy, Geochemistry, Petrology, and Volcanology
2. Environmental Geology
3. Hydrogeology
4. Structural Geology
5. Stratigraphy/Sedimentary

GSA Today  |  July 2019
Before heading off on your next summer vacation, stop by the GSA Store for ideas and inspiration.

Is camping on your itinerary? Explore central California from Yosemite National Park to the Sierra Nevada foothills with *A Tour of California’s Iconic Geology*—just US$9.99 for the ebook.

Heading to Europe? Incorporate field trips to the Eastern, Bavarian, Oetztal, and Northern Alps with *Geological Field Trips in Central Western Europe*.

Looking to spend some time at the beach? Pick up Special Paper 491, *Geology and Geomorphology of Barbados*, before your next trip to the Caribbean, or download *The Eastern Pacific Ocean and Hawaii* (volume N of the DNAG series) before flying to the islands.

Start exploring at
https://rock.geosociety.org/store.
In Memoriam

The Society notes with regret the deaths of the following members (notifications received between 28 Jan. and 29 Apr. 2019). Memorials to deceased members are published open access at www.geosociety.org/memorial. Visit that page to learn how to honor someone with a memorial.

Prahlad K.N. Ayengar
Seattle, Washington, USA
Date of death: 17 Dec. 2017

William H. Duhling Jr.
Athens, Georgia, USA
Date of death: 14 Oct. 2017

Ian McDougall
Canberra, Australia
Date of death: 10 Nov. 2018

S. George Pemberton
Edmonton, Alberta, Canada
Date of death: 4 Aug. 2018

Harold H. Beaver
Waco, Texas, USA
Date of death: 25 Oct. 2018

John W. Gabelman
Butte, Montana, USA
Date of death: 1 July 2018

Roland C. McEldowney
Evergreen, Colorado, USA
Date of death: 3 Feb. 2019

Warren R. Rehfeldt
Grafton, Wisconsin, USA
Notified: 30 Jan. 2019

Lowell E. Bogart
Port Townsend, Washington, USA
Date of death: 23 Feb. 2018

David C. Hedlund
Parker, Colorado, USA
Date of death: 22 Apr. 2018

Andrew McIntyre
Washington, Virginia, USA
Date of death: 2 Mar. 2019

Charles B. Reynolds
Albuquerque, New Mexico, USA
Date of death: 29 Jan. 2018

Raymond J.T. Butler
South Guildford, Australia
Date of death: 1 June 2018

Charles S. Hutchinson Jr.
Tucson, Arizona, USA
Date of death: 3 Mar. 2019

Conrad Neumann
Durham, North Carolina, USA
Date of death: 28 Jan. 2019

Peter Robinson
Trondheim, Norway
Date of death: 25 Mar. 2019

James R. Chaplin
Noble, Oklahoma, USA
Date of death: 15 Mar. 2018

Louise H. Kellogg
Davis, California, USA
Date of death: 15 Apr. 2019

Laurence H. Nobles
Port Ludlow, Washington, USA
Date of death: 1 Apr. 2018

Floyd F. Sabins Jr.
Fullerton, California, USA
Date of death: 4 Feb. 2019

Charles Benjamin Chapman
Danbury, Connecticut, USA
Date of death: 11 Apr. 2019

William T. Kirchgasser
Colton, New York, USA
Date of death: 14 Jan. 2019

Neal R. O'Brien
West Stockholm, New York, USA
Date of death: 26 Mar. 2019

Sanford I. Strausberg
Ormond Beach, Florida, USA
Notified: 29 Mar. 2019

E. Julius Dasch Jr.
Alpine, Texas, USA
Date of death: 14 Feb. 2019

Keith Richard Long
Marana, Arizona, USA
Date of death: 29 Mar. 2019

Charles Harris Parsons
Cypress, California, USA
Notified: 4 Mar. 2019

Jane H. Wallace
Washington, D.C.
Date of death: 3 Dec. 2018

Robert E. Maurer
Fayetteville, Pennsylvania, USA
Date of death: 21 Dec. 2018

Neal R. Obrien
West Stockholm, New York, USA
Date of death: 26 Mar. 2019

Sanford I. Strausberg
Ormond Beach, Florida, USA
Notified: 29 Mar. 2019

Jane H. Wallace
Washington, D.C.
Date of death: 3 Dec. 2018
2019 Field Award Recipients
Get into the Field with GSA!

GSA Field Camp Scholars Award
These 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.

Jacob Adam, University of South Florida
Dominic Aluia, Michigan State University
Saida Burns-Moore, University of Memphis
Yueyi Che, University of California Berkeley
Jeng Hann Chong, University of Maryland
David Davis, Georgia State University
Lisa Duong, Georgia State University
Rebecca Goughnour, Adrian College
Cody Keith, University of Alaska Fairbanks
Carlos Montejo, California State University, Bakersfield
Kara Naegeli, Angelo State University
Holly Olivarez, University of New Mexico
Nelmary Rodríguez Sepúlveda, University of Puerto Rico–Mayagüez
Laura Taylor, University of Houston
Paige Voss, Pomona College

GSA/ExxonMobil Bighorn Basin Field Award
These awardees will attend a one-week field seminar in the Bighorn Basin of north-central Wyoming, USA, emphasizing multidisciplinary integrated basin analysis. All costs will be covered.

UNDERGRADUATES
Desiree Baker, Southern Illinois University
Claudia Banks, University of Florida
Ekaterina Bolotskaya, Massachusetts Institute of Technology
John Butkevicius, Austin Peay State University
Alex Crooks, Georgia State University
Hailey Dorner, University of Nebraska–Lincoln
Stephanie Evans, Indiana University
Nicole Gonzalez, University of Colorado Boulder
Megan Heins, State University of New York Potsdam
Caje Kindred, Ohio State University
Sophia Leiter, Middlebury College
Emily Loucks, Pennsylvania State University
Andrew McGrady, West Virginia University
Andrew Michel, University of Cincinnati
Savannah Rice, Miami University
Amanda Rossi, University of Vermont

GRADUATES
Victoria Buford Parks, University of Pittsburgh
William Chandonia, Missouri University of Science and Technology
Kristen Cuellar, The University of Texas of the Permian Basin
Nicholas Ferry, University of Cincinnati
Elizabeth Ives, University of Wisconsin–Milwaukee
Jacob Thacker, University of New Mexico

PROFESSIONALS
Raphael Gottardi, University of Louisiana at Lafayette
Megan Rohrssen, Central Michigan University

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.

Nicolas Barth, University of California Riverside
<table>
<thead>
<tr>
<th><strong>GSA OFFICERS</strong></th>
<th>Term: July 2019–June 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRESIDENT</strong></td>
<td>Donald I. Siegel</td>
</tr>
<tr>
<td></td>
<td>Syracuse University</td>
</tr>
<tr>
<td></td>
<td>Syracuse, New York, USA</td>
</tr>
<tr>
<td><strong>PRESIDENT-ELECT</strong></td>
<td>J. Douglas Walker</td>
</tr>
<tr>
<td></td>
<td>University of Kansas</td>
</tr>
<tr>
<td></td>
<td>Lawrence, Kansas, USA</td>
</tr>
<tr>
<td><strong>TREASURER</strong></td>
<td>Richard Berg</td>
</tr>
<tr>
<td></td>
<td>Illinois State Geological Survey</td>
</tr>
<tr>
<td></td>
<td>Champaign, Illinois, USA</td>
</tr>
<tr>
<td><strong>PAST PRESIDENT</strong></td>
<td>Robbie Rice Gries</td>
</tr>
<tr>
<td></td>
<td>Gries Energy Partners LLC</td>
</tr>
<tr>
<td></td>
<td>Lakewood, Colorado, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>GSA COUNCILORS</strong></th>
<th>Term: July 2016–June 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F. Edwin “Ed” Harvey</strong> (Councilor-at-Large)</td>
<td>National Park Service</td>
</tr>
<tr>
<td></td>
<td>Fort Collins, Colorado, USA</td>
</tr>
<tr>
<td><strong>Mark Little</strong></td>
<td>University of North Carolina at Chapel Hill</td>
</tr>
<tr>
<td></td>
<td>Chapel Hill, North Carolina, USA</td>
</tr>
<tr>
<td><strong>Marjorie A. Chan</strong></td>
<td>University of Utah</td>
</tr>
<tr>
<td></td>
<td>Salt Lake City, Utah, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Carmala N. Garzione</strong></th>
<th>Term: July 2017–June 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Rochester</td>
<td>Rochester, New York, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Joan E. Fryxell</strong></th>
<th>Term: July 2018–June 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>California State University, San Bernadino</td>
<td>San Bernadino, California, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Suzanne OConnell</strong></th>
<th>Term: July 2018–June 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wesleyan University</td>
<td>Middletown, Connecticut, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Jeff N. Rubin</strong></th>
<th>Term: July 2019–June 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tualatin Valley Fire &amp; Rescue</td>
<td>Tigard, Oregon, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Nathan A. Niemi</strong></th>
<th>Term: July 2019–June 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Michigan</td>
<td>Ann Arbor, Michigan, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Wendy A. Bohrson</strong> (Sections Liason)</th>
<th>Term: July 2019–June 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Washington University</td>
<td>Ellensburg, Washington, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Glenn Thackray</strong> (Divisions Liaison)</th>
<th>Term: July 2019–June 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idaho State University</td>
<td>Pocatello, Idaho, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Margaret Eggers</strong></th>
<th>Term: July 2019–June 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eggers Environmental Inc.</td>
<td>Oceanside, California, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Katharine Huntington</strong></th>
<th>Term: July 2019–June 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Washington</td>
<td>Seattle, Washington, USA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>GSA STUDENT ADVISORY COUNCIL CHAIR</strong></th>
<th>Term: July 2019–June 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyler King (through Sept. 2019)</td>
<td>Utah State University</td>
</tr>
<tr>
<td></td>
<td>Logan, Utah, USA</td>
</tr>
</tbody>
</table>
Iceland: The Formation and Evolution of a Young, Dynamic, Volcanic Island—A Field Trip Guide
By Brennan T. Jordan, Tamara L. Carley, and Tenley J. Banik

This field trip guide contains an introduction to the geology of Iceland and an itinerary for a 10-day journey around the island. The itinerary consists of 55 stops and 15 optional stops. These stops include exposure to representative examples of most phenomena typical of the island’s geology and all of the major tectonic elements of Iceland. The primary focus of this guide is on volcanic and tectonic features, but topics such as glaciation, geothermal energy, geomorphology, paleontology, soil loss, and geo-tourism are also addressed.

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A Geologist’s Role in Congress

On 25 Sept. 2018 I started my year-long GSA-USGS Congressional Science Fellowship in the office of Senator Tom Udall (D-NM), working on both the energy and environment portfolio and the wildlife, natural resources, and public lands portfolio teams. Thus far, the best compliment I’ve received from a congressional staffer was not for me, but rather for our geoscience community at large. I was told that “geologists make for some of the best congressional fellows.” I was immediately flattered after being told that geoscientists were great to work with on Capitol Hill. Then, on reflection, it became obvious why members of our community would be sought after and so valued by congressional personnel and committee offices.

Geology is inherently interdisciplinary. Earth and its processes are dynamic, requiring a command of the core, basic sciences to understand all of Earth’s interacting physical, chemical, and biological aspects. This leads geologists to generally be comfortable with tackling a variety of issues outside our expertise. Our geology undergraduate degrees required introduction to physics, chemistry, calculus, and sometimes biology and statistics. Although our undergraduate schedules were overloaded with labs and our backpacks weighed down with oversized textbooks, I appreciated the opportunity to broaden my overall knowledge of the sciences.

To answer our research questions, we collaborate heavily with geologists specializing in different fields from our own and with scientists across disciplines, ranging from computer scientists to material scientists to engineers. Often, our research and collaborations involve travel to attend conferences, use labs, or collect samples. Through these travels, we experience new cultures and interact with a diversity of individuals. I’ve often found that geologists are genuinely interested in getting to know others and spending time together—GSA’s Annual Meeting feels more like a reunion of friends instead of a society conference. Our ability to communicate, engage, and navigate within our community and among foreign colleagues, rural communities, private landowners, government agencies, etc., in our travels are highly transferable skills. A day in Congress might have you meeting with the Frankfurt Zoological Society to discuss preservation needs in the Serengeti National Park, sitting down with World Wildlife Federation representatives who flew in from Brazil to raise concerns regarding the violation of indigenous people’s rights in the Amazon, or inviting representatives who flew in from Brazil to raise concerns regarding the violation of indigenous people’s rights in the Amazon, or inviting foreign colleagues, rural communities, private landowners, government agencies, etc., in our travels are highly transferable skills. A day in Congress might have you meeting with the Frankfurt Zoological Society to discuss preservation needs in the Serengeti National Park, sitting down with World Wildlife Federation representatives who flew in from Brazil to raise concerns regarding the violation of indigenous people’s rights in the Amazon, or inviting representatives who flew in from Brazil to raise concerns regarding the violation of indigenous people’s rights in the Amazon, ...
in hopes of getting funded or published. Along those lines, we can also handle rejection, thereby writing more persuasive arguments next time around. These are skills that geologists, and more broadly scientists, learned early on in their careers that come in handy daily in Congress.

Although some, including members of our field, might think that our expertise does not directly relate to legislative policy, the skills and perspectives geologists possess bring great value to the Hill. We are a community of smart, adventurous, hard-working people. Our insight and expertise is sought after and appreciated by policy makers. If someone on the Hill reaches out with an earth-science–related policy question, you and your earth-science peers are more capable and prepared to provide the answer than you might expect.

This manuscript is submitted for publication by Caitlin Keating-Bitonti, 2018–2019 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 no. G18AP00098. 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. Keating-Bitonti works in the office of Senator Tom Udall (D-NM) and can be contacted by e-mail at crkeatin@gmail.com.

36th International Geological Congress (IGC) Mentoring and Travel Grant Program

Delhi, India | 2–8 March 2020

GSA is accepting applications for its mentoring and travel-grant program to the 36th International Geological Congress (IGC) in Delhi, India. Students and early career professionals (those within seven years of receiving their Ph.D.) are welcome to apply.

To be eligible, the applicant must be a resident or citizen of the United States and be enrolled in, or employed at, a U.S. institution. Each award is anticipated to be a maximum of US$3,500.

Complete applications will consist of

- An online application form;
- A cover letter addressing your reasons for attending the meeting;
- A prioritized budget of expenses;
- A copy of your submitted abstract; and
- One letter of recommendation.

Applications must be received electronically no later than 3 Sept. 2019 at www.geosociety.org/GSA/Education_Careers/Field_Experiences/GSA/fieldexp/home.aspx.

This program is organized in collaboration with the GSA Foundation, the U.S. National Committee for Geological Sciences (of the National Academy of Sciences), and the American Geosciences Institute.

Questions? Contact Jennifer Nocerino, jnocerino@geosociety.org, +1-303-357-1036.
Congressional Visits and the Power of a Good “Ask”

Geologists like to follow the clues, collecting evidence to reconstruct past histories. We use facts to decide what questions to answer and what sort of information still needs to be uncovered. Geoscientists are great stewards for the planet—considering the problem-solving we do every day, we are also a valuable resource to representatives as they make important policy decisions.

Throughout the year, scientific organizations like the Geological Society of America sponsor Congressional Visits Days, matching scientists with congressional representatives. During these visits, small groups of scientists meet with staffers to talk about issues facing their districts, the country, and even the entire planet. The goal of these meetings is to foster trusted relationships with the representative’s staff through a face-to-face conversation while building awareness of scientific issues.

This spring, I attended Climate Science Day (CSD) in Washington, D.C., representing GSA. The goal of CSD was to emphasize the importance of incorporating the scientific community’s consensus on climate science into policy discussions and decisions.

An important part of that discussion is to spur your representative to action on science policy, all by leveraging an important technique: the “ask.”

What Is an Ask?

During a congressional visit, the most important message for your representative is the ask. An ask is something that you would like them to do—a call to action. A topic as big as tackling climate change can be overwhelming, but breaking down the issue into smaller pieces is an effective approach for moving science further into policy decisions. Representatives appreciate a concrete task to work toward, and it is your job to help them understand what is needed.

Our goal for CSD was to remind representatives that climate science can be used for bipartisan decision making. The ask, or how they could implement this goal, could include:

- Contact scientists with questions on climate science and other issues;
- Visit a research institution and/or field site;
- Host discussions with scientists and community leaders about the impacts of a changing climate in your state/district;
- Bring climate science to relevant policy discussions, such as infrastructure, hazards, coasts, and agriculture;
- Hold hearings that are interdisciplinary, explore groundbreaking impacts, or garner bipartisan support;
- Make a floor speech regarding the scientific community’s understanding of the changing climate and the influence of humans, the impacts of a changing climate on your district/state, or the research happening on the topic in your state;
- Circulate a “Dear Colleague” letter sharing the scientific community’s view of climate change and the role of humans; and
- Speak out when policymakers state a view that is inconsistent with scientific consensus on climate change.

Tailoring an Ask

The ask should be as specific as possible—avoid generalities and open-ended tasks. Although following the latest scientific research on climate change might seem like an obvious choice to you, this request is too vague and too big. Representatives, and the staff who support them, juggle a long list of to-dos, and expecting a non-scientifically trained staffer to scour through the literature is unrealistic.

Instead, dig into the details. For example, if you know a bill is being sponsored to address coastal erosion, and you are a coastal geomorphologist, offer up your expertise as they navigate through the policy language. If your laboratory is making exciting strides in solar battery life expectancy, invite your representative to the lab to see the scientific strides you are making and highlight any business interests your research has created.

Once you present the ask, try to connect it to issues near and dear to the representative’s heart. Before the congressional visit, look up the representative online and get a feel for their passions—are they an advocate for health care? Perhaps you can connect climate science to health concerns in the district, mentioning new research linking climate change to cardiopulmonary distress (https://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health) during your meeting.

Tailoring your ask to their interests and creating a personalized message will stick with the staffer long after your meeting is done.

The Impact of an Ask

A 2016 survey (http://www.congressfoundation.org/storage/documents/CMF_Pubs/cmf-citizen-centric-advocacy.pdf) showed that only 11% of voters thought that representatives listen to them, and I have to say that I was one of the cynical majority. But it turns out that 94% of congressional staff said “in-person issue visits from constituents” influence representatives on undecided issues.

I came away from my congressional visit feeling inspired and motivated to continue reaching out to my representatives. My experience at CSD was extremely positive and revealed that scientists’ voices are a valuable resource on policy issues—we just need to show up.

To be a part of the science policy process, apply to be a representative for this fall’s GEO—Congressional Visits Day: www.geosociety.org/geocvd.
Application deadline: August 24th, 2019 (23:59 Swiss time GMT+2).

The application in PDF must be shared in several document not bigger than 9.9 MB and will be considered only if sent through this website where you find a full description of the position: https://bit.ly/2PF6D0a

Or www.unil.ch/central/en/home.html -> Jobs

search sedimentology.

Assistant (Tenure-Track) or Associate (Tenured) Professor in Solid Earth Geophysics, The University of Texas at Austin

The Faculty of Geosciences and the Environment (FGSE) of the University of Lausanne invites applications for a professorship in Paleoclimatic Sedimentology, to be based in the Institute of Earth Sciences (ISTE).

We are looking for an excellent sedimentologist who focuses on the reconstruction of past climate changes (including sedimentary, paleoclimatic, biological and paleoenvironmental changes) at geological timescales using the stratigraphic and sedimentary record. We seek a candidate who can provide an innovative interpretation of sedimentary archives, using laboratory, and field techniques and reconstructing Earth system history. The ideal candidate should have a strong background in geology, a strong commitment to field-based research and a willingness to contribute to field-based teaching.

The successful candidate will actively participate in the research activities of the Institute of Earth Sciences, will teach in the Bachelor of Geosciences and Environment and in relevant Masters taught by the FGSE, and will supervise masters and doctoral students.

Appointment will be at the Assistant Professor level (tenure track). However, exceptionally, we will consider outstanding candidates for direct appointment to the Associate or Ordinary Professor level, notably if this corresponds with our equal opportunity objectives.

The application should include a cover letter (max. 0.5 page), a full Curriculum Vitae, a research statement (max. 4 pages), a teaching statement (max. 2 pages), PDFs of the three most significant publications, and the names and contact information of five referees. For further information, contact Prof. Frédéric Herman, Dean of the FGSE (frederic.herman@unil.ch).

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**POSITIONS OPEN**

**Assistant Professor (Tenure Track) in Paleoclimate Sedimentology, University of Lausanne**

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**OPPORTUNITIES FOR STUDENTS**

Ph.D. Opportunity in Active Tectonics and Remote Sensing, University of Canterbury. One fully funded Ph.D. scholarship in active tectonics and remote sensing is available through a joint research initiative with Dr. Tim Stahl at the University of Canterbury and Dr. Kate Clark at the Institute of Geological and Nuclear Sciences (GNS). The successful applicant will join a research team utilising novel photogrammetric datasets and techniques, alongside field work, to research historical earthquake fault ruptures in a range of tectonic environments in New Zealand. Research topics include (1) developing techniques for processing historical aerial photographs into digital elevation data; (2) analysis of pre- and post-earthquake data for the purpose of assessing fault geometries, connectivity and kinematics; (3) modelling multi-fault ruptures using geologic and remotely sensed validation datasets, and exploring the implications of this research for seismic hazard analysis.

The ideal candidate will have strengths in active tectonics, paleoseismology, and/or geomorphology, and will have worked with remote sensing data. Field experience in active tectonics/geomorphology would be beneficial and experience in computational science, programming &/or numerical modelling is required. Masters degree or BS/BSc degree with significant research and work experience required. The Ph.D. position will be based in Christchurch, New Zealand, at the University of Canterbury. There will be opportunities to undertake research visits to GNS Science, Lower Hutt. Applications will be accepted until 15 July 2019 or until the position is filled. Please email timothy.stahl@canterbury.ac.nz with your CV and cover letter. Candidates from under-represented and diverse backgrounds are encouraged to apply.

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Why I Give: The GSA Foundation’s Board of Trustees

The GSA Foundation is fortunate to have a strong volunteer base of dedicated geologists from across the full breadth of our science. The members of our Board of Trustees generously volunteer their time and resources to ensure both our success and that of the Society’s. Several board members wanted to share with you why they invest their time, talents, and resources in GSA—and why they hope you will do the same.

Judy Parrish: GSA is a premier geological society that has strong and diverse programs to serve students. Its journals are among the top ones in our discipline, and the membership has a strong appreciation for the continued value of fieldwork, as well as the development and application of new technologies. It is one place where you really can see the impact of your giving.

Jack Shroder: You could give your money in a variety of ways or to a lot of different organizations but your donation to GSA can be followed easily from donation, through student application, to recipient so that you can see where it goes or what it is being used for.

Wes Ward: Many people, most of whom I will never meet, made it possible for me to have a great career in geology. They had the foresight to set up or contribute to a fund to help undergrads and graduate students such as I was then. Their faith in future generations is something I admire and feel obligated to emulate—something I very much enjoy. I am proud to do my part in the development and continuation of our science.

Darrel Cowan: GSA has always been my home society, even as an undergraduate. I published my first paper in the *GSA Bulletin* and presented my first talks while a graduate student at Section Meetings. I give to GSA partly as thanks for everything it provides to our community.

Terri Bowers: GSA members were such a community for me when I was young that now is the time for me to help on the other end. There has never been a time when earth-science education was so important as it is now—yet resources for this support are ever more limited. I don’t know if we, the Society members, can make up the gaps, but we have to try.

Rex Buchanan: The discipline of geology has been a welcoming professional home to me. I’ve developed relationships in the community that I value highly. Supporting GSA is one way to pay back the discipline for what it’s given me. This is also a challenging time for science and scientific societies. And that makes support of GSA more important than ever.

Steve Wells: The Geological Society of America has been my professional society of choice since I was a graduate student in the early 1970s. As a student, young professional, professor, and academic administrator, I have benefited from the Society in ways that I cannot measure. From support for my graduate research to honing my professional leadership skills, the Society has been one of the most important factors in my career over the past 40 years. Giving is a very small step I can take to ensure that GSA will continue to provide these types of positive impacts in the future.

Do you have a similar experience? Are you ready to give back? Your generosity will support the broader geoscience community and aid GSA members from their student years to retirement. If you have questions about ways to significantly support GSA programs, please contact Clifton Cullen at +1-303-357-1007 or ccullen@geosociety.org. To learn more about the GSAF Board of Trustees, visit gsa-foundation.org/trustees.
Geology in the Classroom

If you’re an educator looking for insight and inspiration to help keep you motivated, you’ll want to check out these Special Papers from GSA. Both volumes, which are available for download from the GSA bookstore, explore how improved understanding of how humans think and learn about the Earth can help educators prepare the next generation of geoscientists.

*Earth and Mind: How Geologists Think and Learn about the Earth* presents essays by geoscientists, cognitive scientists, and educators that explore how geoscientists learn and what the implications are for student learning. (SPE413P, 188 p., ISBN 0813724139, US$9.99)

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