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## Flooding Induced by Rising Atmospheric Carbon Dioxide



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**Cover:** Mississippi River flooding at West Alton, Missouri, USA, 1 June 2019 (Scott Olsen, Getty Images, user license 2064617248). For the related article, see pages 4–8.



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# Flooding Induced by Rising Atmospheric Carbon Dioxide

Gregory J. Retallack\* and Giselle D. Conde, Dept. of Earth Sciences, University of Oregon, Eugene, Oregon 97403-1272, USA

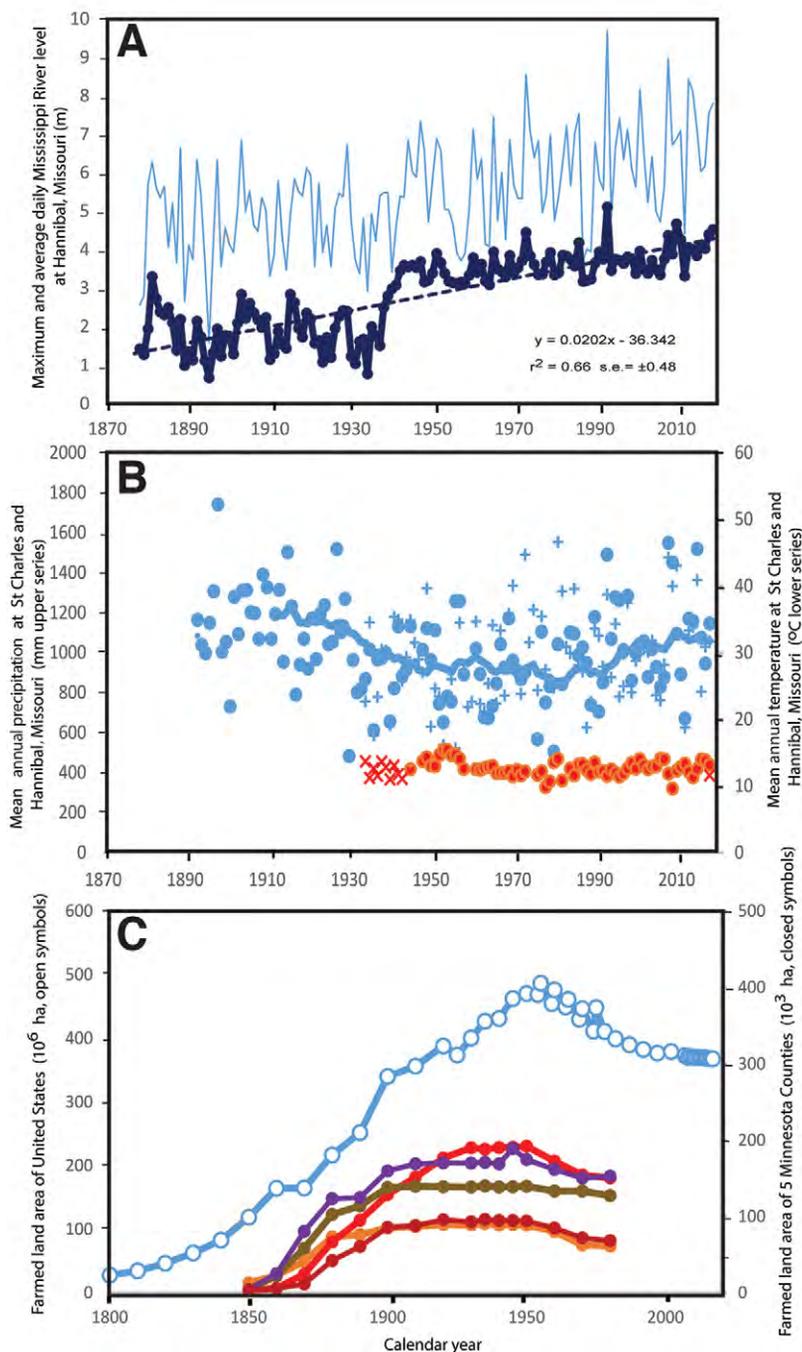
## ABSTRACT

A direct consequence of rising CO<sub>2</sub> is increasingly devastating flooding, because deciduous plants deploy fewer stomates each year as the atmospheric CO<sub>2</sub> supplies more carbon for photosynthesis. When plants transpire less, more water runs off in streams and floods. Here we quantify this effect with high-resolution observations of changing density and size of stomates of a mesic tree, *Ginkgo*, since 1754. The observed decline in maximum potential transpiration corresponds with rising water levels in the Mississippi River and represents a potential transpiration decline from 1829 to 2015 of 18 mL s<sup>-1</sup> m<sup>-2</sup>: a reduction of 29%. Rising atmospheric CO<sub>2</sub> and declining transpiration promote flooding, which handicaps lowland cultivation and renders irrelevant insurance and zoning concepts such as the 100-year flood.

## INTRODUCTION

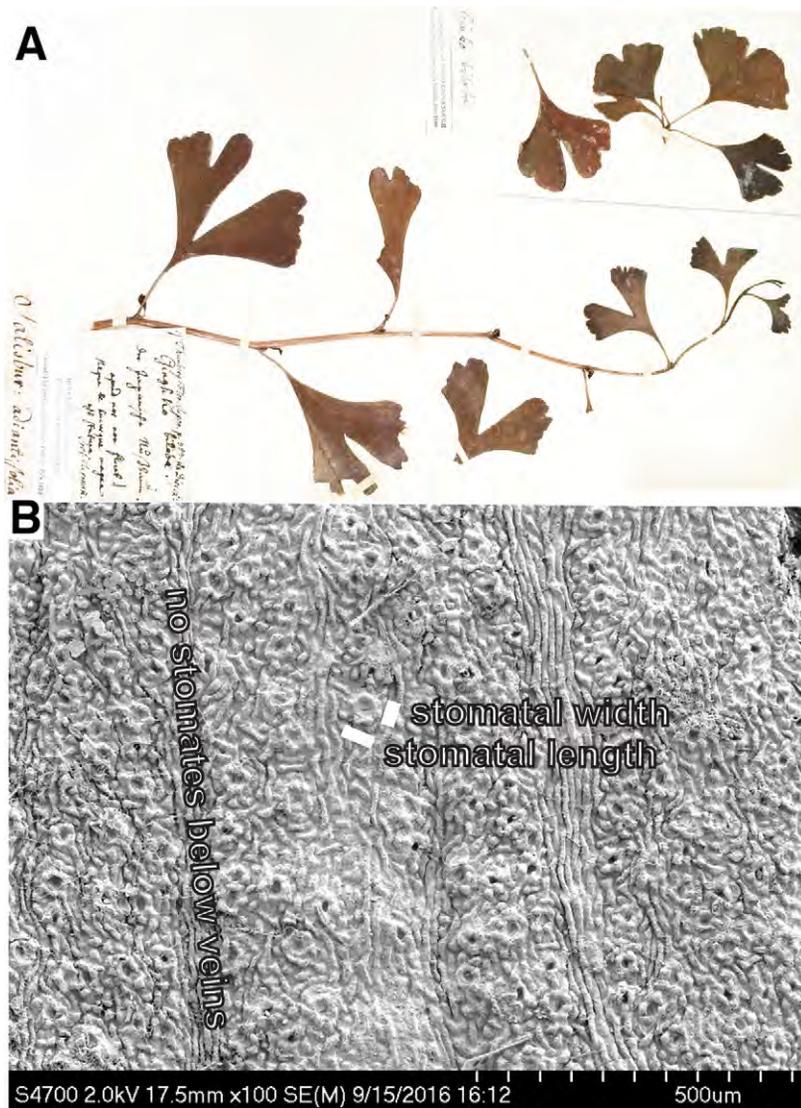
Ongoing climatic change with rising atmospheric greenhouse gases (Yan et al., 2016) is disproportionately affecting tropical regions with sterilizing heat waves (Mora et al., 2017) and polar regions with disappearing sea ice (Kwok, 2018), but is less apparent in the American Midwest, thus allowing skepticism of global warming science (Wallace et al., 2014). Nevertheless, Midwestern cities and

**Figure 1. The paradox of rising water in the Mississippi River, but little change in climate or land use:** (A) maximum and mean annual water level of the Mississippi River at Hannibal, Missouri (U.S. Army Corps of Engineers, 2019); (B) mean annual precipitation (mm) and mean annual temperature (°C) at Hannibal (crosses) and St. Charles (solid symbol), Missouri (National Oceanographic and Atmospheric Administration, 2019a); (C) area of farmed land in United States (Sohl et al., 2016; U.S. Department of Agriculture Statistics Service, 2019: millions of hectares, open symbols) and in five Minnesota counties of St. Croix watershed (Andersen et al., 1996; thousands of hectares, closed symbols: top to bottom, Polk, St Croix, Pierce, Chisago, and Washington counties).



agriculture have been progressively ravaged by flooding (Fosu et al., 2018). Steadily increased floods and general level (U.S. Army Corps of Engineers, 2019) of the Mississippi River (Fig. 1A) have been independent of local climatic changes in precipitation and temperature (National Oceanographic and Atmospheric Administration, 2019a), which have remained surprisingly flat (Fig. 1B). Nor can increases in farmed areas be blamed for rising flood levels, because Midwestern cultivated acreage reached a plateau between 1900 and 1960 (Clausen, 1979; Sohl et al., 2016; Andersen et al., 1996; U.S. Department of Agriculture Statistics Service, 2019), and has declined slightly since then (Fig. 1C).

Flooding is a long-term and direct response to rising atmospheric CO<sub>2</sub> concentrations of much greater consequence in mid-latitudes than temperature increases, and it has been observed for decades. Deciduous trees adapt to rising CO<sub>2</sub> annually by developing fewer stomates on spring leaves, because adequate CO<sub>2</sub> for photosynthesis can be obtained by reduced air intake (Sugano et al., 2010; Chater et al., 2015). Fewer stomates also reduce plant transpiration of water, so that more precipitation runs off in rivers and floods (Betts et al., 2007). The relationship between CO<sub>2</sub> and stomatal density has been known for some time (Woodward, 1987), and there have been many attempts at quantifying the relationship (Royer et al., 2001; Retallack, 2001, 2009; Barclay and Wing, 2016; McElwain and Steinthorsdottir, 2017). Here we update quantification of stomatal response to atmospheric CO<sub>2</sub> inferred from herbarium specimens of *Ginkgo biloba* with an unprecedented data set ranging from leaves picked in 1754 (Fig. 2) through the definitive upturn of CO<sub>2</sub> in the early twenty-first century (Fig. 3A). Such studies have been the basis for determining CO<sub>2</sub> levels from the distribution of stomates on fossil leaves (Retallack, 2001, 2009) and also for showing the link between greenhouse crises and flooding in deep time (Steinthorsdottir et al., 2012). A single collection of fossil or herbarium leaves determines global CO<sub>2</sub> concentration with a resolution of weeks because the atmosphere is well mixed on such time scales, as illustrated by seasonal variation ( $\pm 4$  ppm CO<sub>2</sub>) between rising values with autumn leaf shedding and draw-down by photosynthetic initiation as leaves unfurl in spring (National Oceanographic and Atmospheric Administration, 2019a). Concentrations of atmospheric CO<sub>2</sub> are

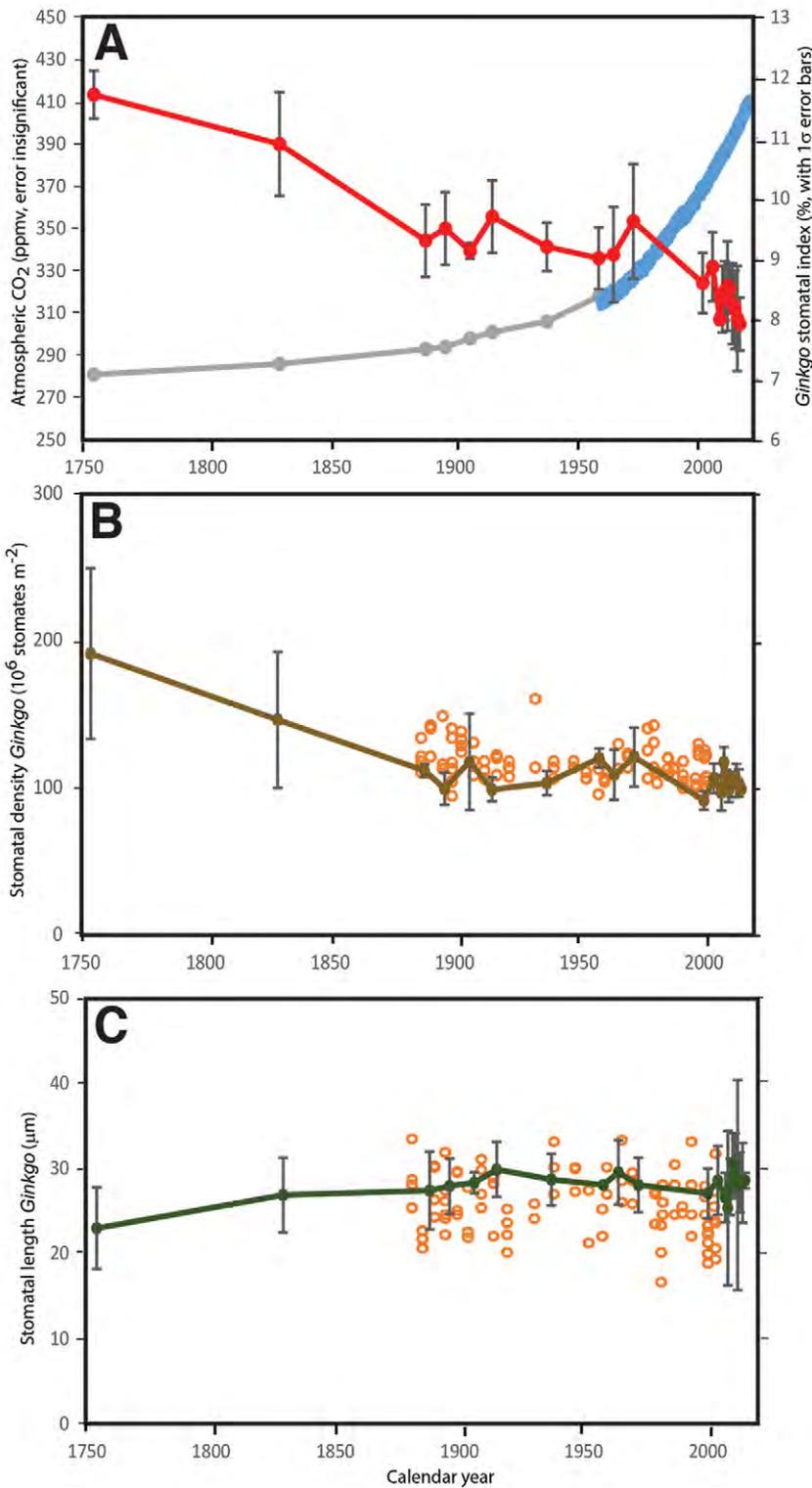


**Figure 2.** Stomates from leaves of *Ginkgo* picked in 1754 from Deshima, Japan. Large images with ~600 stomates and also non-stomatiferous areas below veins were counted to ascertain total leaf conductance. Pressed leaves from Kew Herbarium and scanning electron microscopy image courtesy of Chrissie Pritchard.

sensed by stomatal ion channels, which direct gene expression for stomatal density in the developing leaf for that year (Sugano et al., 2010; Chater et al., 2015). In deciduous plants like *Ginkgo* and oak (*Quercus*), stomatal index reflects spring time CO<sub>2</sub> for the year in which that leaf formed. *Ginkgo* has been a favorite for such studies because of its unusually long fossil record, and so has the highest quality data (Barclay and Wing, 2016; Retallack and Conde, 2020). Comparable records have been obtained from oak (*Quercus*) and many other species of leaves (Lammertsma et al., 2011). The relationship between stomatal density and atmospheric CO<sub>2</sub> varies with different species, but *Quercus* and *Ginkgo* have a similar response (Fig. 3B–3C).

## MATERIALS AND METHODS

We used scanning electron microscopy (SEM) images from herbarium specimens of *Ginkgo biloba* (Retallack and Conde, 2020) to refine a time series of historic stomatal parameters (Retallack, 2009), now extended back to 1754 with specimens in Kew Herbarium picked in Deshima, Japan, and forward with specimens picked during the dramatic upswing in CO<sub>2</sub> over the past decade (Fig. 2). Stomatal papillae may obscure subsidiary cell walls in cuticle preparations (Barclay and Wing, 2016), but are clear in SEM images (Fig. 2B). Our method counted images with ~600 cells and 60 stomates in both stomatiferous and astomatic areas as a proxy for total leaf conductance. Counting smaller areas of cuticle with only



**Figure 3.** Changes in *Ginkgo* stomatal parameters since 1754: (A) observed (National Oceanographic and Atmospheric Administration, 2019b) and inferred from ice cores (Lüthi, et al., 2008: before 1955) atmospheric CO<sub>2</sub>, with insignificant error, and declining stomatal index (%) of *Ginkgo* (1σ error); (B) stomatal density (stomates·m<sup>-2</sup>) of *Ginkgo* (1σ error); (C) stomatal length (μm) of *Ginkgo* (1σ error). Stomatal index, density, and length were all measured from scanning electron microscopy images of herbarium specimens (Retallack and Conde, 2020). Comparable data scatter in panels (B) and (C) are for *Quercus laurifolia* in Florida, from Lammertsma et al. (2011).

<sup>1</sup>Supplemental Material: Stomatal data for *Ginkgo biloba*. Please visit <https://doi.org/10.1130/GSAT.S.12678941> to access the supplemental material, and contact [editing@geosociety.org](mailto:editing@geosociety.org) with any questions.

5–16 stomates (Barclay and Wing, 2016) gives unacceptable systematic errors of stomatal index: ~20% depending on whether four or five stomates are accidentally in the image. Stomatal bands are distinct from astomatic areas below veins, but we counted both stomatal and subvenal areas to capture total leaf conductance (Fig. 2B).

The current stomatal index CO<sub>2</sub> paleobarometer (Retallack and Conde, 2020) is based on atmospheric CO<sub>2</sub> ( $C$  in ppm) from observations (National Oceanographic and Atmospheric Administration, 2019b) and ice cores (Lüthi et al., 2008) together with stomatal index ( $I$  in % from Equation 1) from microscopic imaging of herbarium specimens in which number of stomates ( $n_s$ ) and number of epidermal cells ( $n_e$ ) in the same area are counted. This inverse relationship (Equation 2) has an algebraically simplified equivalent (Equation 3) between *Ginkgo* stomatal index ( $I$  in %) and atmospheric CO<sub>2</sub> ( $C$  in ppm). Standard deviations (1σ) of CO<sub>2</sub> concentration (in ppm) were calculated by Gaussian error propagation. Maximum potential transpiration ( $g_{wmax}$  in mol·m<sup>-2</sup>·s<sup>-1</sup>) can be calculated using Equation 4 (Wolfram Alpha, 2019; Franks et al., 2014) with additional measurements of stomatal pore length ( $l$ , in m), width ( $w$ , in m), and density of stomates ( $D$ , as number per m<sup>2</sup>), as well as physical constants (Cussler, 1997) of diffusivity of water vapor in air ( $d = 0.0000282$  m<sup>2</sup>·s<sup>-1</sup>) and molar volume of air ( $v = 0.0224$  m<sup>3</sup>·mol<sup>-1</sup>), and 0.6 area correction factor for *Ginkgo biloba* stomatal anatomy (Franks et al., 2014). Diffusivity and molar volumes of vapor and liquid are all at 25 °C and 1 atm. All measurements of *Ginkgo biloba* stomatal density, length, and width are included in the GSA supplemental material.<sup>1</sup>

$$I = 100 \times \frac{n_s}{n_s + n_e} \quad (1)$$

$$C = 239.7 + \frac{1}{2.75255 \times 10^{-7} \times I^{4.79}} \quad (2)$$

$$C = 239.7 + 3,633,000 \times I^{-4.79} \quad (3)$$

$$g_{wmax} = \frac{\frac{d}{v} \cdot D \cdot 0.6\pi \left(\frac{l}{2}\right)^2}{\frac{w}{2} + \left(\frac{\pi}{2}\right) \sqrt{\frac{0.6\pi \left(\frac{l}{2}\right)^2}{\pi}}} \quad (4)$$

Our data on plant stomatal response to a well-mixed atmosphere reflects global CO<sub>2</sub>, but our assessment of flooding response was limited to upper Mississippi River data derived from public databases (U.S. Army Corps of Engineers, 2019). This region was also chosen because of available data on climate change (National Oceanographic and Atmospheric Administration, 2019a) and land use (Clausen, 1979; Sohl et al., 2016; Andersen et al., 1996; U.S. Department of Agriculture Statistics Service, 2019).

## RESULTS

Our study is based on measurements of stomatal parameters of herbarium specimens of *Ginkgo biloba* extending back to 1754 (Fig. 2). *Ginkgo* stomatal proxies are similar to those established for *Quercus* and other plants (Royer et al., 2001; Lammertsma et al., 2011; Franks et al., 2014), and the *Ginkgo* stomatal record is among the best known (Barclay and Wing, 2016; Retallack and Conde, 2020). Measures of stomatal length and width can be used to calculate maximum pore area and volume (Franks et al., 2014) and infer water conductance from leaves using the physics of diffusion through pores (Cussler, 1997). Our records show a secular decline in stomatal index, or percent stomates versus epidermal cells (Equation 1), of *Ginkgo* with increasing atmospheric CO<sub>2</sub> as measured since 1955 on Mauna Loa (National Oceanographic and Atmospheric Organization, 2019b) with a base line provided by earlier data (Lüthi et al., 2008) from ice cores (Fig. 3A). The change in *Ginkgo* stomatal index over the past 265 years was due more to changes in stomatal density (Fig. 3B) than to stomatal size (Fig. 3C), and our high-precision data from *Ginkgo* are supported by less-accurate data from *Quercus* (Lammertsma et al., 2011). There is evidence from fossils that stomatal size also changes when atmospheric CO<sub>2</sub> is very high (Retallack, 2009; Franks and Beerling, 2009), but that threshold was not reached in our observations. Stomatal size also changes significantly with gene ploidy levels (McElwain and Steinthorsdottir, 2017), but such jumps were not seen in our data either.

The decline in transpiration for *Ginkgo* 1829–2015 has been dramatic (Fig. 4A): 0.98 mol s<sup>-1</sup> m<sup>-2</sup>. This is 73 L s<sup>-1</sup> m<sup>-2</sup> of water vapor, or 18 mL s<sup>-1</sup> m<sup>-2</sup> liquid water, and a reduction by 29%. This substantial decline is a maximal value realized for only a part of the day in favorable seasons and illumination, but if biorhythms of the plants remained comparable, as seems reasonable for regions such as

the American Midwest with relatively stable climate (Fig. 1B), a comparable decline in transpiration is likely. Our result also assumes that the stomatal response of *Ginkgo* is comparable with that of dominant Midwestern plants such as *Quercus*, because both show comparable slopes in stomatal CO<sub>2</sub> response over changing historic CO<sub>2</sub> concentrations (Royer et al., 2001). Furthermore, comparable data from *Quercus laurifolia* from a Florida swamp (Lammertsma et al., 2011) straddles our data (Figs. 3B–3C, 4A) but with greater variance due to smaller cell counts. *Quercus* is a dominant plant throughout much of the northern hemisphere (Manos et al., 1999). The central Mississippi River had estimated summer monthly evapotranspiration (Mu et al., 2013) of 90 mm by 2010. The transpiration decline 1829–2015 is 29%, for a decline since

1829 of 30 mm evapotranspiration, and as much added to runoff.

## RISING WATERS

Records of Mississippi River levels at Hannibal, Missouri (U.S. Army Corps of Engineers, 2019), go back to 1888, and since that time, mean annual river levels have risen in proportion to the decline in maximum transpiration of *Ginkgo* (Fig. 4B). Flood levels also increased over time, but their severity has been erratic (Fig. 1A). Other factors promoting flooding include reduced transpiration from replacement of trees with grasses (Alton et al., 2009; Morton et al., 2015), observed in pollen records (Sohl et al., 2016), and maintenance of hard surfaces such as roads and parking lots to service continuously developed acreages (U.S. Department

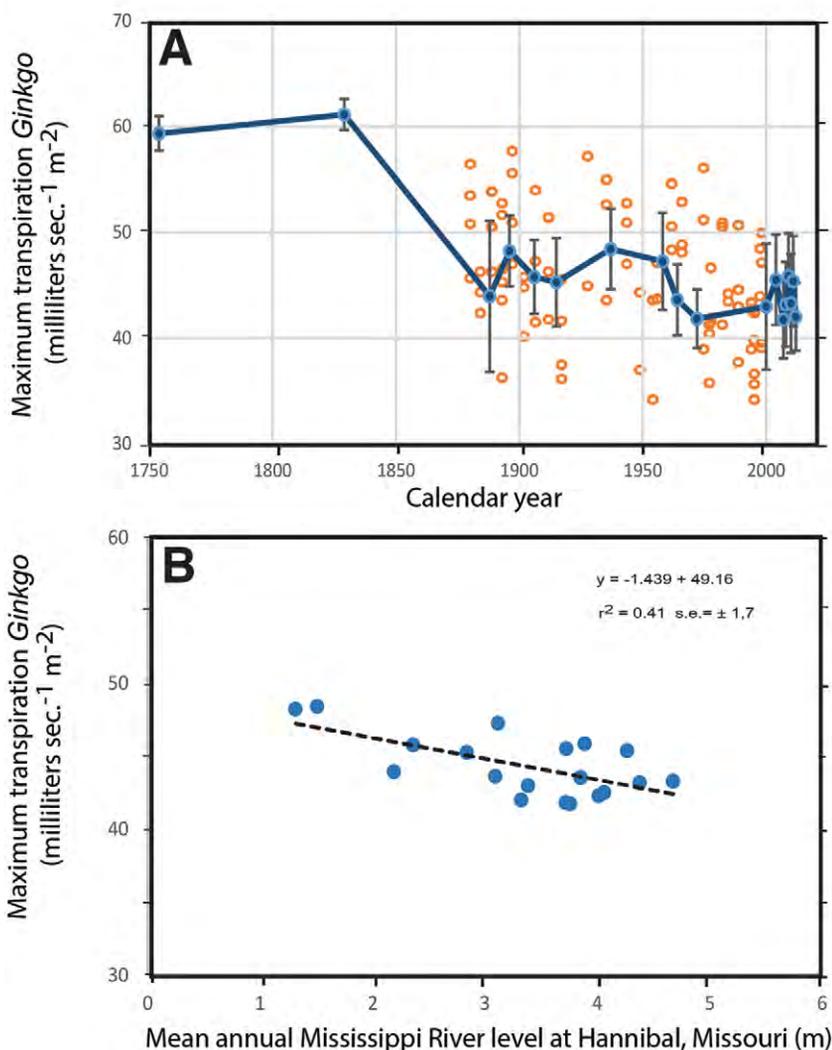


Figure 4. Changes in *Ginkgo* transpiration since 1754: (A) reduction in maximum stomatal transpiration (l·s<sup>-1</sup>·m<sup>-2</sup>) of *Ginkgo* (1σ error) calculated using Equation 4; (B) mean annual level of Mississippi River at Hannibal, Missouri, (m) as a function of maximum stomatal transpiration (l·s<sup>-1</sup>·m<sup>-2</sup>) of *Ginkgo*. Comparable data in panel (A) from *Quercus laurifolia* in Florida is from Lammertsma et al. (2011).

of Agriculture Statistics Service, 2019). In this regime of rising river and flood levels, planning for the 100-year or other flood recurrence levels is vain, and non-stationary flood prediction is needed (Vogel et al., 2011). At Hannibal, Missouri, annual average levels of the river can be expected to rise 2 cm per year for the foreseeable future (Fig. 1A), even if climate does not finally become significantly more humid, as expected with rise in atmospheric temperature (Retallack and Conde, 2020). Declining transpiration as a direct response to rising atmospheric CO<sub>2</sub> is an underappreciated factor in flood prediction (Betts et al., 2007).

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With deepest appreciation, the Museum acknowledges Kathryn W. Davis for her generous founding support of the Master of Arts in Teaching (MAT) Program. Leadership support for the MAT program is provided by The Shelby Cullom Davis Charitable Fund.

The MAT program is supported in part by the National Science Foundation under Grant Number DUE-1340006 and the U.S. Department of Education under Grant Number U3365140026.

[amnh.org/mat](http://amnh.org/mat)

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# FY2020 Annual Report



THE  
GEOLOGICAL  
SOCIETY  
OF AMERICA®

# Table of Contents

We are pleased to submit this report of GSA's fiscal year 2020 operations, including program activities, accomplishments, challenges, and innovations. Our mission is to provide the best service possible for you and your profession.

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Cover: Painted Desert, Arizona, USA. Photo by USGS on Unsplash.

In the American Southwest, transitions from one ecosystem to another can be dramatic and abrupt. This certainly is true in northern Arizona, USA, where the parched Painted Desert, shown here in a palette of purples, adjoins Sitgreaves National Forest (shades of green), a realm of pine woodlands with abundant wildlife. Within the Painted Desert lie the Hopi Buttes, a field of ancient volcanic cones, seen here as a scattering of dark, circular shapes near the top of the image.

### **Our Mission**

To advance geoscience research and discovery, service to society, stewardship of Earth, and the geosciences profession.

### **Our Vision**

To be the premier geological society supporting the global community in scientific discovery, communication, and application of geoscience knowledge.

# GSA Meeting the Challenges of a Changing World

*“The best-laid schemes of mice and men  
Go often askew...”*—Robert Burns

Just as we began to implement our exciting Decadal Strategic Plan, GSA found itself in the midst of the largest social changes in recent memory coupled to a global pandemic. Fortunately, our well-crafted strategic plan contains the necessary elements to address all of these challenges. The social changes that are upon us demand greater attention to how geoscientists do science and interact with and accept colleagues. GSA needs to try to be as diverse and inclusive as possible and clearly address any identified bias within our organization if we wish to remain viable, relevant, and robust.

## GSA CODE OF ETHICS STATEMENT AND ETHICAL COMPLAINTS

GSA expects our members to adhere to interactions that speak to collegiality, inclusiveness, and respect. Certainly concerns raised by the “Me Too Movement” apply to geosciences as well. To this end, GSA implemented a comprehensive Code of Ethics and Professional Conduct (<https://www.geosociety.org/gsa/membership/code-of-ethics/gsa/membership/code-of-ethics.aspx>) this past year. We developed a methodology for handling ethics complaints we receive regarding GSA member conduct. Should such conduct, whether inside or outside of our venues, have serious merit, an ad-hoc ethics panel (our ethics officer, our executive director, and past presidents) assesses the findings of fact and then brings them to Council for a decision. I urge all members to review our new ethics policies, which are online at <https://www.geosociety.org/ethics>.

## BLACK LIVES MATTER

Most recently, our nation has been painfully made aware of how serious institutional racism has persisted across America. Our Black students and colleagues literally face what has been described to me as “an existential decision” should they decide to pursue fieldwork in rural or even some suburban locations in America. To be honest, it took me a while to digest this information.

In June, GSA issued a statement (<https://www.geosociety.org/statement>) affirming our solidarity with our fellow Black, Indigenous, and People of Color (BIPOC) colleagues and their families in facing injustice. GSA supports the intents of the changes and initiatives we are seeing within the geoscience community, such as the *Notimeforsilence* petition, and we’re actively focusing on improvements within our own organization. GSA Council continues to prioritize diversity, equity, and inclusion (DEI) because it is the right thing to do and leads to better science.

As we do better, perhaps more young People of Color will entertain the geosciences as a career path. The geosciences historically have not been as attractive to People of Color as other STEM disciplines. I will be serving on a panel discussion about what geoscience societies may do to help this situation at our 2020 annual meeting. I refer you to the following link for details on what we are already doing and how you might be able to participate: <https://www.geosociety.org/documents/gsa/diversity/dei-action-202006.pdf>.

## COVID-19 AND THE FUNDAMENTAL CHANGE IN HOW GEOSCIENCE MAY BE DONE IN THE FUTURE

The fundamental core missions of our Society consist of promoting geoscience, hosting meetings to present science, and facilitating our members to network and forge scientific collaborations and publish outstanding scientific contributions. Only the last of these missions has been relatively unaffected by COVID-19. All our administrative meetings, from Council on down, have been done virtually since March. All the in-person GSA spring Section Meetings were cancelled except for our South-Central Section Meeting, held in Fort Worth, Texas, USA. We did pivot the Duluth, Minnesota, USA, North-Central Section Meeting (NCGSA) from in-person to a successful virtual meeting. Our 2020 annual meeting will also be online.

GSA is not alone. The annual European Geosciences Union (EGU) met virtually instead of in Vienna, Austria, but even so,



thousands of papers were presented. I attended both EGU and NCGSA and gave an address at the latter. I found the science as good if not better than when I attended in real time. Why? Because speakers received far more questions than before, and more dialog ensued. I missed the in-person meetings to be sure, social and collaborative. Yet, I think opportunities will evolve from this pandemic, and GSA is moving to take advantage of them. Staff have been conducting webinars on subjects as wide ranging as geoscience careers and virtual field methods, and we anticipate our annual meeting, GSA 2020 Connects Online (<https://community.geosociety.org/gsa2020/home>), will be terrific if members give the virtual medium a chance. Do come! Present. Learning the online platform will not be onerous—even I can learn it. I am convinced more of our conferences or at least parts of our conferences will be presented online after COVID-19 becomes part of history. Too many geoscientists will have come to accept virtual as the norm, much as universities and colleges will have to have more online courses normatively.

## MEMBERSHIP

As GSA president, I’ve wanted to bring more applications-based science into GSA to both enrich the intellectual life of the Society and to attract members. To this end, I challenged GSA’s members and its Divisions at my Presidential Address (GSA 2019 Annual Meeting in Phoenix, Arizona, USA) to become leaders in new initiatives to address how humanity can adapt to large-scale environmental changes caused by future climate disruption. GSA’s Geology and Society Division has accepted this challenge, and I look forward to seeing what they will be doing to this end at our future meetings. I did identify cultural differences between application and discovery science that may be more of an impediment than intellectual differences in attracting

# Letter from the Executive Director

To all GSA members and GSA staff,

Even though the Society has weathered pandemics and wars and social strife in its long past, we who are here presently are experiencing most of these challenges for the first time. I want to applaud GSA staff for their professionalism and grit in stepping up to keep our operations going expertly and smoothly. I also want to recognize GSA leadership for their crucial support and advice as we weather the challenges of COVID-19.

The fiscal year started out in July 2019 with our directions firmly in place. GSA Council had approved the broad Decadal Strategic Plan (<https://www.geosociety.org/documents/gsa/about/2019-strategic-plan.pdf>), and we at headquarters were deep into developing the detailed implementation activities. This work included prioritizing objectives and goals and identifying and redirecting resources. Throughout this annual report, you will see examples of initial implementation of strategic plan actions especially in the meetings and events; diversity, equity, and inclusion actions; membership benefits and retention; and geoscience policy. These were some of the areas where we have already made advances, but it doesn't stop there of course.

In line with strategic actions, GSA Council approved the recommendations of the Ad Hoc Campus Vision Committee that it was time to relocate the GSA operations headquarters. This includes selling the existing GSA headquarters campus located in Boulder, Colorado, USA. The almost 50-year-old building and surrounding grounds require major renovations to be useful for occupation and to comply with the city of Boulder's exacting energy and sustainable building standards. It simply would not be in the best interests of GSA to invest funds that would take decades to recoup if at all. The plan is to sell the property and lease a more efficient office space somewhere in the Denver-Boulder corridor, using the dividends from the endowed sale funds to cover expenses. As with most businesses in the world right now, GSA staff are working almost entirely remotely, and we are finding that space needs assumptions we made in January are already out of date. It will not be easy for many of us who have

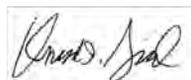
worked or volunteered for GSA to leave such an iconic space, but we understand the fiduciary reasons for such a decision. We have begun the process of assessing the values of the many GSA belongings and reducing our warehoused materials.

As GSA President Don Siegel notes in his report, much of the second half of this fiscal year has been consumed by responding to the global crisis. Being in response mode brings on anxiety and frustration, whether you are trying to keep your career afloat or trying to maintain your family life. GSA has stepped up to offer as much assistance to our members and the geoscience community as we can during these stressful times. We have conducted a special student assistance grant program (GSA COVID-19 Assistance and Relief Effort for Students [GSA CARES]), extended the term for early career professional membership, made our many educational and career resources open to all, reached out to our Associated Societies to offer webinars and information sharing, and, in general, worked to be a resource for the geosciences. We will continue to do so of course.

Our focus now is to define the "new normal" for GSA and the geosciences and to fit our long-term plans to it. Along the way, we will continue to serve you, our members, and the geoscience community. You can help with that by volunteering to serve as GSA leaders, nominating deserving colleagues for awards and medals, encouraging your students and early career colleagues to join and participate, and certainly using GSA's publications and meetings to share your science.

members from industry. But GSA has technical expertise across applications science through at least the Hydrogeology, Environmental and Engineering, and Geology and Society Divisions, so there remains untapped opportunity. I hope to initiate more conversations about possibilities to expand our membership beyond curiosity-driven science when I serve as past president this coming year.

It is clear that the new generation of young geoscientists wants to be engaged in decision-making processes earlier than my generation had expected and has different societal needs and expectations of what membership means than mine (albeit perhaps not as expressed in consensus fashion yet). GSA needs to respond to changes in expectations and the social cultures of our membership, while respecting those of the past if we want to remain relevant. I have every expectation we will do so.



**Donald I. Siegel**  
GSA President



**Vicki S. McConnell**  
GSA Executive  
Director

## GSA 2021 MEMBERSHIP

Renew by 1 November —  
Save 15%\* off dues

<https://www.geosociety.org/members>

\* applies to those in high-income countries/territories

## SPONSORS

# Broadening Corporate and Organizational Relationships

GSA and the GSA Foundation collaborate in a range of sponsorships supporting the annual meeting and more: field camp excellence recognition, geoscience students' field camp attendance, diversity programs, and a number of in-kind services and member benefits, which are all made possible thanks to partners and sponsors. We are pleased to include companies in a more integrated way: technical sessions, short courses, and field camps are searchable by four different industry tracks, and applied geoscience sessions are integrated into the annual meeting. Additionally, representatives from our corporate partners have served on proposal teams, strategic planning task forces,

and our careers program committee, and even attended a Foundation field trip along with individual donors.

The combined efforts of business and science can make a greater difference than any organization alone. As GSA continues to convey its relevance to the private sector, we look forward to expanding corporate relationships in a variety of industries. Together, we can foster the growth of current and future leaders in the geoscience community, engaging business and industry as a positive force to advance science, stewardship, and service.

We thank the companies and organizations that join us in the meaningful impacts of partnership. Asterisks indicate in-kind donations.

## Thank You FY2020 Sponsors

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# Focusing on Ethics, Diversity, and Inclusion

Ethics, diversity, and inclusion are fundamental to GSA's vision. As a premier geological society, GSA plays a vital role—and has a responsibility—to build a more diverse, respectful, and inclusive space for all geoscientists to thrive. That is why we continue to focus on new ways to promote high ethical standards and implement strategies to increase diversity and engagement in the geosciences that we believe will lead to stronger and more innovative science.

## SELECTED ACCOMPLISHMENTS

Over the past year, we have taken several steps to advance ethics, diversity, and inclusion:

- **Code of Ethics & Professional Conduct.** GSA launched this new enforceable ethics policy to set a positive example for the geosciences profession and hold GSA members accountable for adhering to high ethical standards in all of their professional activities. An ethics committee ensures that all complaints are processed in a fair, consistent manner. As the final arbiter of all ethics cases, GSA Council has the authority to discipline or terminate GSA members who violate the Code of Ethics.
- **Respectful, Inclusive Scientific Events (RISE).** GSA established RISE in 2016 as a way to reinforce the Society's Events Code of Conduct. During the last fiscal year, we made several improvements, including policy changes to guard against excessive drinking, eliminating alcohol service during poster presentations, rolling out a new training program for RISE liaisons, and strengthening the procedures used to ensure that conduct concerns are handled appropriately.
- **Culture Task Force.** GSA invited members to participate in a culture task force charged with identifying practical steps to promote a safe, respectful, and inclusive culture at our meetings. We plan to implement several recommendations in connection with GSA 2020 Connects Online, including proactively inviting presenters with disabilities to request reasonable accommodations, sending a letter to all exhibitors to remind them to comply with GSA's Events Code of Conduct, offering training to session chairs on their roles in promoting safe and respectful sessions, and stepping up our communications of diversity commitments and actions. In August 2020, the culture task force submitted a full report with recommendations to GSA's president. The task force is led by the past chair of the Diversity in the Geosciences Committee and includes 13 members, with 61% from BIPOC (Black, Indigenous, and People of Color) groups.
- **Grants to Support Ethics, Diversity, and Inclusion.** GSA was awarded a three-year grant from the National Science Foundation (NSF) to increase the diversity of students who apply for and receive research grants. To achieve this goal, GSA is altering its recruiting, application, and evaluation procedures. GSA also partnered with universities and our Associated Societies to pursue NSF funding to advance and accelerate cultural change in the geosciences in order to broaden participation.
- **Investing in Diversity-Focused Scientific Conferences.** GSA is invested at diversity-focused conferences and partners with other earth-science organizations to promote opportunities and careers in the geosciences. This year, we advertised,

exhibited, and/or presented sessions at the National Association of Black Geoscientists (NABG), Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), and American Indian and Science and Engineering Society (AISES) national conferences.

## CHALLENGES AND FUTURE OUTLOOK

We recognize that more work needs to be done to address the systemic barriers that prevent the full participation of everyone in our field. We are taking progressive actions and reviewing our activities (<https://www.geosociety.org/documents/gsa/diversity/dei-action-202006.pdf>) in order to make improvements within our own organization and develop an actionable path forward. On 1 June, GSA issued a statement affirming our solidarity with our fellow BIPOC colleagues and their families in facing injustice. A follow-up statement was issued by GSA's president and president-elect on 25 June that communicated the support for the recommendations, petitions, and letters offering changes and initiatives for the geoscience community. GSA leadership began this work by holding an Executive Committee retreat in August 2020 to develop action plans. Both statements are online at <https://www.geosociety.org/GSA/About/Diversity/GSA/About/Diversity.aspx>.

We will keep you informed about the outcome of this retreat and our ongoing efforts to ensure that GSA is positively supporting the ideals of ethics, diversity, and inclusion that will ultimately drive our science forward. We encourage all members to continue to challenge us to make a real difference.



## Diversity Makes Our Science Better and RISE Marks

GSA developed the Diversity Makes Our Science Better mark at the request of the Diversity Committee and the ad hoc Culture Task Force as a way for individual members to show support for the ideals embodied in the GSA position statements on diversity. The RISE mark was updated to adhere to GSA's brand standards. Please read the usage guidelines for GSA RISE & Diversity marks at <https://www.geosociety.org/documents/gsa/about/ethics/rise-usage-guidelines.pdf>.

# Student Advisory Council Annual Report (Sept. 2019–July 2020)

GSA is dedicated to remaining relevant and responsive to its large student membership and to providing leadership opportunities that will ensure future career success. GSA’s Student Advisory Council (SAC) is composed of student representatives serving on behalf of Divisions, Sections, and most GSA Committees. SAC gives voice to student issues and concerns in a consequential way and is empowered with a direct line of communication with GSA Council.

FY20 chair, Alexandra Nagurney (Virginia Tech), reports that SAC has been busy working on a number of different initiatives over the past year. “After our annual business meeting in at the 2019 Annual Meeting in Phoenix, SAC members discussed how we can better communicate with the GSA student population. As a result, we created a Twitter account (@GSA\_SAC) that has allowed us to communicate with the broader GSA student community. While our plans to have more of a presence at Section Meetings were unfortunately derailed due to

### Member Benefits Include:

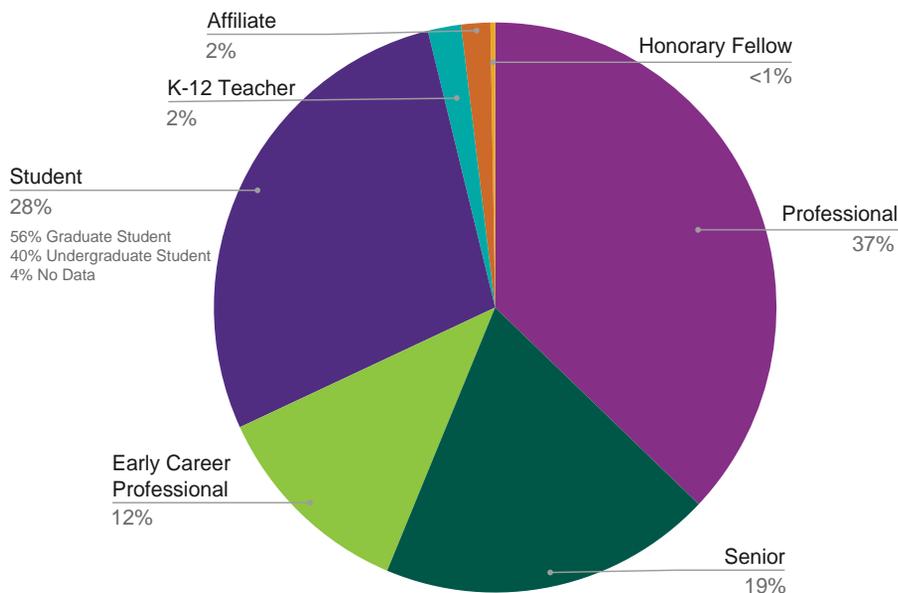
- Student and early career professional members qualify for reduced membership fees and reduced Division dues.

COVID-19, SAC is hard at work making informational material to help GSA students prepare virtual presentations for GSA 2020 Connects Online. This summer and fall, SAC and the On To the Future students have cosponsored virtual community hours each month to discuss how geosciences and GSA can become more inclusive and diverse. This fall, SAC is helping present a GeoCareers webinar on ‘Demystifying the Graduate School Application Process’ and continuing to work to support GSA students.”

Students interested in serving on the SAC should contact their Division or Section and express an interest in being selected as a student representative. A simple email to the chair, secretary, or other officer will suffice. To apply as a student representative on a GSA Committee, complete the nomination form at <https://www.geosociety.org/gsa/about/leadership/gsa/about/sac.aspx>.

## Membership Demographics

Membership as of 31 December 2019 = 20,590



### Did You Know?

- Individuals in non-high income countries/territories qualify for reduced membership dues.
- The GSA/GSA Foundation Membership Assistance Program and Fund enables those who cannot afford the cost of membership—or who experience difficulty in transferring funds from their country to the USA— to become members.

## Thanks to These Outgoing Officers and Councilors

All GSA Officers and Councilors are highlighted in the July GSA Today.



Marjorie A. Chan



Mark Little



F. Edwin (Ed) Harvey



Robbie Gries



Allie Nagurney

# 2019 GSA Medal & Award Recipients



Tanya M. Atwater



Ira Flatow



John W. Valley



Jessica Creveling



Craig Schiffries



Asmeret Asefaw  
Berhe



Kimberly V. Lau



E. Wesley Hildreth  
Judy Fierstein



Nancy Riggs



Christian Koeberl



Reynaldo Charrier  
Gonzalez



Doerthe Tetzlaff

## Penrose Medal

Tanya M. Atwater, University of California, Santa Barbara

## President's Medal of the Geological Society of America

Ira Flatow, State University of New York at Buffalo; "Science Friday"

## Arthur L. Day Medal

John W. Valley, University of Wisconsin–Madison

## Young Scientist Award (Donath Medal)

Jessica Creveling, Oregon State University

## GSA Public Service Award

Craig Schiffries, Carnegie Institution for Science

## Randolph W. "Bill" and Cecile T. Bromery Award for Minorities

Asmeret Asefaw Berhe, University of California, Merced

## Doris M. Curtis Outstanding Woman in Science Award

Kimberly V. Lau, University of California, Riverside

## GSA Florence Bascom Geologic Mapping Award

E. Wesley Hildreth, U.S. Geological Survey

Judy Fierstein, U.S. Geological Survey

## GSA Distinguished Service Award

Nancy Riggs, Northern Arizona University

Christian Koeberl, University of Vienna

## Honorary Fellows:

Reynaldo Charrier Gonzalez, Universidad de Chile

Doerthe Tetzlaff, Leibniz Institute of Freshwater Ecology

# An Opportunity to Connect and Collaborate



*“GSA membership means that I am contributing to a collective body of knowledge that is constantly growing.”*

GSA offers a variety of meetings to geoscientists—from small research forums, to moderate specialty conferences, to a large annual meeting. These forums, conferences, and meetings are held around the globe throughout the year. GSA provides a platform for scientists to share their latest research, build upon current knowledge, and network with peers. GSA strives to keep meetings cost-effective yet provide the latest technology platforms for scientific exchange.

## GSA ANNUAL MEETING

In fiscal year 2020 (FY20), GSA hosted our Annual Meeting in Phoenix, Arizona, USA, in September 2019 and had more than 5,500 attendees from 56 countries attending, while presenting more than 3,700 abstracts over several days. Twenty-three field trips ran and 20 short courses were held. More than 200 companies, organizations, and universities exhibited during the meeting.

In addition, GSA hired a consulting company called Minding Your Business to evaluate GSA meetings, particularly the annual meeting, to provide feedback on best practices to elevate the meetings. The consultants were very generous in mentioning what GSA already does well, and they reported back to us that the meeting attendees enjoy the networking opportunities GSA provides. The final consultant’s

report has been shared with staff members, GSA’s Executive Committee, as well as the Annual Program Committee. The report is being taken seriously, and staff is currently working to implement their recommendations. An overview of the recommendations includes:

1. Take steps to elevate and differentiate content;
2. Amplify networking opportunities;
3. Personalize the experience;
4. Turn the Exhibit Hall into a Resource & Innovation Center;
5. Continue to strengthen diversity and inclusion initiatives and increase awareness;
6. Enhance technology to further engage and connect with attendees;
7. Extend the value 365 days;
8. Beta test the annual meeting location rotation; and
9. Fine-tune the marketing.

Hundreds of volunteers participate yearly in the GSA Annual Meeting—from local organizing committee members and the Joint Technical Program Committee, to the hundreds of session conveners from every geoscience discipline and the hundreds of student volunteers from campuses across the Americas and farther abroad. There is something for everyone at the GSA Annual Meeting.

### Member Benefits Include:

- Members enjoy reduced meeting registration rates.
- Special opportunities for student members—mentor luncheons, volunteer opportunities to offset the cost of attending GSA meetings.

## GSA SECTION MEETINGS

GSA Section Meetings are unique venues for interdisciplinary science and are an important hub for discussing and presenting current research. They provide an excellent opportunity for both professionals and students to attend and participate in technical sessions, field trips, and short courses close to home.

In 2020, GSA was able to successfully run the South-Central Section Meeting in-person in Fort Worth, Texas, USA, on 9–10 March 2020, with over 300 attendees. Then the world changed with COVID-19 and the remaining four sectional meetings had to cancel their in-person meetings. GSA was able, with the help of the local planning committee for the North-Central Section Meeting, to host its first-ever virtual meeting, which consisted of two half-days, running six concurrent sessions each day, with a combination of oral and poster presentations. The presidential address and afternoon mentoring sessions and career workshops also took place. The North-Central Section virtual meeting had close to 900 attendees during those two days. A Resolution of Thanks was passed by the Executive Committee and Officers of the Geological Society of America to recognize and congratulate the North-Central Section of GSA for hosting the first virtual Section Meeting on 18–19 May 2020. They made GSA history!

## GSA PENROSE CONFERENCES AND THOMPSON FIELD FORUMS

GSA Penrose Conferences and Thompson Field Forums are GSA’s premiere small-group meeting and field-trip venues for collaborative research around the world. In FY20, one Thompson Field Forum took place: Age and Carving of Grand Canyon: Toward a Resolution of 150 Years of Debate, on 14–21 September 2019, in Grand Canyon, Arizona, USA.

# Geographic Sections

GSA's six geographic Sections have their own governance boards and organize scientific meetings in their regions of North America. These smaller meetings attract many geoscience students and provide outstanding learning and networking opportunities closer to home. Sections offer travel grants not only to their own meetings but to the GSA Annual Meeting as well. Many Sections offer research grants.

## CORDILLERAN SECTION

The Cordilleran Section is the oldest of GSA's sections. It was formally approved on 26 August 1901, when the Society itself was only 13 years old. The first organizational meeting of the Section, held in Berkeley, California, USA, in 1899, included the presentation of 11 scientific papers.

*In the United States:* The states of Alaska, California, Hawaii, Nevada, Oregon, Washington, and that part of Arizona south of 35 degrees North Latitude.

*In Canada:* The Province of British Columbia, the Yukon Territory, the Northwest Territories, and the Nunavut Territory.

*In Mexico:* The Distrito Federal and the states of Aguascalientes, Baja California, Baja California Sur, Chiapas, Colima, Durango, Guanajuato, Guerrero, Hidalgo, Jalisco, México State, Michoacán, Morelos, Nayarit, Oaxaca, Puebla, Querétaro, San Luis Potosí, Sinaloa, Sonora, Tlaxcala, and Zacatecas.

## NORTH-CENTRAL SECTION

In 1966, the North-Central Section was established by GSA Council to expand section coverage for all of the United States and Canada.

*In the United States:* The states of Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin.

*In Canada:* The Province of Manitoba, and the western portion of the Province of Ontario (west of the 89th meridian).

## NORTHEASTERN SECTION

The Northeastern Section was founded by GSA Council in April 1965.

*In the United States:* The District of Columbia and the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

*In Canada:* The provinces of New Brunswick, Newfoundland and Labrador, Nova Scotia, Prince Edward Island, Quebec, and that part of Ontario east of the 89th meridian.

## ROCKY MOUNTAIN SECTION

The Rocky Mountain Section has been a thriving part of GSA since 1948.

*In the United States:* The states of Colorado, Idaho, Montana, New Mexico, North Dakota, South Dakota, Utah,

### Membership Benefits Include:

- One complimentary Section affiliation is included with membership. Choose others when you renew to expand your geographic interests.

Wyoming, and that part of Arizona north of 35 degrees North Latitude.

*In Canada:* The provinces of Alberta and Saskatchewan.

## SOUTH-CENTRAL SECTION

The South-Central Section was established by GSA Council in 1966.

*In the United States:* The states of Arkansas, Kansas, Louisiana, Oklahoma, and Texas.

*In Mexico:* The states of Coahuila, Nuevo León, Tabasco, Tamaulipas, and Veracruz.

## SOUTHEASTERN SECTION

The Southeastern Section was established in December 1947, but did not hold its first annual meeting until 1952.

*In the United States:* The states of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia, and the Commonwealth of Puerto Rico.

*In Mexico:* The states of Campeche, Quintana Roo, and Yucatán.



## GSA International

GSA is active within the international geoscience community in the belief that science knows no borders. The GSA worldwide member community spans 118 countries outside of North America; most reside in the United Kingdom, Australia, Japan, Germany, and China. The purpose of GSA International is to promote, create, and enhance opportunities for international cooperation, provide a forum for science and policy discussions that are international in scope and relevance, build collaborative relationships with GSA scientific Divisions and Associated Societies on international issues, and strengthen cooperation with international geoscientific societies. GSA International encourages and hosts international

geoscience and environmental-related discussion topics through the online GSA Member Community platform and promotes meetings, exchanges of visiting scholars/lecturers, organizes annual meeting topical sessions, and helps organize and promote field workshops. GSA International evaluates and recommends international awardees for the GSA Honorary Fellow, the International Distinguished Career Award, the James B. Thompson Jr. Distinguished International Lectureship (which is on hold during the COVID-19 pandemic), and the Farouk El-Baz Student Research Grant. It also recommends travel grant awards for international students and early career professionals to attend the GSA Annual Meeting.

# Scientific Divisions

GSA has 22 scientific Divisions to help you stay connected with your colleagues worldwide and receive specific information related to your area of interest. Divisions provide opportunities for leadership and service, offer awards and support for students, and help develop the GSA Annual Meeting technical program. Join one or more when you renew for 2021.

**Continental Scientific Drilling** (established in 2017) focuses on continental scientific drilling and coring research tools used in many GSA scientific Divisions and fields.

**Energy Geology** (established in 1954) encourages energy research and interchange of scientific information about energy resources and related issues within the wide range of their geologic significance, and to act as an organized group in promoting these objectives within the GSA framework.

**Environmental and Engineering Geology** (established in 1947) seeks to advance the ability of geologists to identify, characterize, and mitigate adverse geological and environmental conditions and hazards affecting human safety and the built environment.

**Geoarchaeology** (established in 1977) provides a forum for the presentation and discussion of papers on archaeological geology in order to stimulate and promote research and teaching within this field.

**Geobiology and Geomicrobiology** (established in 2001) promotes interdisciplinary research focusing on the interplay between the biosphere, lithosphere, hydrosphere, and atmosphere.

**Geochronology** (established in 2018) aims to represent geochronologists of all types, as well as the many geoscientists who use geochronological data.

**Geoinformatics & Data Science** (established in 2006) advances “Data to Knowledge,” providing GSA members with an opportunity to participate in the emerging field of cyberinfrastructure.

**Geology and Health** (established in 2005) focuses on the intersection of natural or anthropogenic geological conditions with health, disease, pathology, and death in modern and fossil humans, animals, and plants.

**Geology and Society** (established in 2003) advances the concept of “geology working for society” by providing GSA members with opportunities to bring together multiple fields of geoscience to address important societal issues.

**Geophysics and Geodynamics** (established in 1971) facilitates the presentation and discussion of the ideas of scientists interested in geophysics and geodynamics, fosters communication among geophysicists and other earth scientists, and promotes research and publication.

**Geoscience Education** (established in 1991) fosters the active participation of GSA members in all aspects of earth-science education.

**History and Philosophy of Geology** (established in 1976) works to encourage the study and communication of the philosophy and history of geology.

**Hydrogeology** (established in 1959) focuses on the geologic aspects of hydrogeology, the role of geology in the hydrologic cycle, and the importance of hydrogeology to society and science.

**Karst** (established in 2014) studies karst terranes, which necessarily involves a wide variety of subjects and specialties, spanning almost every Division in GSA and scientific disciplines outside of GSA’s purview.

**Limnogeology** (established in 2002) encourages research on both ancient and modern lakes around the world, the collaboration of scientists from all disciplines on lake research, and the fostering of student research and careers in lake studies.

**Marine and Coastal Geoscience** (est. 2019) promotes the profile of marine and coastal research and will focus energy, generate

## Membership Benefits Include:

- Join one or more scientific Divisions when you renew your membership.
- Students members get one Division free.

excitement, and work actively to promote this vibrant and highly relevant field.

**Mineralogy, Geochemistry, Petrology, and Volcanology** (established in 2009) promotes awareness, teaching, and research in these fields, and stimulates discussion about the knowledge, ideas, research results, and problems regarding these fundamental areas of the earth sciences.

**Planetary Geology** (established in 1981) fosters interactions among planetary scientists, facilitates the presentation and discussion of their research and ideas, stimulates communication with other earth scientists, and promotes planetary geology to a broad audience.

**Quaternary Geology and Geomorphology** (established in 1955) facilitates communication among scientists in these fields and the presentation of their research and ideas to the wider scientific community.

**Sedimentary Geology** (established in 1985) works to ensure the presentation of sedimentary-related topics and sessions at GSA meetings and actively nurtures the work of students.

**Soils and Soil Processes** (established in 2017) works on issues with particular solutions that include land stewardship, water quality and quantity, carbon cycling and paleoclimate reconstruction.

**Structural Geology and Tectonics** (established in 1980) focuses on the geometry and mechanisms of natural and experimental deformation at all scales and works to promote the research of scientists in these fields and to facilitate communication and discussion at all levels of the earth sciences.

Renew Your GSA 2021 Membership at <https://www.geosociety.org/members>

# 2019 GSA Scientific Division Primary Awards



C. Blaine Cecil



D.M. Staley



J.A. Negri



J.W. Kean



J.L. Laber



A.C. Tillery



A.M. Youberg



Kathleen Nicoll



J. Douglas Walker



Emily Brodsky



Sarah L. Sheffield



Naomi Oreskes



Bridget Scanlon



Thomas Johnson



Suzanne  
Mahlburg Kay



Alfred McEwen



Kristen L. Cook



Marjorie Chan



Gautam Mitra



Paul J. Fox

## Gilbert H. Cady Award

*Energy Geology Division*

C. Blaine Cecil, U.S. Geological Survey

## E.B. Burwell, Jr., Award

*Engineering and Environmental Geology Division*

Staley, D.M., Negri, J.A., Kean, J.W., Laber, J.L., Tillery, A.C., and Youberg, A.M., 2017, Prediction of spatially explicit rainfall intensity-duration thresholds for post-fire debris-flow generation in the western United States: *Geomorphology*, v. 278, p. 149–162, <https://doi.org/10.1016/j.geomorph.2016.10.019>.

## Rip Rapp Archaeological Geology Award

*Geoarchaeology Division*

Kathleen Nicoll, University of Utah

## Outstanding Contributions Award

*Geoinformatics Division*

J. Douglas Walker, University of Kansas

## George P. Woollard Award

*Geophysics and Geodynamics Division*

Emily Brodsky, University of California, Santa Cruz

## Biggs Award for Excellence in Earth Science Teaching

*Geoscience Education Division*

Sarah L. Sheffield, University of South Florida

## Mary C. Rabbitt History of Geology Award

*History and Philosophy of Geology Division*

Naomi Oreskes, Harvard University

Photo credit: Kayana Szymczak

## O.E. Meinzer Award

*Hydrogeology Division*

Bridget Scanlon, The University of Texas at Austin

## Israel C. Russell Award

*Limnogeology Division*

Thomas Johnson, University of Massachusetts Amherst

## Distinguished Geologic Career Award

*Mineralogy, Geochemistry, Petrology, and Volcanology Division*

Suzanne Mahlburg Kay, Cornell University

## G.K. Gilbert Award

*Planetary Geology Division*

Alfred McEwen, University of Arizona

## Kirk Bryan Award for Research Excellence

*Quaternary Geology and Geomorphology Division*

Kristen L. Cook, Jens M. Turowski, and Niels Hovius, 2014, River gorge eradication by downstream sweep erosion: *Nature Geoscience*, v. 7, p. 682–686, <https://www.doi.org/10.1038/NGEO2224>.

## Laurence L. Sloss Award

*Sedimentary Geology Division*

Marjorie Chan, University of Utah

## Career Contribution Award

*Structural Geology and Tectonics Division*

Gautam Mitra, University of Rochester

## GSA Distinguished Career Award

*International*

Paul J. Fox, Texas A&M University

# Communicating the Value of Geoscience

## PRESS RELEASES

Supporting its strategic aspiration to link geoscience to society, GSA engages in media relations activities to enlarge the footprint of member research and publications. GSA issued 44 press releases in FY20, highlighting peer-reviewed research published in the Society’s top-rated, peer-reviewed geoscience journals and books, as well as new findings presented at GSA meetings and Society news. These are distributed to an extensive list of science journalists and posted on the American Association for the Advancement of Science (AAAS) online science news service, EurekAlert! and the European media resource site, AlphaGalileo. In addition, GSA encourages and assists public information officers at universities and government agencies to write their own releases about their GSA-published research or presenting authors and then augments distribution of those releases for wider reach. GSA invites journalists to attend annual and Section Meetings with complimentary registration, and hosts a newsroom at the annual meeting.

As a result of these efforts, our science gets considerable press coverage, ranging from top-tier outlets like *Science*, *Nature*, *National Geographic*, *Forbes*, *The Economist*, *LiveScience*, *CNN*, *Newsweek*, and others, to more niche audiences in trade publications, blogs, and syndicated websites. Go to [www.geosociety.org](http://www.geosociety.org), click on the “News” tab, and select “GSA in the News” to read some of the latest coverage.

## SCIENCE COMMUNICATION FELLOWSHIP

GSA’s Science Communication Fellowship is an opportunity for a science writer, journalist, or scientist with a passion for communicating to spend 10 months gaining experience and professional contacts, working in concert with GSA communications and member leaders. The goal of the Fellowship is to help improve communication of geoscience knowledge between the members of GSA and the non-scientific community by translating technical research from GSA journals and annual meeting presentations into relatable stories for non-technical audiences. The Fellow also helps staff the onsite

newsroom, assisting members of the media covering the meeting and mentoring student communication interns.



Terri Cook served as GSA’s 2019–2020 Science Communication Fellow. Accomplishments from her term included crafting a press release (<https://www.geosociety.org/GSA/News/pr/2019/19-38.aspx>) about an annual meeting presentation on research in Machu Picchu, which garnered coverage by more than 100 scientific and mass media outlets in over 30 countries, and was translated into 15 languages; and scripting pilot text-over-videos to accompany traditional press releases on social media (see <https://youtu.be/9Z11RrehmdA> and <https://youtu.be/oKztjX9HNJQ>).

## SCIENCE COMMUNICATION INTERNSHIP

Each year, GSA accepts a few geoscience students who are interested in science communication as a possible alternative career path to collaborate with the Science Communication Fellow during the annual meeting. Selected students work under the tutelage of the GSA communications staff and the Fellow with the goal of building their confidence and skills for conveying scientific subject matter in compelling ways.



The 2019 interns with FY20 GSA President Don Siegel and GSA staff.

## GSA ON SOCIAL MEDIA

GSA is a leader among our Society peers in reaching wide audiences with information about our events, publications, membership, programs, and activities through social media.

  Follow GSA @geosociety on **Twitter** (41,000+ followers) and **Instagram**. Use hashtag #GSA2020 to keep up with the latest from GSA 2020 Connects Online.

 **Facebook**—Join 280,000+ GSA fans worldwide at [www.facebook.com/GSA.1888](http://www.facebook.com/GSA.1888).

 **YouTube**—Learn more about GSA and careers in the geosciences at [www.youtube.com/user/geosociety](http://www.youtube.com/user/geosociety).

 **LinkedIn**—Network and stay connected to your professional peers at <http://linkd.in/1HsYwni>.

*“GSA means being part of a greater team and community which values the important science of geoscientists across the world.”*



## GSA MEMBER COMMUNITY, POWERED BY YOU!

GSA's vibrant member community platform is a simple, dynamic way to communicate within your professional network. It allows GSA members to easily connect, learn, and share with fellow members online, and it empowers groups to work together more effectively.

### Features:

- Centralized discussion groups with enhanced email capabilities—members receive email notifications from discussion forums that are more structured and easier to read than listservs and allow participants to reply directly from email.
- Member directory—Within the member community platform, GSA member search is comprehensive and interactive.
- Resource libraries help archive shared documents and collaborative work products.

*Did you know?* GSA Division websites also include these community features so Division members can interact with and one another. Members are automatically placed in their group's online community when they join a Division.

- Division-scale member directories with powerful search capabilities.
- Division-wide discussion forums.
- Division libraries (document sharing and archives).

**Getting started is easy.** Your member community awaits you. GSA members can simply navigate to <https://community.geosociety.org> and click on the "Login" button in the upper right-hand corner of the page to get started.

*"GSA membership provides community and access to shared knowledge and research that is meaningful, impactful, and appropriate for our current challenges in the world."*

**Interact with your peers today** and get involved!

- Update your profile and add a picture.
- Find and connect with other GSA members.
- Post questions and comments to the open forum discussion.
- Join a discussion of interest.
- Post your presentations, pictures, documents, videos, or other content you feel will help other participants in the geoscience community.

## WEBSITE

Even more than usual in this past year, our website and other online platforms were critical in providing members with the resources and connections needed to do their best science and succeed in their careers. We continue to focus on projects that bring value to our online users.

Among such projects, we began implementing a design update, section-by-section, across our main site. We started with an overhaul of our membership pages and EarthCache program, and we continue to improve content areas at every opportunity.

In addition, an internal collaboration produced GSA's new webinar library (<https://www.geosociety.org/webinars>), a dynamic, visually appealing, searchable directory of the webinars GSA teams and partners work hard to create. This growing library also features a new strategy to offer web content tailored to users based on their membership type and status, which allows us to provide an enhanced, custom experience.

As always, GSA is maintaining a robust and evolving online presence. Visit us at <https://www.geosociety.org>.

### Top website page views in FY2020

1. Geologic Time Scale (144k)
2. Home page (126k)
3. Job Board (97k)
4. Geoscientists-in-the-Parks home page (59k)
5. 2020 Joint Southeastern and Northeastern Section Meeting (26k)

### SPEAKING OF GEOSCIENCE™

"Speaking of Geoscience" is GSA's guest blog. It is a platform for giving voice to GSA members and friends in support of the Society's global mission. In FY20, GSA posted 21 blogs on this venue for sharing ideas and information, asking questions, and dissecting issues across a broad range of earth-science topics. If you would like to contribute as a guest blogger, please contact [communications@geosociety.org](mailto:communications@geosociety.org). Please note that information and opinions presented by "Speaking of Geoscience" guest bloggers do not necessarily represent official positions of GSA. Self-promotional content that includes links to other products and services will not be posted.

## GSA 2021 MEMBERSHIP

Renew by 1 November—Save 15%\* off dues

<https://www.geosociety.org/members>

\* applies to those in high-income countries/territories

# Bridging the Geosciences and Public Policy

## GSA MEMBERS MEET WITH MEMBERS OF CONGRESS

GSA provides opportunities for its members to meet with policymakers by holding Congressional Visits Days and associated training sessions. Participants begin with an orientation workshop that covers relevant legislation, the structure of Congress, and strategies to build relationships between scientists and policymakers before conducting congressional visits.

During Geosciences Congressional Visits Day on 10–11 September 2019, 50 geoscientists from multiple scientific societies conducted visits to nearly 100 congressional offices. All GSA Divisions sponsored students to attend, joining GSA leadership and scientists selected through GSA’s online application process. Harriet S. Cornachione, a student sponsored by GSA’s Rocky Mountain Section, reflected, “What a great opportunity to quickly grasp the magnitude of the job of a congressional member and how Congress works! I so very much appreciate this opportunity. I will definitely be following up from this visit with further communication with the staffers we met, as well as staying apprised of the work in the offices of these members from our region.”



Kasey White presenting the USGS Coalition award to Rep. Tipton.

## GSA LETTERS AND TESTIMONY

GSA Director for Geoscience Policy Kasey White testified before the House Appropriations Subcommittee on Interior, Environment and Related Agencies in support of the U.S. Geological Survey (USGS). GSA also submitted testimony requesting increased funding for the National Science Foundation and the National Aeronautics and Space Administration for Fiscal Year 2021.

GSA is an active member of coalitions that submitted testimony and letters in support of these and other geoscience agencies, including the Coalition for National Science Funding, the Coalition for Aerospace and Science, the USGS Coalition, the Energy Sciences Coalition, and the Task Force on American Innovation, during both the regular appropriations process and response to COVID-19.

GSA submitted letters to policymakers on topics ranging from open access of scientific publications, to climate change research needs, to visa and immigration policy.

## USGS COALITION LEADERSHIP AWARDS

The 2019 USGS Coalition Leadership Awards were presented on 10 September 2019 to Rep. Derek Kilmer (D-WA-06) for his support of the National Landslide Preparedness Act and Rep. Scott Tipton (R-CO-03) for his support of the Chronic Wasting Disease Transmission Act, in addition to their overall support of the survey and its missions. Senior USGS leaders, as well as representatives of national organizations that use and support USGS science and information, attended the reception and discussed the benefits that USGS activities provide to the nation.

## UPDATED POSITION STATEMENT

GSA Council adopted minor revisions to the “Climate Change” position statement.

*“GSA membership keeps me apprised of recent and updated events in all geosciences, and serves as a voice for our profession to political and community audiences.”*



Ryan Haupt, Science Policy Fellow, with Sen. Jim Risch (R-ID) and Dr. Zachery Lifton.

## GSA SCIENCE POLICY FELLOW

GSA Science Policy Fellow Ryan Haupt began a one-year term as the “in-house” fellow in September 2019, working in GSA’s Washington, D.C., office to bring science and scientists into the policy process. Haupt worked with GSA’s Geology and Public Policy Committee, represented GSA at coalition meetings, attended hearings on relevant geoscience legislation and programs, and developed resources for GSA members to engage in policy.

## GSA-USGS CONGRESSIONAL SCIENCE FELLOW



Each year, GSA and the USGS jointly sponsor a geoscientist to spend a year working in the office of a member of Congress or congressional committee.

Mike O’Connor served as the 2019–2020 GSA-USGS Congressional Science Fellow, working in the office of Rep. Paul Tonko (D-NY). O’Connor is a hydrologist with an extensive background in water resources and cold regions.

## STATE AND LOCAL POLICY ENGAGEMENT

Kasey White attended the National Conference of State Legislators Legislative Summit in Nashville, Tennessee, USA, in August 2019. GSA partnered with the Association of American State Geologists, the Association of Environmental and Engineering Geologists, and the American Institute of Professional Geologists to share geoscience information with local policymakers.

# Supporting Our Science Community

In January 2020, GSA fulfilled a commitment (approved by GSA Council in 2019) to transfer its journal *Lithosphere* to a new home with a new purpose—serving as an open-access journal for a community of society publishers. Now published by GeoScienceWorld on behalf of seven societies, the journal gives authors and the participating publishers alike another open-access option.

The abrupt changes we all faced this year due to the pandemic gave GSA publications another opportunity to be of service, this time to the hundreds of academic libraries worldwide who were suddenly shut out of their in-person campus resources. Along with several other society publishers, GSA agreed to open its online book content until the end of June—that’s well over 900 books made freely available to researchers everywhere.

*“GSA membership provides opportunities to have my ‘finger on the pulse’ of the cutting-edge advances in our field—by networking with colleagues, learning through direct contact, and publication about new research.”*

About halfway through the fiscal year, publications staff began transferring about 20,000 files and their accompanying metadata from the GSA Data Repository site to an outside host, Figshare. The new database is completely searchable and offers authors new ways to post supplemental materials.

To help new authors get their work published successfully, the GSA Publications Department holds an annual early-career publishing workshop led by GSA science editors. The free workshop explains the process of preparing research for submission to scholarly journals and includes a section on the importance of contributing as a reviewer.

## ABOUT GSA JOURNALS AND BOOKS

GSA’s peer-reviewed journals *GSA Bulletin*, *Geology*, and *Geosphere* are hosted at [www.gsapubs.org](http://www.gsapubs.org), through the aggregate GeoScienceWorld. *GSA Bulletin* and *Geology* are also available in print. *Geosphere* is 100% open access, and *Geology* is free online for all GSA members. Early career professional members, student members, and K–12 teacher members also get free online access to *GSA Bulletin*. *GSA Today*, GSA’s member magazine, is open access at <https://www.geosociety.org/GSAToday>, and members can get a free print subscription.

Published jointly by the Association of Environmental and Engineering Geologists and GSA, *Environmental & Engineering Geoscience* (online at GeoScienceWorld) contains peer-reviewed papers on new theory, applications, and case histories illustrating the dynamics of environmental and applied disciplines.

The society publishes three peer-reviewed book series in print and online ([www.gsapubs.org](http://www.gsapubs.org)): Special Papers (four volumes in fiscal year 2020) are for state-of-the-art treatments of evolving subjects; Memoirs (one volume in FY20) are intended to remain authoritative

## Member Benefits Include:

- All members get free online *Geology*. Student and early career professional members also get free online *GSA Bulletin*.
- Supercharge your research with Geofacets—a web-based tool to access thousands of georeferenced maps—included with membership.
- Subscribe to premier publications at member-only rates when you renew your 2021 membership.

references for a number of years; and Field Guides (four volumes in FY20) feature guides from GSA or GSA-related field trips. *Memorials* to deceased GSA members are open access at <https://www.geosociety.org/memorials>.

## 2020 JOURNAL IMPACT FACTORS (WEB OF SCIENCE GROUP, 2019)

*GSA Bulletin*: 3.558; five-year: 4.368.  
*Geology*: 4.768; five-year: 5.412.  
*Geosphere*: 2.577; five-year: 3.032.  
*Lithosphere*: 3.248; five-year: 3.530.  
*Environmental & Engineering Geoscience*: 0.755; five-year: 0.785.

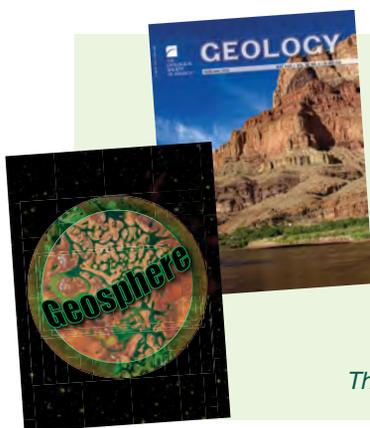
## GSA STORE

Along with providing a storefront for GSA books, educational materials, specialty tools, and the map and chart collection, the GSA Store offers e-versions of hundreds of previously unavailable or out-of-print publications—including the complete suite of Decade of North American Geology volumes and maps—to researchers and citizen scientists alike.

## Publications by the Numbers

<b>18</b> science editors	<b>3,128</b> authors	<b>76</b> disciplines
<b>190</b> associate editors and editorial board members	<b>53</b> countries	<b>9,253</b> pages published

*Thank you to our thousands of reviewers, the backbone of scientific peer review.*



# Helping to Navigate Your Professional Path



*"I loved each of the mentor's perspectives, and especially their practical advice to students and graduates."*

## Explore Careers

### THE GEOCAREERS PROGRAM

GeoCareers disseminates career information, develops resources, and connects the geoscience community through webinars, mentoring, networking, and workshops at annual and Section Meetings and throughout the year. With a goal of increasing knowledge of geoscience career pathways, GSA works with the geoscience community at all levels of their careers.

### GEOCAREERS WEBINARS

Eight career-focused webinars were offered in collaboration with corporate partners, scientific Divisions, and Associated Societies. The webinars were introductions to career pathways in today's most popular fields, including careers with the U.S. Forest Service, National Parks, in geothermal energy, minerals, petroleum, and professional geologist licensure. A special webinar was organized to offer advice and projected

outlook in the energy industry. GeoCareers webinars were attended by more than 2,400 individuals. Webinar recordings can be accessed at [www.geosociety.org/webinars](http://www.geosociety.org/webinars).

### NETWORKING

Developing relationships at meetings, workshops, and networking events is essential to building social capital and provides critical connections to the profession. Networking programs offer students and early career professionals the opportunity to work on networking skills with practicing geoscientists from a variety of employment sectors.

Programs available:

- Early Career Professionals Coffee
- Networking Reception
- Women in Geology Career Pathways Reception
- Geoscience Career Workshops at Section and Annual Meetings

### MENTORING

Participating in a mentorship program can be a valuable experience for both mentors and mentees. Mentees report that they receive good advice related to their career or academic pathway and are introduced to other professionals in their area of interest. Mentors report altruistic gains when helping others as well as enjoyment in meeting promising young scientists. GSA has operated mentor programs since 1996 and recruits new mentors and mentees every year for the following:

- Roy J. Shlemon Mentor Program in Applied Geoscience
- John Mann Mentors in Applied Hydrogeology
- GeoCareers Center
- Drop-in Mentoring in the GeoCareers Center
- Résumé Mentoring in the GeoCareers Center
- GeoCareers Panel Luncheon
- On To the Future



### GSA 2021 MEMBERSHIP

Renew by 1 November—Save 15%\* off dues

<https://www.geosociety.org/members>

\* applies to those in high-income countries/territories

## Grants and Scholarships

### ON TO THE FUTURE (OTF) PROGRAM

Expanding diversity and inclusivity is critical to innovation, scientific advancement, and solving tomorrow’s geoscience challenges. GSA’s On To the Future (OTF) program supports students from a diversity of backgrounds to attend their first annual meeting. In 2019, the Society funded 72 students to attend the annual meeting, where students were paired with mentors, met with GSA leadership, and learned about participation in internships, scholarships, and research opportunities.

Through a partnership with the University of Arkansas, Fayetteville, and supported by the National Science Foundation, an additional 18 returning OTF students were awarded travel support to the annual meeting along with participation in a mentored professional development workshop. An additional 15 OTF students were slated to receive awards to attend the 2020 joint Section Meeting; however, this meeting was cancelled due to COVID-19, and the professional development workshop was offered via webinar.

### EXPANDING REPRESENTATION IN THE GEOSCIENCES SCHOLARSHIPS (ERG)

ERG scholarships (formerly the Minority Student Scholarships) were awarded to six undergraduate students from communities



*“Meeting other people that are also underrepresented in the geosciences helped me bond and relate to them. We were able to talk about the mishaps and challenges that each of us underwent personally and professionally.” —2019 OTF Student*

underrepresented in the geosciences. Awardees received a US\$1,500 scholarship and complimentary registration to the annual meeting, where students are recognized at the Diversity in the Geosciences Reception.

### NORTHEAST URBAN TRAVEL AWARDS

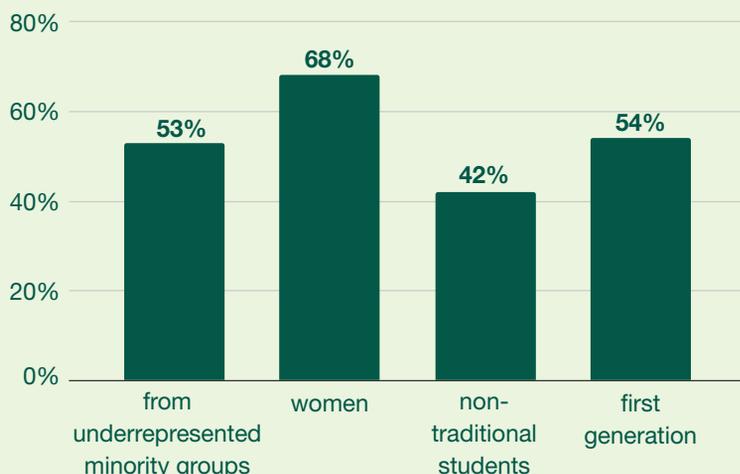
The Northeast Urban Travel Awards Program provides financial assistance to non-traditional students attending urban universities in GSA’s Northeastern geographic Section. Non-traditional students are those who have delayed enrollment in post-secondary education associated with caring for dependents and/or working full-time, and

who, due to competing non-academic priorities, are unable to participate in multi-day field or meeting experiences critical to geoscience education and training. This year, six students were awarded grants; however, the Northeastern Section Meeting was cancelled due to COVID-19.

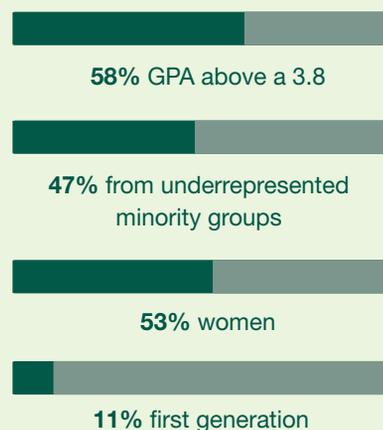
### GSA FOUNDATION FIELD CAMP SCHOLARSHIPS

The GSA J. David Lowell Field Camp Scholarship is a US\$2,000 award to undergraduate students to attend a field camp of their choice. In 2020, 19 students were awarded based on their economic and financial need, merit, and diversity.

On To the Future Students in FY2020



GSA J. David Lowell Field Camp Scholarship Awardees





## Field and Research Experiences

### GEOCORPS™ AMERICA AND THE NATIONAL PARK SERVICE (NPS) GEOSCIENTISTS-IN-THE-PARKS (GIP) PROGRAM

Over the past 24 years, the NPS Geoscientists-in-the-Parks program has engaged 1,912 participants in scientific work with 207 national parks and offices. This year, GSA helped connect 141 GIP participants with projects taking place at 70 different NPS sites. GeoCorps America celebrated its 20th year by renewing partnerships with the U.S. Forest Service, Bureau of Land Management (BLM), and BLM Direct Hiring Authority for Resource Assistant Internship Program. Fifty-five GeoCorps participants contributed 27,082 hours to geoscience-related projects on national forests and BLM lands. Twenty-five GeoCorps and GIP alumni presented their project-related work at the GSA 2019 Annual Meeting in Phoenix, Arizona, USA. GSA offers its special thanks to federal partners, mentors, and partnering organizations like Stewards Individual Placement Program and Aerotek, Inc., for providing career-building opportunities that support the science and stewardship of public lands.

### GSA/EXXONMOBIL FIELD CAMP PROGRAMS

The GSA/ExxonMobil Field Camp Excellence Award is given annually to a

geology field camp that demonstrates safety awareness, diversity, and technical excellence. In May 2020, the US\$10,000 award went to the University of Louisiana.

*“The award was used to update our field and audiovisual equipment. We plan to record student videos on their field experiences so contribution will affect a large student population on our campus through our intro classes.”*

### THE EARTHCACHE™ PROGRAM

The EarthCache program, a longstanding partnership between GSA and Geocaching HQ (Geocaching.com), is now in its 16th year. This educational program gets members of the public outdoors to *experience* geology in the field, thus increasing their knowledge and support of the geosciences. Geocaching HQ has coordinated with a team of international volunteers to translate the EarthCache guidelines into other languages; 11 languages were added to the website in FY20. The GSA EarthCache web pages were updated in spring 2020 in alignment with concepts that are being employed across our marketing and outreach efforts to achieve clearer and simpler messaging.

## Field Experiences by the Numbers



**141**

GIP participants

**70**

different NPS sites

**25**

GeoCorps and GIP alumni presented their project-related work at the GSA 2019 Annual Meeting



**20**

years of programming

**55**

GeoCorps participants

**27,082**

hours worked on projects for national forests and BLM lands



**205**

countries host an EarthCache site

**11**

new languages were added to the EarthCache guidelines web pages

Renew Your GSA 2021 Membership at <https://www.geosociety.org/members>

## Professional Development

### K-12 (KINDERGARTEN THROUGH 12TH GRADE) EDUCATION AND 2YC (2-YEAR COLLEGES)

GSA worked with member volunteers and the National Earth Science Teachers Association to run the GeoTeach Workshop ([https://serc.carleton.edu/nesta/prof-dev/GSA\\_NESTA\\_GeoTeach\\_2019.html](https://serc.carleton.edu/nesta/prof-dev/GSA_NESTA_GeoTeach_2019.html)) for ~30 educators at the GSA 2019 Annual Meeting. Members of the GSA Education Committee created an educational activity to submit to the 2020 American Geosciences Institute Earth Science Week calendar. GSA's collection of E-Teach Resources was made available free-of-charge in the GSA Store. These resources have been promoted for parents and educators during the coronavirus pandemic, resulting in over 1,600 downloads in March alone. In response to the pandemic, GSA also developed an Online Education Resource Guide ([https://www.geosociety.org/GSA/Education\\_Careers/GSA/edu-career/online-resources.aspx](https://www.geosociety.org/GSA/Education_Careers/GSA/edu-career/online-resources.aspx)) to help educators with online teaching, learning, and remote research at all levels.

### SHORT COURSES

GSA offers Short Courses at each of our geographic Section Meetings and at annual meetings. The courses are taught by professional geoscientists and enable attendees to learn new topics, build skills, and network. If you plan to run a field trip or a field camp, consider taking our Field Safety Leadership Course. An attendee last year said it was an “excellent short course that should be mandatory for all field camp

directors, faculty teaching field camp, and any field geologist!”

### DIGITAL FIELD TOOLS WEBINARS

In response to the pandemic, numerous universities offered virtual courses and field camps. To assist faculty with this transition, a digital field-tools webinar series was offered by GSA and the National Association of Geoscience Teachers. The goals of this series were to (1) increase digital literacy in the geosciences, and (2) provide professional development to instructors and teachers on digital tools and alternative field experiences. Webinars were offered on Google Earth, GigaPan, and Virtual Landscapes. Recordings can be accessed in the webinar library at [www.geosociety.org/webinars](http://www.geosociety.org/webinars).

*“These were some of the most helpful webinars I've attended in the switch to remote teaching and planning for the fall during the pandemic.”*

### GRADUATE STUDENT RESEARCH GRANTS

GSA's Graduate Student Research Grants Program continues to be one of the largest and most prestigious funding programs for graduate students in the geosciences. The goals of the program are to

- support graduate student research in the geosciences and ultimately enhancement of the geoscience workforce;
- provide career-development opportunities for students by gaining experience with

grant writing, project development, and research; and

- increase the diversity of the geosciences through opportunities for students of underrepresented communities to achieve success in research.

GSA was awarded a new three-year (2020–2022) award from the National Science Foundation to support the program and to make efforts at increasing the level of diversity among the students who apply for and receive grants.

### AGeS2 (AWARDS FOR GEOCHRONOLOGY STUDENT RESEARCH2) PROGRAM

2019–2020 represented year two of GSA's partnership with Becky Flowers (University of Colorado Boulder) and Ramon Arrowsmith (Arizona State University) in a three-year, cross-programmatic award from the National Science Foundation to support the AGeS2 (Awards for Geochronology Student Research2) program. AGeS2 awardees visit an AGeS2 lab for a week or more, participate in sample preparation and analysis, and learn fundamental aspects of the methods, techniques, and theory used in modern analytical facilities. Awards, which range from US\$6,000 to US\$10,000, can be used to fund analytical costs, sample preparation, travel to the host geochronology lab, lodging, and other expenses. The AGeS2 program is open to GSA student members. Learn more at <https://www.geosociety.org/ages>.



#### Graduate Student Research Grants

##### FY20 stats:

**659**

student proposals received

**358**

(~55%) proposals funded

**US\$651,645**

granted

**US\$1,820.24**

average grant amount

**200+**

annual meeting presentations supported

#### AGeS2 FY20 stats:

**10**

reviewers

**69**

student proposals received

**18**

proposals funded

**US\$150,551**

granted

**US\$8,364**

average grant amount

# Serving Geoscience and the Profession

The mission of the Geological Society of America Foundation is to develop and provide funds to support the goals and programs of the Geological Society of America. These funds are distributed according to the needs of the Society and in a manner consistent with the desire of the donors. The responsibilities of the Foundation are twofold: (1) to support GSA programs, and (2) to preserve the Foundation's assets for the future.

## 2019–2020 HIGHLIGHTS

In fiscal year 2020, the GSA Foundation received annual campaign contributions and pledges of more than US\$807,300 from individual GSA members and corporations. Our success was assured by 7,316 separate gifts at all levels, a testament to the enthusiasm and dedication of GSA members and supporters.

On 5 May 2020, people around the world came together for *Giving Tuesday Now* to tap into the power of something that GSA already lives by: a sense of community to support one another. During this critical time, people everywhere experienced unexpected challenges. GSA and the GSA Foundation each committed US\$50,000 to create a new program, GSA COVID-19 Assistance and Relief Effort for Students (GSA CARES). We thank you, our members and GSA Sections, who went above and beyond the challenge to match this so that we were able to offer US\$188,000 in assistance to our students—those who will be stepping into ever-vital future roles in the geosciences.

The Campaign for GSA's Future wrapped up during the GSA 2019 Annual Meeting in Phoenix, Arizona, USA, having raised US\$6,270,000 from 176 donors to support GSA programs into the future. The Foundation celebrated its campaign success with a special combined Penrose Circle, student awards, and campaign donor dinner.

We also thank dozens of other individuals, Associated Societies, GSA Sections, and corporate sponsors for continuing to help advance On To the Future, GSA's flagship diversity initiative. A very generous individual donor once again offered a

matching challenge, and despite the unprecedented circumstances during the spring of 2020, our donors surpassed the match amount. The Foundation will continue to provide membership and help students from underrepresented groups attend their first GSA annual gathering: GSA 2020 Connects Online.

Our donors remain committed to helping students obtain vital field experience, and we were able to offer 19 scholarships from the J. David Lowell Field Camp Scholarship Program. Four of these were supported by the Petroleum Geoscientists Fund for Undergraduate Field Experience. Due to COVID-19 circumstances, while some 2020 field camps are still convening in person or virtually, those recipients whose field camps have been cancelled will use their funds next summer.

Corporate partners helped us re-think and adapt our seventh year of the GeoCareers Program, with a virtual version to be included during GSA 2020 Connects Online and additional career webinars throughout the year.

In 2019, our student donors continued to show their generosity, as 1,161 gave back to GSA in support of their fellow students. The Foundation was pleased to recognize this dynamic group through their own unique giving circle, Tektonikos. The accompanying tagline, "Building the Future," conveys their important role in the geosciences.

We are deeply appreciative of those who include the Foundation in their estate plans, and Legacy Circle gifts are vital to unrestricted funding. We are inspired that we continue hearing from donors making new legacy gift commitments, and we look



forward to introducing them personally to GSAF's new president, who joined GSAF in July, Dr. Christopher Grant Maples, so that he can learn firsthand why this is such an important personal commitment from some of you. Dr. Maples replaces Dr. John W. (Jack) Hess, who was the president of the Foundation since

## How Members Can Get Involved:

- Support students, research, and education through a voluntary contribution to the GSA Foundation when you renew your 2021 membership.
- Help others be part of our GSA member community. The Membership Assistance Program and Fund enables those who cannot afford the cost of membership, or who experience difficulty in transferring funds from their country to the USA, to become members. Support and spread the word.



January 2015. The staff greatly appreciates him and his years of caring leadership. The Foundation is continuing a strategy of communications themed around

*Community of Support*, in keeping with one of the enduring qualities that GSA members value most: the sense of community found within the Society.

Most recently, we have featured interviews with donors who gave to GSA CARES at [https://gsa-foundation.org/gsa-cares\\_camala-garzzone/](https://gsa-foundation.org/gsa-cares_camala-garzzone/).



The Foundation is pleased to help donors support GSA programs and priorities important to them. Looking forward, the Foundation and GSA are collaborating to carry out even more effective resource building strategies. With your help, we will shape a strong future for GSA.

We encourage every member to avail themselves of the opportunity to serve GSA and to support the Foundation in our combined efforts to ensure the dynamism and strength of the geosciences. Please visit the Foundation's website at [www.gsa-foundation.org](http://www.gsa-foundation.org) for information and ideas regarding ways you can make a philanthropic impact for GSA and the geosciences.

# Allied in Service to Members and the Larger Geoscience Community

GSA collaborates with these national and international Associated Societies, with consistent aims and missions of advancing the geosciences and/or science in general. As the Society looks to the future, it aims to build strong, meaningful partnerships with societies and organizations across the country and around the world in service to members and the larger geoscience community.

AASP - The Palynological Society	Geologica Belgica (GB)	Minnesota Ground Water Association (MGWA)
American Association of Petroleum Geologists (AAPG)	Geological Association of Canada (GAC)	National Association of Black Geoscientists (NABG)
American Geophysical Union (AGU)	Geological Society of Africa (GSAF)	National Association of Geoscience Teachers (NAGT)
American Institute of Professional Geologists (AIPG)	Geological Society of Australia (GSAus)	National Association of State Boards of Geology (ASBOG®)
American Quaternary Association (AMQUA)	Geological Society of China (GSC)	National Cave and Karst Research Institute (NCKRI)
American Rock Mechanics Association (ARMA)	Geological Society of London (GSL)	National Earth Science Teachers Association (NESTA)
Association for the Sciences of Limnology and Oceanography (ASLO)	Geological Society of South Africa (GSSA)	National Ground Water Association (NGWA)
American Water Resources Association (AWRA)	Geoscience Information Society (GISIS)	National Speleological Society (NSS)
Asociación Geológica Argentina (AGA)	Geoscience Society of New Zealand (GSNZ)	Nepal Geological Society (NGS)
Association for Women Geoscientists (AWG)	German Geological Society (GV)	Nigerian Society of Physical Sciences (NSPS)
Association of American State Geologists (AASG)	Groundwater Resources Association of California (GRA)	Paleontological Research Institution (PRI)
Association of Earth Science Editors (AESE)	History of Earth Sciences Society (HESS)	Paleontological Society (PS)
Association of Environmental & Engineering Geologists (AEG)	International Association for Geoscience Diversity (IAGD)	Seismological Society of America (SSA)
Association of Geoscientists for International Development (AGID)	International Association for Promoting Geoethics (IAPG)	Sigma Gamma Epsilon (SGE)
Blueprint Earth (BE)	International Association of Emergency Managers (IAEM)	Sociedad Geológica Mexicana, A.C. (SGM)
The Clay Minerals Society (CMS)	International Association of GeoChemistry (IAGC)	Società Geologica Italiana (SGI)
Colorado Scientific Society (CSS)	International Association of Geomorphologists (IAGC)	Society for American Archaeology (SAA)
Council on Undergraduate Research Geosciences Division (CUR)	International Association of Hydrogeologists (IAH)	Society for Environmental Geochemistry and Health (SEGH)
Cushman Foundation (CF)	International Association of Limnogeology (IAL)	Society for Mining, Metallurgy & Exploration (SME)
Environmental & Engineering Geophysical Society (EEGS)	International Medical Geology Association (IMGA)	SEPM (Society for Sedimentary Geology)
European Association of Geoscientists & Engineers (EAGE)	International Society for Aeolian Research (ISAR)	Society for the Preservation of Natural History Collections (SPNHC)
European Geosciences Union (EGU)	Israel Geological Society (IGS)	Society of Economic Geologists (SEG)
Geobiological Society (GBS)	Karst Waters Institute (KWI)	Society of Exploration Geophysicists (SEG)
Geochemical Society (GS)	Microanalysis Society (MAS)	Society of Vertebrate Paleontology (SVP)
	Mineralogical Association of Canada (MAC)	Soil Science Society of America (SSSA)
	The Mineralogical Society (MS)	Western Interior Paleontological Society (WIPS)
	Mineralogical Society of America (MSA)	

# Discover more with your GSA Membership



**Access Cutting-edge Science** —  
Peer reviewed publications, free online *Geology*, *Geofacets*, and *GSA Today*



**Advance your Skills** —  
Career guidance & lifelong learning opportunities—tech sessions, short courses, career workshops



**New Discoveries** —  
Publish & present research, travel & research grants, field experiences



**Be Recognized** —  
Honors & awards for outstanding contributions to the science and community



**Contribute to the Future** —  
Mentoring, advocacy, volunteer & leadership opportunities



**Connect with the Geoscience Community** —  
21,000 worldwide member community, scientific Divisions, geographic Sections



**Renew by 1 Nov. — Save 15% off dues\***

**[www.geosociety.org/members](http://www.geosociety.org/members)**

\*Applies to those in high income countries/territories

26–30 October  
**GSA 2020  
CONNECTS ONLINE**

## Not Just Another Video Call

The hub of GSA 2020 Connects Online is a virtual lobby where you can sign in, have a look around, and explore the meeting's opportunities. From the lobby, you can head into the auditorium, tech session rooms, the GSA HQ booth, and even a lounge where you can meet up and chat. Each session's recorded videos will be polished, and you can watch them ahead of time to plan any questions you might have during the live Q&A.

### **Watch presentations at your leisure.**

Bookmark your place and return later, or stop to take notes.

### **Get help editing your presentation.**

Our staff will work with you to polish your recording and make it shine.

### **Have a private chat.**

Connect with colleagues, download business cards of new contacts, and send private chats.

### **Connect in our lounge.**

Read the social media wall and general chat, and connect with friends, old and new.

### **Visit the Resource & Innovation Center.**

Connect live with corporations, universities, Associated Societies, and GSA Divisions.



### **Dive deeper into your career choices.**

Learn how to craft a résumé, use USAJobs, and meet with mentors.

### **Honor your colleagues.**

Visit the GSA Hall of Fame and see the honors and awards and our new Fellows.

### **Visit the GSA Headquarters Booth.**

Ask questions about your membership and learn about new programs and publications.

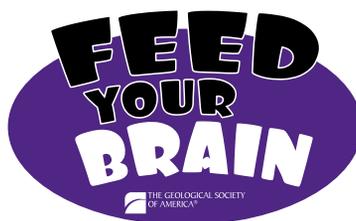
Platform preview: <https://community.geosociety.org/gsa2020/information/platform>

# Registration

<https://community.geosociety.org/gsa2020/registration>

	Fees
Professional Member	US\$250
Professional Member over 70	US\$200
Professional non-member	US\$350
Early career professional	US\$150
Student member	complimentary
Student non-member	US\$125
K–12 professional	US\$45
Low Income Country**	50%

\*\*Participants from countries classified as “Low or Lower Middle Income Economies” by the World Bank need only pay 50% of the category fee for registration. Online registration is not available for “Low or Lower Middle Income Economy” registrants. Please call GSA Sales & Service, +1-303-357-1000, option 3.



## Feed Your Brain—*Lunchtime Enlightenment*

<https://community.geosociety.org/gsa2020/program/special>

### GSA Presidential Address

Monday, 26 Oct., 11 a.m.–noon EDT

**J. Douglas Walker**, “Doing Geology in an Online World”

The earth sciences are doing more of their activities online, and the COVID-19 crisis has amplified this trend. Because the subject is our shared planet and environment, it is becoming more critical for earth scientists to better engage the public. GSA should seize this opportunity to lead the earth sciences in moving forward with online and data-centered efforts.

### The Way Forward: Toward an Anti-Racist and Equitable Geoscience Community

Tuesday, 27 Oct., 12:15–1:15 p.m. EDT

**Hendratta Ali, Christopher Aiden-Lee Jackson, Anita Marshall, Sherilyn Williams-Stroud, Erika Marín-Spiotta, and Don Siegel**

Panelists will discuss, share experiences, and offer concrete suggestions to spur geoscientists towards ally-ship, bystander intervention, accessible practices, recognizing bias, and other anti-racist actions to improve our discipline.

### 2020 Michel T. Halbouty Distinguished Lecture

Wednesday, 28 Oct., 12:15–1:15 p.m. EDT

**Tom Gleeson**, “Is Groundwater a Local and Global Resource? New Sustainability Ideas and Tools across Scales”

In this talk, Gleeson argues for the importance of global perspectives in groundwater governance and management, introduces a recent global groundwater sustainability initiative, and highlights research on new tools for protecting environmental flows from local groundwater pumping.

### Science and Mapping of Underwater Caves

Thursday, 29 Oct., 12:15–1:15 p.m. EDT

**Jill Heinerth**

Cave divers have become an important asset to scientists exploring global climate change, archaeology, water issues, and unique biology. Heinerth will share stories from expeditions to faraway caves around the world from Egypt to Antarctica and Bermuda to the Bahamas.

These events will all take place in the GSA e-Attend Platform Auditorium.

# Take a Trip Online

## Four Free Field Trips Offered This Year

**408. Kirk Bryan Field Trip: Pre-LGM Stratigraphic Record in the Central St. Lawrence Lowlands— How Much Ice in Southern Quebec and Adjacent New England during MIS-3?** Thurs., 22 Oct. Free. CEU: 0.80. Limit: 500. Leaders: Michel Parent, michel.parent@canada.ca; and Michel Lamothe. *Endorsed by the GSA Quaternary Geology and Geomorphology Division.* This Kirk Bryan field trip will bring participants to classical as well as new sites exhibiting parts of the St. Lawrence valley Quaternary record and should provide them with ample opportunity to discuss the ins and outs of the revised stratigraphic record.

**402. Transect of a Hot, Long Orogen: The Grenville Province of Western Québec.** Fri., 23 Oct. Free. CEU: 0.80. Limit: 500. Leaders: Christopher W. Lambert, chris.lambert@polymtl.ca; Félix Gervais; and Charles Kavanagh-Lepage. Highway 117 in western Québec beautifully exposes a complete transect of all the main segments of the paleo-orogenic crust. Through this now virtual trip, we aim to guide you through some of the key outcrops, recent findings, and queries arising from the various tectonic segments along the transect.

**415. Canada’s Role in Space.** Fri., 23 Oct. Free. CEU: 0.80. Limit: 500. Leader: Kristyn Jessica Rodzinyak, kristyn.rodzinyak@mcgill.ca. Featured keynote speaker: Dr. Marie-Josée Potvin, senior systems engineer, Canadian Space Agency. *Endorsed by the Canadian Space Agency.* Join us as we #DareToExplore a morning of space projects in Canada.

**414. Geology and Wine: What Grows Together, Goes Together: Exploring Montréal Terroir.** Fri., 23 Oct., half-day, afternoon. Free. CEU: 0.80. Limit: 500. Leaders: Kristyn Jessica Rodzinyak, kristyn.rodzinyak@mcgill.ca; and Chimira Nicole Andres. Featured topics: wine regions in Québec; wine and geology; and the effects of climate, geography, and geology on viticulture practices. A set of wines will also be recommended to the attendees prior to the meeting in order to get the “full-bodied” experience of geology and wine.



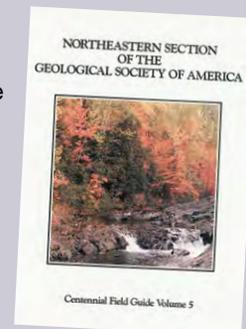
## Tour Canada with Free Resources from the GSA Store



To coincide with GSA 2020 Connects Online, we’re bringing the geology of Canada to you with a selection of volumes, transects, and field guides.

The field guide volume includes four guides from eastern Canada. Here you’ll examine glacial stratigraphy near Lac St. Pierre, explore the 277-foot-high Montmorency Falls (higher than Niagara Falls!), and trace the geologic evolution of the Thetford Mines ophiolite.

To begin your exploration, visit the GSA Store at <https://rock.geosociety.org/Store/> and search “FreeMontreal”—we’ve gathered for you a large selection of classic Canadian volumes from the Decade of North American Geology collection. Get free digital access to them all now through the end of November.



From top: Montmorency Falls. Photo by Leslie Mateus via Wikimedia Commons. Mont Tremblant. Photo by Anaïs Kowalczyk on Unsplash.

# Register for a Short Course Today!

<https://community.geosociety.org/gsa2020/program/short>

As scientists, our learning is never done. Take advantage of these cutting-edge courses as part of your GSA 2020 experience.

**Topics include:** petroleum structural geology, resistivity surveying, detrital geochronology data, ground-penetrating radar, and medical geology.

**Tips for teaching and the field:** teaching quantitative structural geology, a teaching workshop on geosciences and society, field safety, and geophysics for geotechnical site investigation.

**Learn code, 3D printing, and modeling:** tools to write better code, 3D printing for geoscience and engineering, 3D hydrogeological modeling, airborne electromagnetic method data to a 3D hydrogeological conceptual model, and exploring surface processes using a community surface dynamics modeling system.

**Research tools:** getting started with synthetic aperture radar, a quantitative toolkit to analyze stratigraphic data, and detrital and petrochronologic applications of U-Pb geochronology and Lu-Hf and trace/REE geochemistry.

## Diversity and Inclusion Events Open to All

All events will be listed in the meeting app, and all times are Eastern Daylight Time.

### Monday, 5 Oct.

- Diversity in the Geosciences Committee Meeting: 1–2:30 p.m.

### Monday, 26 Oct.

- On To the Future Networking Event: 5:45–6:30 p.m.

### Tuesday, 27 Oct., Day of Action

- Film: “Can We Talk?”: 10 a.m.–noon
- Special Lecture: “The way forward: Toward an anti-racist and equitable geoscience community”: 12:15–1:15 p.m.
- Pardee Symposium: The Next Generation of Geoscience Leaders: Strategies for Excellence in Diversity and Inclusion: 1:30–5:30 p.m.
- Diversity in the Geosciences Celebration: 5:45–6:45 p.m.
- Women in Geology Panel: 5:45–6:45 p.m.
- LGBTQ+ Social: 7–8 p.m.

### Wednesday, 28 Oct.

- GSA Diversity, Ethics, and Inclusion Panel: 5:45–6:45 p.m.

### Thursday, 29 Oct.

- GSA Accessibility in Geosciences Panel: 5:45–6:45 p.m.



### Sign up to be a Mentor

Build your skills and pay it forward: Serve as a GSA Annual Meeting mentor. Learn more and sign up at <https://forms.gle/bZeKibPue7BXEsyQ9>.

See some of the mentoring opportunities for GSA 2020 Connects Online at <https://community.geosociety.org/gsa2020/connect/student-ecp/geocareers>.

Learn more at  
<https://community.geosociety.org/gsa2020/mentor>

The Geological Society of America®  
**GEOCAREERS**

If you are entering the job market, transitioning into a new career, or are supporting someone who is and want more information about career pathways in the geosciences, plan to attend the events below. Sign-up information for drop-in mentoring and the résumé/CV review clinic will be sent to all registered students on 19 Oct.

All times are in Eastern Daylight Time.

<https://community.geosociety.org/gsa2020/geocareers>

**FRIDAY, 23 OCT.**

- Cover Letter Workshop, 10–11:15 a.m.
- Geoscience Workforce Outlook Presentation, 11:30 a.m.–12:45 p.m.
- Career Panel, 1:30–3 p.m.

**MONDAY, 26 OCT.**

*Spotlight on Industry*

- Creating a Résumé for Industry, 10–11:30 a.m.
- Careers in Industry Panel, noon–1:30 p.m.
- Drop-in Mentoring with an Industry Rep., 1–5 p.m.
- Résumé/CV Review Clinic, 1–5 p.m.
- Networking Event, 2–3 p.m.
- Early Career Panel, 5:45–6:45 p.m.

**TUESDAY, 27 OCT.**

*Spotlight on Government*

- An Introduction to USAJOBS, 10–11:30 a.m.
- Careers in Government Panel, noon–1:30 p.m.
- Drop-in Mentoring with a Government Rep., 1–5 p.m.
- Résumé/CV Review Clinic, 1–5 p.m.
- Geology Club Meet-Up, 2–3 p.m.
- Women in Geology Panel, 5:45–6:45 p.m.

**WEDNESDAY, 28 OCT.**

*Spotlight on Academia*

- Creating a Curriculum Vitae (CV), 10–11:30 a.m.
- Careers in Academia and Teaching Panel, noon–1:30 p.m.
- Drop-in Mentoring with a Faculty Rep., 1–5 p.m.
- Résumé/CV Review Clinic, 1–5 p.m.
- Diversity, Inclusion, and Ethics Panel, 5:45–6:45 p.m.

**THURSDAY, 29 OCT.**

*Spotlight on Non-Traditional Careers*

- Creating a Résumé for Non-Traditional Employment, 10–11:30 a.m.
- Non-Traditional Careers Panel, noon–1:30 p.m.
- Drop-in Mentoring, 1–5 p.m.
- Résumé/CV Review Clinic, 1–5 p.m.
- Accessibility in Geosciences Panel, 5:45–6:45 p.m.

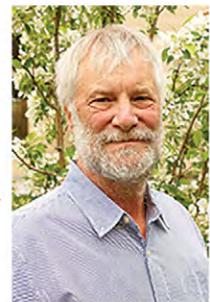
# KU DEPARTMENT OF GEOLOGY

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Glaciology/Geobiology/Geochemistry/  
Environmental Geology**



GSA President '20-'21  
& KU Geology Professor  
Doug Walker

**[geo.ku.edu](http://geo.ku.edu)**

# Pardee Keynote Symposia

Pardee Keynote Symposia are named in honor of GSA Fellow and benefactor Joseph Thomas Pardee (1871–1960) via a bequest from Mary Pardee Kelly. Symposia consist of invited presentations covering a broad range of topics. These events will take place in the GSA e-Attend Platform Auditorium.

## P1. Assembling Laurentia: Turning Points in the Geologic Evolution of the North American Continent

**Monday, 26 Oct., 1:30–5:30 p.m. EDT**

**Endorsed by** *GSA Structural Geology and Tectonics Division; Mineralogical Society of America; GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division; GSA Sedimentary Geology Division; GSA Geophysics and Geodynamics Division*

**Disciplines:** Tectonics/Tectonophysics, Geophysics/Geodynamics, Geochemistry

**Advocates:** Dawn Kellett; Basil Tikoff; Michael L. Williams

The North American continent (Laurentia) records the evolution of tectonic processes from the earliest Archean to modern times. This Pardee Keynote Symposium will initiate a meeting-wide series of sessions focusing on “turning points” in the tectonic evolution of Laurentia. The goal is to integrate the broad range of geologic disciplines in order to scrutinize key periods in the long history of Laurentia when the character, rate, or style of tectonic processes changed or when the plate tectonic process itself may have changed in some fundamental way, and to identify potential drivers for these changes.

## P2. Frontiers of Research, Discovery, and Societal Impact in the Hydrologic Sciences

**Monday, 26 Oct., 1:30–5:30 p.m. EDT**

**Endorsed by** *GSA Hydrogeology Division; GSA Geology and Society Division; GSA Environmental and Engineering Geology Division; GSA Karst Division; GSA Limnogeology Division; Geochemical Society; GSA Quaternary Geology and Geomorphology Division*

**Discipline:** Hydrogeology

**Advocates:** Ingrid Y. Padilla; William L. Cunningham; Elizabeth Eide

The fields of hydrology and hydrogeology address how water interacts with the landscape and ecosystem as well as how hydrologic systems are altered by land use and climate. Hydrologic science research is often interdisciplinary and multidisciplinary, involving expertise from physical and ecosystem sciences, engineering, and/or mathematics, and integrates observational, experimental, theoretical, modeling, and field approaches. The field has changed rapidly due to new discoveries, technological advances, societal needs, and the data revolution. This session will include presentations from leaders in the field that highlight opportunities for research and societal impact in the hydrologic sciences, followed by a panel discussion.

## P3. Our Coastal Futures: Working Together to Understand Hazards and Mitigate Disasters

**Thursday, 29 Oct., 1:30–5:30 p.m. EDT**

**Endorsed by** *GSA Marine and Coastal Geoscience Division; GSA Geology and Society Division; GSA Quaternary Geology and Geomorphology Division; GSA Limnogeology Division*

**Disciplines:** Marine/Coastal Science, Geoscience and Public Policy, Geoscience Information/Communication

**Advocates:** Rónadh Cox; Robert Weiss

As sea level rises and storm intensity increases, the coastal zone bears the brunt. As we work to understand the science of coastal hazards, we must also consider the human and societal aspects as part of effective mitigation strategies. This symposium convenes a transdisciplinary group of experts in coastal and marine geoscience, policy, anthropology, and history, to discuss the multiplex aspects of coastal hazards in the twenty-first century. This includes cutting-edge scientific approaches as well as attention to social justice and inclusivity.

## P4. The Next Generation of Geoscience Leaders: Strategies for Excellence in Diversity and Inclusion

**Tuesday, 27 Oct., 1:30–5:30 p.m. EDT**

**Endorsed by** *GSA International; Mineralogical Society of America*

**Discipline:** Geoscience Education

**Advocates:** Raquel Bryant; Benjamin Andrew Keisling

Scientists who make significant diversity, equity, and inclusion (DEI) contributions are often not rewarded, and may even be penalized for their additional efforts. In order to make real strides in achieving DEI goals, we must reframe scientific and academic excellence to include the rigorous pursuit of equity in the geoscience community. This Pardee Symposium will feature (A) speakers who are leaders and role models with demonstrated records of excellence in DEI, (B) a leadership exercise to develop targeted community-relevant solutions, and (C) a panel of non-scientist experts that can provide additional resources to support DEI efforts.

## P5. Challenges and Solutions for a Changing Climate: New Directions for GSA

**Friday, 30 Oct., 10 a.m.–2 p.m. EDT**

**Endorsed by** *GSA Geology and Society Division; GSA Geology and Health Division; GSA Sedimentary Geology Division; GSA Structural Geology and Tectonics Division; GSA Karst Division; GSA Geochronology Division; GSA Quaternary Geology and Geomorphology Division; GSA Energy Geology Division; GSA Environmental and Engineering Geology Division; GSA Marine and Coastal Geoscience Division; GSA Soils and Soil Processes Division; GSA Mineralogy, Geochemistry, Petrology and Volcanology Division; GSA Continental Scientific Drilling Division; GSA Hydrogeology Division; GSA Limnogeology Division; GSA Geoscience Education Division; GSA Geology and Public Policy Committee; GSA International*

**Disciplines:** Environmental Geoscience, Energy Geology, Geoscience Information/Communication

**Advocates:** Beth Bartel; Malcolm Siegel; Candace L. Kairies-Beatty; Luke J. Bowman; Sinjini Sinha

Responding to a 2019 challenge from GSA President Don Siegel, this symposium in turn challenges GSA leadership and membership to think creatively, critically, and constructively about our role in climate change solutions. The year is 2020. Looking back, what will we wish we had done? This session looks forward, exploring visions and viewpoints in the themes of assessment, mitigation, adaptation, and engagement, with a focus on North America. As a society of geoscientists, it is our responsibility to drive the solutions that will ensure a sustainable existence on our favorite planet.

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# GSA Resource & Innovation Center

**Exhibitor deadline:** 4 Oct.

**For exhibitor questions please contact:**

Gavin McAuliffe, exhibits manager, Corcoran Expositions Inc.,  
gavin@corcexpo.com, +1-312-265-9649

**GSA 2020 Connects Online Exhibitor Schedule**

*Times in Eastern Daylight Time*

11 a.m.–3 p.m., Tues.–Thurs., 27 to 29 Oct.

**ASSOCIATED SOCIETIES**

- AASP - The Palynological Society
- Geochemical Society
- International Association for Geoscience Diversity
- Paleontological Research Institution
- The Paleontological Society

**CAMPUS CONNECTION**

- East Carolina University
- Missouri University of Science and Technology
- Syracuse University
- University of Delaware
- University of Minnesota Duluth/Twin Cities Earth & Environmental Sciences

- University of Oklahoma School of Geology and Geophysics
- University of Southern California
- Western Michigan University

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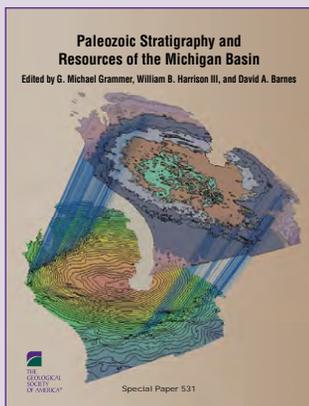
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- International Ocean Discovery Program
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- Society for Sedimentary Geology
- The Geological Society of America
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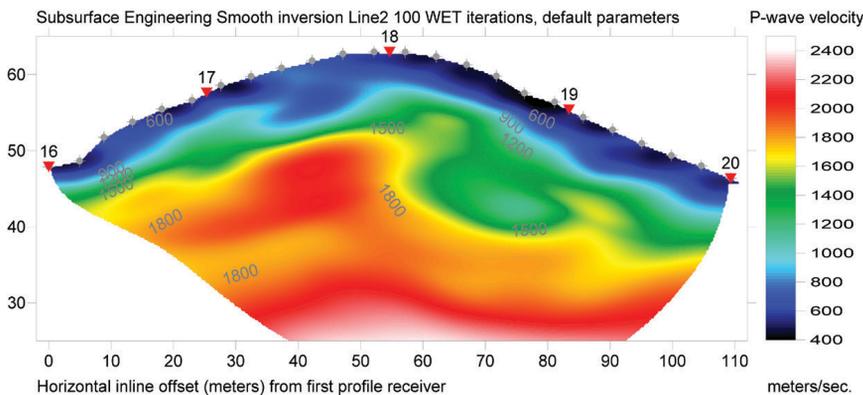
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## CALL FOR NOMINATIONS

# 2021 GSA Awards & Medals



GSA selects individuals based on track record and commitment to integrity and promise to continue living up to the ethical standards embodied in GSA's Code of Ethics & Professional Conduct, in addition to their many accomplishments.

The deadline for receipt of all medal, award, and recognition nominations is **1 February 2021**. Learn more at <https://www.geosociety.org/awards>

### Penrose Medal

The Penrose Medal was established in 1927 by R.A.F. Penrose Jr. to be awarded in recognition of eminent research in pure geology, for outstanding original contributions, or for achievements that mark a major advance in the science of geology. Nominees do not need to be members of the Society. Penrose's objective was to encourage original work in purely scientific geology, which is interpreted as applying to all scientific disciplines represented by GSA. Scientific achievements should be considered rather than contributions in teaching, administration, or service. Mid-career scientists who have already made exceptional contributions should be given full consideration for the award.

### Day Medal

The Arthur L. Day Medal was established in 1948 through a donation by Arthur L. Day, founding director of the Geophysical Laboratory of the Carnegie Institution of Washington. It recognizes outstanding distinction in the application of physics and chemistry to the solution of geologic problems, with no restriction to the particular field of geologic research. It was Dr. Day's wish to provide an award to recognize outstanding achievement in research and to inspire further effort, rather than to reward a distinguished career, so it has been the longstanding practice of the Society to award this medal to geoscientists actively pursuing a research career.

### Young Scientist Award (Donath Medal)

The Young Scientist Award was established in 1988 to be awarded to a young scientist (35 years or younger throughout the year in which the award is to be presented—for 2021, only those candidates born on or after 1 January 1986 are eligible) for outstanding achievement in contributing to geologic knowledge through original research that marks a major advance in the earth sciences. The award consists of a gold medal and an honorarium.

### How to Nominate for These Three Medals

To ensure thorough consideration by the respective committees, please follow these nomination instructions carefully; additional information supplied will not enhance the nomination.

1. **Nomination form:** Go to <https://rock.geosociety.org/forms/Awardform.asp>.
2. **Supporting documents**, to be submitted as e-mail attachments or via post:
  - **Curriculum vitae;**

- Summary (300 words or less) of the scientific contributions to geology that qualify the candidate for the award;
- Selected bibliography of no more than 20 titles (for the Donath medal, only 10 titles are required); and
- Letters of support from each of five GSA Fellows or members *in addition* to the person making the nomination. **For the Day Medal only:** letters from five scientists with at least three of those being from GSA Fellows or members and two from fellows or members of the Mineralogical Society of America, Geochemical Society, or American Geophysical Union.

### Florence Bascom Geologic Mapping Award

This award acknowledges contributions in published high-quality geologic mapping that led the recipient to publish significant new scientific discoveries, to bring about greater understanding of fundamental geologic processes and concepts, and to contribute to the application of new knowledge to societal needs and opportunities in such areas as mineral resources, water resources, and the environment.

The recipient will have authored high-quality geologic maps, cross sections, and summary reports that have received scientific acclaim and are available to both peers and the public, through federal or state agencies or major scientific societies. In evaluating the merits of nominees for this award, scientific achievements should be considered rather than contributions in teaching, administration, or service. Nominees do not need to be members of the Society, and they may be from any nation.

Selection criteria: (A) excellence of the nominee's published geologic maps; (B) a clear record of greater understanding of fundamental geologic processes and/or concepts, and high-quality publication of same, emerging directly from the meritorious quality of the geologic mapping; and (C) peer acclaim of the practical usefulness of the geologic mapping and the new discoveries that emerged from the mapping.

### How to Nominate

1. **Nomination form:** <https://rock.geosociety.org/forms/Awardform.asp>.
2. **Supporting documents**, to be submitted as e-mail attachments or via post:
  - **Curriculum vitae;**
  - Letter of nomination (300 words or less) addressing the evaluation criteria;
  - Selected bibliography of geologic maps (20 titles or less);
  - Selected bibliography of peer-reviewed publications (20 titles or less);
  - PDFs or website links to several key geologic maps authored by the nominee; and
  - Letters of support from three scientists with at least two from GSA Fellows or members and one from a member of another professional geoscience organization. Diverse supporters (i.e., including individuals who are not currently/recently associated with the nominee's institution) are strongly encouraged.

## The Bromery Award for Minorities

This award should be given to a person of any minority, preferably African American, who qualifies under at least one of these two categories:

1. Nominee has made significant contributions to research in the geological sciences, as exemplified by one or more of the following:
  - Publications that have had a measurable impact on the geosciences;
  - Outstanding original contributions or achievements that mark a major advance in the geosciences; and
  - Outstanding lifetime career that demonstrates leadership in geoscience research.
2. Nominee has been instrumental in opening the geoscience field to other minorities, as exemplified by one or more of the following:
  - Demonstrable contributions in teaching or mentoring that have enhanced the professional growth of minority geoscientists;
  - Outstanding lifetime career service in a role that has highlighted the contributions of minorities in advancing the geosciences; and
  - Authorship of educational materials of high scientific quality that have enjoyed widespread use and acclaim among educators or the general public.

### How to Nominate

1. **Nomination form:** <https://rock.geosociety.org/forms/Awardform.asp>.
2. **Supporting documents**, to be submitted as e-mail attachments or via post:
  - **Curriculum vitae;**
  - Letter of nomination (300 words or less);
  - Letters of support from three scientists with at least two from GSA Fellows or members and one from a member of another professional geoscience organization; and
  - Optional selected bibliography of no more than 10 titles.

## Doris M. Curtis Outstanding Woman in Science Award

This award recognizes a woman who has had a major impact on the field of the geosciences based on her Ph.D. research. GSA's 103rd president, Doris Curtis pioneered many new directions for geology, not the least of which was her tenure as GSA president after an unbroken chain of 102 men. Causes dear to her were women, public awareness, minorities, and education. Women are eligible for this award the first three years following their Ph.D.

### How to Nominate

1. **Nomination form:** <https://rock.geosociety.org/forms/Awardform.asp>;
2. **Supporting documents**, to be submitted as e-mail attachments or via post:
  - **Curriculum vitae including** dissertation title and abstract
  - Letter of nomination that clearly states how the Ph.D. research has impacted the geosciences in a major way
  - Letters of support from three scientists with at least two from GSA Fellows or members and one from a member of another professional geoscience organization; and
  - Selected bibliography of no more than 10 titles.

## GSA Distinguished Service Award

This award recognizes individuals for their exceptional service to the Society. GSA members, Fellows, associates, and employees may be nominated for consideration, and any GSA member or employee may submit a nomination for the award.

### How to Nominate

1. **Nomination form:** <https://rock.geosociety.org/forms/Awardform.asp>.
2. **Supporting documents**, to be submitted as e-mail attachments or via post:
  - **Curriculum vitae;**
  - Letter of nomination (300 words or less);
  - Brief biographical sketch that clearly demonstrates the applicability of the selection criteria; and
  - Optional selected bibliography of no more than 10 titles.

## GSA Public Service Award

GSA Council established this award in 1998 in honor of Eugene and Carolyn Shoemaker. It recognizes contributions that have materially enhanced the public's understanding of the earth sciences or have significantly served decision makers in the application of scientific and technical information to public affairs and earth-science-related public policy. This may be accomplished by individual achievement in:

- Authorship of education materials of high scientific quality that have enjoyed widespread use and acclaim among educators or the general public;
- Acclaimed presentations (books and other publications, mass and electronic media, or public presentations, including lectures) that have expanded public awareness of the earth sciences;
- Authorship of technical publications that have significantly advanced scientific concepts or techniques applicable to the resolution of earth-resource or environmental issues of public concern; and/or
- Other individual accomplishments that have advanced the earth sciences in the public interest.

The award will normally go to a GSA member of any nation, with exceptions approved by Council, and may be presented posthumously to a descendant of the awardee.

### How to Nominate

1. **Nomination form:** <https://rock.geosociety.org/forms/Awardform.asp>.
2. **Supporting documents**, to be submitted as e-mail attachments or via post:
  - **Curriculum vitae;**
  - Letter of nomination (300 words or less);
  - Brief biographical sketch that clearly demonstrates the applicability of the selection criteria; and
  - Selected bibliography of no more than 10 titles.

## Honorary Fellow

Honorary Fellowship may be bestowed on individuals who have made outstanding and internationally recognized contributions to geoscience, or in rare circumstances, provided notable service to the Society. In practice, nearly all candidates are non-North Americans who live and work outside of North America. The most noteworthy exceptions were astronauts. The awardee does not

have to be a member of the Society. No more than two Honorary Fellows will be awarded annually. Honorary Fellows will be recognized during the GSA Annual Meeting and will receive complimentary life-time membership to the Society.

### How to Nominate

1. **Nomination form:** <https://rock.geosociety.org/forms/Awardform.asp>.
2. **Supporting documents**, to be submitted as e-mail attachments or via post:
  - **Curriculum vitae;**
  - Letter of nomination (300 words or less) that clearly demonstrates the applicability of the selection criteria;
  - Letters of support from three scientists with at least two from GSA Fellows and one from a GSA Fellow or a person of equivalent international stature; and
  - Selected bibliography of no more than 20 titles.

### Award Notes

Candidates whose names are submitted by the respective award committees to GSA Council but who do not receive an award will remain under consideration by those committees for three years. For those still under consideration, it is recommended that an updated nomination letter be sent to GSA.

All nomination forms and submission instructions can be found online at [www.geosociety.org/awards/](http://www.geosociety.org/awards/). Nomination forms and instructions can also be obtained from GSA Grants and Awards, P.O. Box 9140, 3300 Penrose Place, Boulder, CO 80301-9140, USA, +1-303-357-1028, [awards@geosociety.org](mailto:awards@geosociety.org).

### John C. Frye Environmental Geology Award

**Deadline:** 31 March 2021

In cooperation with the Association of American State Geologists (AASG), GSA makes an annual award for the best paper on environmental geology published either by GSA or by one of the state geological surveys.

Anyone can nominate a paper as long as it is selected from GSA or a state geological survey publication and published during the preceding three full calendar years. The nomination letter must

include a paragraph stating the importance of the paper. Up to three letters from users of the publication can be included to support the nomination.

Each nominated paper will be judged on its uniqueness or significance as a model of its type of work and its overall worthiness for the award. The paper must (1) establish an environmental problem or need; (2) provide substantive information on the basic geology or geologic process pertinent to the problem; (3) relate the geology to the problem or need; (4) suggest solutions or provide appropriate land-use recommendations based on the geology; (5) present the information in a manner that is understandable and directly usable by geologists; and (6) address the environmental need or resolve the problem. It is preferred that the paper be directly applicable to informed laypersons (e.g., planners, engineers).

**Please send your nominations to** GSA Grants and Awards, P.O. Box 9140, Boulder, CO 80301-9140, USA. For more information, go to [http://www.stategeologists.org/awards\\_honors.php](http://www.stategeologists.org/awards_honors.php).

### AGI Medal in Memory of Ian Campbell

This medal recognizes singular performance in and contribution to the profession of geology. Candidates are measured against the distinguished career of Ian Campbell, whose service to the profession touched virtually every facet of the geosciences. Campbell was a most uncommon man of remarkable accomplishment and widespread influence, and in his career as a geologist, educator, administrator, and public servant, he was noted for his candor and integrity. To submit a nomination, go to <https://www.americangeosciences.org/awards>.

### AGI Marcus Milling Legendary Geoscientist Medal

This medal is given to a recipient who has made consistent contributions of high-quality scientific achievements and service to the earth sciences having lasting, historic value; who has been recognized for accomplishments in field(s) of expertise by professional societies, universities, or other organizations; and is a senior scientist nearing completion or has completed full-time regular employment. To submit a nomination, go to <https://www.americangeosciences.org/awards/legendarygeoscientist>.

# Call for Field Trip, Short Course, and Technical Session Proposals



It's time to plan for the GSA 2021 Annual Meeting in Portland, Oregon, USA. We challenge you to propose a field trip, short course, and/or a technical session that reflects your expertise and pushes the boundaries of the discipline. Share your science with your community, teach your colleagues, and promote discussion of the incredible regional geology.

## Show the geology by leading a Field Trip.

Field Trip proposal deadline: **1 Dec. 2020**

*Trips can be anywhere from a half day to five days long. Field trip proposals may be submitted by anyone. We are accepting proposals for virtual field trips also. The selection can be made within the proposal submission form.*

<https://gsa.confex.com/gsa/2021AM/fieldtrip/cfs.cgi>

## Exchange the geology by organizing and chairing a Technical Session.

Technical Session deadline: **1 Feb. 2021**

*Proposals are being taken for Pardee, Keynote, Symposia, and Topical Sessions. Please make your selection on the proposal submission form.*

<https://gsa.confex.com/gsa/2021AM/cfs.cgi>

## Share the geology as an instructor of a Short Course.

Short Course proposal deadline: **1 Feb. 2021**

*Courses run the Friday and Saturday before the meeting and are typically a half day to two full days.*

<https://gsa.confex.com/gsa/2021AM/shortcourse/cfs.cgi>



### A MESSAGE FROM GSA's EXECUTIVE DIRECTOR

Dear Colleagues,

As you know, GSA is committed to the ideal of scientific discovery, rigor, diversity, and integrity.

I invite you to prepare a proposal for a Technical Session for the 2021 annual meeting that reflects your expertise and research but also pushes the boundaries of the discipline. Without expanding our horizon, we will not move the geosciences forward and keep our relevance. I challenge you to also broaden your reach to those you collaborate with by including diversity in all ways— discipline, career progression, and individuals.

Thank you for considering sharing your science and work at the GSA 2021 Annual Meeting.

—Vicki S. McConnell



<https://www.geosociety.org>

# Northeastern Section

56th Annual Meeting of the Northeastern Section, GSA  
Hartford, Connecticut, USA  
14–16 March 2021

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



The skyline of Hartford, Connecticut, as seen from across the Connecticut River. Image by Jimaro Morales from Pixabay.

## Lithosphere, Hydrosphere, Anthroposphere

### LOCATION

Hartford was established in 1637 and is one of the oldest and most historic cities in the United States. It is the capital city and home to some of the largest corporations in Connecticut. The city is located on the Mesozoic rocks of the Hartford rift basin with its outstanding dinosaur footprints. It is a short drive from Long Island Sound, metamorphic rocks of the eastern and western uplands, and sediments of Glacial Lake Hitchcock. The meeting will be held at the Hartford Convention Center, which opened in 2005 and is within walking distance of parks along the Connecticut River and by the state capitol building, the Connecticut Science Center, the Wadsworth Atheneum Museum of Art, and a wide range of coffee shops, restaurants, and entertainment venues.

### CALL FOR PAPERS

**Abstracts deadline:** 8 Dec. 2020

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

**Abstract submission fee:** GSA members: professionals: US\$30; students: US\$18. Non-members: professionals: US\$60; students: US\$36.

If you cannot submit an abstract online, please contact Heather Clark, +1-303-357-1018, [hclark@geosociety.org](mailto:hclark@geosociety.org).

### TECHNICAL PROGRAM

#### Symposia

- S1. **Stories in Stone: The Legacy of Jelle Zeilinga de Boer.** *Cosponsored by Department of Earth and Environmental Sciences, Wesleyan University; Geological Society of Connecticut; GSA Structural Geology and Tectonics Division; Connecticut Geological Survey, Department of Energy and Environmental Protection.* Phillip G. Resor, Wesleyan Univ., [presor@wesleyan.edu](mailto:presor@wesleyan.edu); Johan C. Varekamp, Wesleyan Univ., [jvarekamp@wesleyan.edu](mailto:jvarekamp@wesleyan.edu); Martha S. Gilmore, Wesleyan Univ., [mgilmore@wesleyan.edu](mailto:mgilmore@wesleyan.edu).
- S2. **Magma Ascent to Magma Mingling, Volatility, and Volcanism: A Session in Honor of Sheila J. Seaman.** *Cosponsored by GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* Christopher Koteas, Norwich Univ., [gkoteas@norwich.edu](mailto:gkoteas@norwich.edu); David Gibson, Univ. of Maine Farmington, [dgibson@maine.edu](mailto:dgibson@maine.edu).

#### Theme Sessions

- T1. **Use of Digital Well Record Data Sets for Characterizing Fractured Crystalline Bedrock Hydrogeology.** *Cosponsored by Connecticut Geological Survey, Department of Energy and Environmental Protection; GSA Hydrogeology Division.* Gary Robbins, Univ. of Connecticut, [gary.robbs@uconn.edu](mailto:gary.robbs@uconn.edu); Meredith Metcalf, Eastern Connecticut State Univ., [metcalfm@easternct.edu](mailto:metcalfm@easternct.edu).
- T2. **Urban Hydrology and Geochemistry.** *Cosponsored by GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division; GSA Hydrogeology Division; GSA Quaternary Geology and Geomorphology Division.* Ashleigh Kirker, Temple Univ., [ashleigh.kirker@temple.edu](mailto:ashleigh.kirker@temple.edu); Daniel J. Bain, Univ. of Pittsburgh, [dbain@pitt.edu](mailto:dbain@pitt.edu).
- T3. **Impact of Sulfide Weathering on Environmental Quality and Infrastructure.** *Cosponsored by GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* Margaret Thomas, Connecticut Geological Survey, Dept. of Energy and Environmental Protection, [margaret.thomas@ct.gov](mailto:margaret.thomas@ct.gov); Jonathan Gourley, Trinity College, [jonathan.gourley@trincoll.edu](mailto:jonathan.gourley@trincoll.edu).
- T4. **Biogeochemical Cycling of Environmental Contaminants (Posters).** *Cosponsored by GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division; GSA Hydrogeology Division.* Yinka Oyewumi, Central Connecticut State Univ., [oyewumi@ccsu.edu](mailto:oyewumi@ccsu.edu); Justin Richardson, Univ. of Massachusetts, Amherst, [jbrichardson@umass.edu](mailto:jbrichardson@umass.edu).
- T5. **Private Wells—Current Challenges and Opportunities.** *Cosponsored by GSA Hydrogeology Division; GSA Quaternary Geology and Geomorphology Division.* Sille Larsen, Vermont Dept. of Health, [sille.larsen@vermont.gov](mailto:sille.larsen@vermont.gov); Joe Ayotte, U.S. Geological Survey, [jayotte@usgs.gov](mailto:jayotte@usgs.gov); Jon Kim, Vermont Geological Survey, [Jon.Kim@vermont.gov](mailto:Jon.Kim@vermont.gov); Patti Casey, Vermont Agency of Agriculture, Food and Markets, [Patti.Casey@vermont.gov](mailto:Patti.Casey@vermont.gov); Paul Susca, New Hampshire Dept. of Environmental Services, [Paul.Susca@des.nh.gov](mailto:Paul.Susca@des.nh.gov).

- T6. **Geochemical Signatures of River Catchment Sediments Production, Transport, and Depositional Processes.** *Cosponsored by GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division; GSA Hydrogeology Division; GSA Quaternary Geology and Geomorphology Division.* Queenie Chang, Univ. of Connecticut, queenie.chang@uconn.edu; Michael Hren, Univ. of Connecticut, michael.hren@uconn.edu.
- T7. **From the Surface to the Subsurface and Back: Groundwater Influence on Stream Networks.** *Cosponsored by GSA Hydrogeology Division.* Janet Barclay, U.S. Geological Survey, jbarclay@usgs.gov; Eric Moore, Univ. of Connecticut, eric.m.moore@uconn.edu.
- T8. **Environmental Hydrogeology and Innovations in Geologic Environmental Investigation Methods.** *Cosponsored by GSA Hydrogeology Division.* Nick Hastings, Woodard and Curran, nhastings@woodardcurran.com; Mike Apfelbaum, Woodard and Curran, mapfelbaum@woodardcurran.com.
- T9. **Current Research in Coastal and Marine Processes.** *Cosponsored by Eastern Section–SEPM (Society for Sedimentary Geology); GSA Quaternary Geology and Geomorphology Division.* Bryan Oakley, Eastern Connecticut State Univ., OakleyB@easternct.edu; Mark Borrelli, CAPE Lab, Univ. of Massachusetts–Boston, Mark.Borrelli@umb.edu; Justin Shawler, Virginia Institute of Marine Science, jshawler@vims.edu; Arye Janoff, Montclair State Univ., janoffa2@montclair.edu; Isamar Cortes, Montclair State Univ., cortesil@montclair.edu; Rose Palermo, Massachusetts Institute of Technology and Woods Hole Oceanographic Institution, rpalermo@mit.edu.
- T10. **Classic Ground and New Developments: Stratigraphy and Sedimentology in the Northeast.** *Cosponsored by Eastern Section–SEPM (Society for Sedimentary Geology).* James R. Ebert, SUNY Oneonta, James.Ebert@oneonta.edu; Alex Bartholomew, SUNY New Paltz, barthola@newpaltz.edu.
- T11. **Exploring New England’s Signature Landform: The Fieldstone Wall.** *Cosponsored by GSA Quaternary Geology and Geomorphology Division.* Robert M. Thorson, Univ. of Connecticut, robert.thorson@uconn.edu; William Ouimet, Univ. of Connecticut, william.ouimet@uconn.edu.
- T12. **Understanding Orogenic Paleogeography, Past Climates, and Biotic Changes Using Innovative Methods in Detrital Geochronology and Geochemistry—Northeast USA and Beyond.** *Cosponsored by Eastern Section–SEPM (Society for Sedimentary Geology); GSA Quaternary Geology and Geomorphology Division.* Julie Fosdick, Univ. of Connecticut, julie.fosdick@uconn.edu; Sidney Hemming, Columbia Univ., sidney@ldeo.columbia.edu; Athena Eyster, Massachusetts Institute of Technology, aeyster@mit.edu.
- T13. **Landscape Disturbances from Pleistocene to Present: A Look at Geomorphic Resiliency and Response in the Northeast U.S.** *Cosponsored by Eastern Section–SEPM (Society for Sedimentary Geology); GSA Quaternary Geology and Geomorphology Division.* Samantha Dow, Univ. of Connecticut, samantha.dow@uconn.edu; Andy Fallon, Univ. of Connecticut, andy.fallon@uconn.edu.
- T14. **Insights about the Tectonic Evolution of Eastern North America from Rocks, Seismic Data, Experiments, and Models.** *Cosponsored by the GSA Structural Geology and Tectonics Division; GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* Sara Mana, Salem State Univ., smana@salemstate.edu; Victor Guevara, Amherst College, vguevara@amherst.edu; Emily Peterman, Bowdoin College, epeterma@bowdoin.edu; Erkan Toraman, Salem State Univ., etoraman@salemstate.edu.
- T15. **Alkaline Magmatism in the Northern Appalachians.** *Cosponsored by GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* Matthew Severs, Richard Stockton Univ., matthew.severs@stockton.edu; Allison Weinstein, Central Connecticut Univ., weinsteigera@ccsu.edu.
- T16. **Mineral Deposits in the Northeast: Geologic Insights from Recent Studies.** *Cosponsored by Connecticut Geological Survey, Department of Energy and Environmental Protection; GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* Harold Moritz, Geological Society of Connecticut, fritzandsheila@pobox.com.
- T17. **Pre-Atlantic Geological Connections among Northwest Africa, Southern Europe, and Eastern North America.** *Cosponsored by GSA Structural Geology and Tectonics Division; GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* Yvette D. Kuiper, Colorado School of Mines, ykuiper@mines.edu; Sandra M. Barr, Acadia Univ., sandra.barr@acadiau.ca; Faouziya Haissen, Hassan II Univ. of Casablanca, faouziya.haissen@gmail.com; Pilar G. Montero, Univ. of Granada, pmontero@ugr.es; Saïd Belkacim, Ibn Zohr Univ., s.belkacim@uiz.ac.ma.
- T18. **Technology-Driven Active Learning in the Geosciences.** Tarin Weiss, Westfield State Univ., tweiss@westfield.ma.edu; Lori Weeden, Univ. of Massachusetts–Lowell, lori\_weeden@uml.edu.
- T19. **Running around the Track the Other Way: Innovation and Creativity in Geoscience Education and Introductory Geology.** *Cosponsored by National Association of Geoscience Teachers, Eastern Section; National Association of Geoscience Teachers, Teacher Education Division.* Christopher Roemmele, West Chester Univ., croemmele@wcupa.edu.
- T20. **The Human Epoch: Researching and Teaching the Anthropocene.** *Cosponsored by GSA Quaternary Geology and Geomorphology Division.* Gary A. Gomby, Central Connecticut State Univ., garygomby@ccsu.edu; Robert M. Thorson, Univ. of Connecticut, robert.thorson@uconn.edu.

- T21. **It's a Bird, It's a Plane, It's a UAV—Advances in Unmanned Aerial Vehicles (UAVs) for Research and Education.** *Cosponsored by National Association of Geoscience Teachers; GSA Geoscience Education Division; Eastern Section–SEPM (Society for Sedimentary Geology).* Lauren Neitzke Adamo, Rutgers Univ., lneitzke@eps.rutgers.edu; Christian Rowan, Rutgers Univ., cmr392@scarletmail.rutgers.edu; Ashlyn Spector, Rutgers Univ., as3201@eps.rutgers.edu.
- T22. **Geoscience and “Science Denial” in the Classroom and Beyond.** *Cosponsored by GSA Quaternary Geology and Geomorphology Division.* Kristine Larsen, Central Connecticut State Univ., Larsen@ccsu.edu.
- T23. **Next Generation Science Standards (NGSS) Three-Dimensional (3D) Learning: Exploring K–12 Geoscience 3D Activities that Engage Students in Natural Science Phenomenon.** Jeffrey Thomas, Central Connecticut State Univ., thomasjed@ccsu.edu; Marsha Bednarski, Central Connecticut State Univ., bednarskim@ccsu.edu.

## FIELD TRIPS

Trip registration opens in January. For additional information, please contact the Field Trip chair Jean Crespi, jean.crespi@uconn.edu.

**Burying the Park: Hartford and its Rivers.** *Cosponsored by Eastern Section–SEPM (Society for Sedimentary Geology); GSA Quaternary Geology and Geomorphology Division.* Gary A. Gomby, Central Connecticut State Univ., garygomby@ccsu.edu.

**Anthropocene Landscape Change and the Legacy of Human Impacts in Southern New England.** *Cosponsored by Eastern Section–SEPM (Society for Sedimentary Geology); GSA Quaternary Geology and Geomorphology Division.* William Ouimet, Univ. of Connecticut, william.ouimet@uconn.edu; Robert Thorson, Univ. of Connecticut, robert.thorson@uconn.edu.

**Building Connecticut's Jurassic Park: Biotic and Environmental Recovery from the End-Triassic Extinction in the Hartford Basin.** *Cosponsored by Eastern Section–SEPM (Society for Sedimentary Geology); Connecticut Geological Survey Department of Energy and Environmental Protection.* Peter A. Drzewiecki, Eastern Connecticut State Univ., drzewieckip@easternct.edu; Paul E. Olsen, Lamont-Doherty Earth Observatory, Columbia Univ., polsen@ldeo.columbia.edu; James A. Hyatt, Eastern Connecticut State Univ., hyattj@easternct.edu; Randolph P. Steinen, Univ. of Connecticut and Connecticut Dept. of Energy and Environmental Protection (retired), rsteinen@gmail.com.

**Metamorphic Terranes of Western Connecticut: A Complex History of Early Paleozoic Accretion, Deformation, and Intrusion.** *Cosponsored by Geological Society of Connecticut; Connecticut Geological Survey Department of Energy and Environmental Protection; GSA Structural Geology and Tectonics Division; GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* William Burton, U.S. Geological Survey (emeritus), wburton@usgs.gov; Robert Wintsch, Wesleyan Univ.,

wintsch@indiana.edu; Craig Dietsch, Univ. of Cincinnati, dietscc@ucmail.uc.edu; Gregory Walsh, U.S. Geological Survey, gwalsch@usgs.gov; Ryan Deasy, U.S. Geological Survey, ryantdeasy@gmail.com; William Devlin, Rock Bottom Associates, pevov26@icloud.com.

**Revisiting the Geology of Central Park, Manhattan, New York City, USA.** Steven J. Jaret, American Museum of Natural History, sjaret@amnh.org; Nicholas D. Tailby, American Museum of Natural History, ntailby@amnh.org; Keiji Hammond, American Museum of Natural History, khammond@amnh.org.

**Accessible Geology in the Hartford Basin.** *Cosponsored by International Association for Geoscience Diversity (IAGD); Eastern Section–SEPM (Society for Sedimentary Geology).* Jennifer Piatek, Central Connecticut State Univ., piatekjel@ccsu.edu; Anita Marshall, Univ. of Florida, anita.marshall@ufl.edu; Sean Thatcher, Rutgers Univ., sean.thatcher1990@gmail.com.

**Exploring Western New England's Geologic History: A Half-Day Field Trip for Teachers and Community.** *Cosponsored by National Association of Geoscience Teachers, New England Section.* Tarin Weiss, Westfield State Univ., tweiss@westfield.ma.edu; Susan Meabh-Kelly, Henry Abbot Technical School, susankelly.ct@gmail.com; Lindsay Waack, Wilton High School, LWAACK@fairfieldschools.org; Lori Weeden, Univ. of Massachusetts, Lowell, Lori\_Weeden@uml.edu.

## SHORT COURSES

Course registration opens in January. For additional information, please contact the Short Course chair, Margaret Thomas, Margaret.Thomas@ct.gov.

**Teaching the Anthropocene.** *Cosponsored by Eastern Section–SEPM (Society for Sedimentary Geology).* Robert M. Thorson, Univ. of Connecticut, robert.thorson@uconn.edu.

**High Tech, Low Tech, No Tech? Developing Inclusive Field Experiences.** Jennifer Piatek, Central Connecticut State Univ., piatekjel@ccsu.edu; Anita Marshall, Univ. of Florida, anita.marshall@ufl.edu; Sean Thatcher, Rutgers Univ., sean.thatcher1990@gmail.com.

**The LiDAR Revolution in Earth Surface Mapping—From Data Download to Applications in Historic Land-Use Reconstruction and Surficial Geologic Mapping.** *Cosponsored by Eastern Section–SEPM (Society for Sedimentary Geology).* William Ouimet, Univ. of Connecticut, william.ouimet@uconn.edu; Janet Radway Stone, U.S. Geological Survey (emeritus), jrstone@usgs.gov; Margaret A. Thomas, Connecticut Geological Survey, margaret.thomas@ct.gov.

**The Digital Geologic Map Schema (GeMS).** Robert G. Marvinney, Maine Geological Survey, robert.g.marvinney@maine.gov; David R. Soller, U.S. Geological Survey, drsoller@usgs.gov; Ralph Haugerud, U.S. Geological Survey, rhaugerud@usgs.gov.

## REGISTRATION

**Early registration deadline:** 8 February

**Cancellation deadline:** 16 February

Registration opens in January. For further information or if you need special accommodations, please contact the organizing chair, Mark Evans, [evansmaa@ccsu.edu](mailto:evansmaa@ccsu.edu).

## ACCOMMODATIONS

**Hotel registration deadline:** 19 February, 5 p.m. Eastern Time

A block of rooms has been reserved at the Hartford Marriott Downtown, 200 Columbus Blvd., Hartford, Connecticut, 06103 USA, located adjacent to the Connecticut Convention Center. The meeting rate is US\$169 per night single/double occupancy, US\$179 per night triple occupancy, and US\$189 per night quad occupancy, plus tax. The hotel offers many amenities (restaurants, bar, pool, Wi-Fi). There is a bus service from Bradley International Airport, and a complimentary DASH shuttle from the Hartford Union train station. Reservations can be made by calling +1-860-249-8000. Please be sure to identify yourself as attending the GSA Northeastern Section Meeting. Parking is available at the Convention Center garage next to the hotel. Connecticut Convention Center visitors are eligible for exclusive discounts at nearby restaurants, bars, and entertainment venues.

## OPPORTUNITIES FOR STUDENTS AND EARLY CAREER PROFESSIONALS

### Career Mentoring Luncheons

Ask your career-related questions and learn about non-academic pathways in the geosciences while networking with professionals at the Roy J. Shlemon and John Mann Mentor Luncheons. GSA student members are welcome to attend.

### Career Workshop Series

This three-part series will feature career development planning, an exploration of geoscience job sectors, and information on best practices for crafting a résumé and cover letter. Non-technical

skills and workforce statistics will be reviewed. No registration is required, and everyone is welcome.

To learn more about mentors and career workshops, go to <https://www.geosociety.org/mentors> or contact Jennifer Nocerino at [jnocerino@geosociety.org](mailto:jnocerino@geosociety.org).

### Student Volunteers

Take advantage of work opportunities to earn free meeting registration. Students interested in helping with the various aspects of the meeting should contact Jennifer Piatek, [piatekjel@ccsu.edu](mailto:piatekjel@ccsu.edu).

## PROFESSIONALS

If you like to share your interest, enthusiasm, and experience in applied geology, consider being a GSA mentor at the meeting. Being a mentor is a rewarding experience. To learn more, contact Jennifer Nocerino at [jnocerino@geosociety.org](mailto:jnocerino@geosociety.org).

This meeting also offers an excellent opportunity to earn CEUs toward your continuing education requirements for your employer, K–12 school, or professional registration. The CEU certificate can be downloaded from the meeting website after the meeting.

## LOCAL COMMITTEE

**Organizing Chair:** Mark Evans, [evansmaa@ccsu.edu](mailto:evansmaa@ccsu.edu)

**Technical Program Co-Chairs:** Michael Wizevich, [wizevichmic@ccsu.edu](mailto:wizevichmic@ccsu.edu); Christoph Geiss, [Christoph.geiss@trincoll.edu](mailto:Christoph.geiss@trincoll.edu)

**Field Trip Chair:** Jean Crespi, [jean.crespi@uconn.edu](mailto:jean.crespi@uconn.edu)

**Sponsorships Co-Chairs:** Allison Weinstein, [weinsteiger@ccsu.edu](mailto:weinsteiger@ccsu.edu); Oluyinka Oyewumi, [oyewumi@ccsu.edu](mailto:oyewumi@ccsu.edu)

**Short Course Chair:** Margaret Thomas, [Margaret.Thomas@ct.gov](mailto:Margaret.Thomas@ct.gov)

**Exhibits Co-Chairs:** Drew Hyatt, [hyattj@easternct.edu](mailto:hyattj@easternct.edu); Phil Resor, [presor@wesleyan.edu](mailto:presor@wesleyan.edu)

**Industry Relations Chair:** Jon Gourley, [jonathan.gourley@trincoll.edu](mailto:jonathan.gourley@trincoll.edu)

**Student Volunteer Chair:** Jennifer Piatek, [piatekjel@ccsu.edu](mailto:piatekjel@ccsu.edu)

**K–12 Teacher Education Program Co-Chairs:** Jeff Thomas, [thomasjed@ccsu.edu](mailto:thomasjed@ccsu.edu); Kristine Larsen, [larsen@ccsu.edu](mailto:larsen@ccsu.edu)



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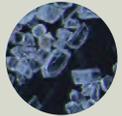
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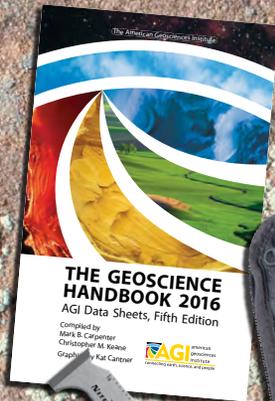


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# Southeastern Section

70th Annual Meeting of the Southeastern Section, GSA  
Auburn, Alabama USA

1–2 April 2021

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



William J. Samford Hall, Auburn University. The George F. Landegger Collection of Alabama Photographs in Carol M. Highsmith's America, Library of Congress, Prints and Photographs Division.

## Advancing knowledge in the geosciences to understand Earth's past, present and future

### LOCATION

The 70th Annual Meeting of GSA's Southeastern Section will be held in Auburn, Alabama, USA. This is the second SEGSA meeting to be held in Auburn, where the foothills of the southernmost Appalachians meet the Coastal Plain. As the "Loveliest Village of the Plains," Auburn and the surrounding regions are known for prominent universities, cultural centers, and natural attractions, with proximity to major cities of the southeast. The meeting will be held in the Auburn University Hotel and Dixon Conference Center, located on the campus of Auburn University. To allow maximum participation and increase the scope of its scientific content, the symposia, technical sessions, and field trips will offer combinations of in-person and virtual attendance. The technical program for the 70th SEGSA will be exceptionally broad and diverse, with topics from planetary geology and the origins of Earth to resilience in the context of environmental hazards and strategies to mitigate climate change. The meeting will be exceptionally rich in its emphasis of geoscience education, with a strong emphasis on field instruction and student safety, and it offers many opportunities for student participation and career mentoring. The 70th SEGSA has a strong program to encourage contributions in mineralogy, petrology, tectonics, sedimentology and stratigraphy, geochemistry, hydrogeology, geomorphology, geophysics, paleontology, and economic geology. We invite you to make plans to attend—in person or with a virtual format—as we use the perspectives of geoscience to understand Earth's past, present, and future.

### CALL FOR PAPERS

**Abstracts deadline:** 12 January 2021

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

**Abstract submission fee:** GSA members: professionals: US\$30; students: US\$18. Non-members: professionals: US\$60; students: US\$36.

If you cannot submit an abstract online, please contact Heather Clark, +1-303-357-1018, [hclark@geosociety.org](mailto:hclark@geosociety.org).

### TECHNICAL PROGRAM

#### Symposia

- S1. **CO<sub>2</sub> Storage in Geological Formations.** Richard A. Esposito, Southern Company, [raesposi@southernco.com](mailto:raesposi@southernco.com); Lauren Beckingham, Auburn Univ., [leb0071@auburn.edu](mailto:leb0071@auburn.edu).

- S2. **Climate Resilience.** Karen McNeal, Auburn Univ., [ksm0041@auburn.edu](mailto:ksm0041@auburn.edu); Katie Brown, Auburn Univ., [kbn0006@auburn.edu](mailto:kbn0006@auburn.edu); Chris Burton, Auburn Univ., [cgb0038@auburn.edu](mailto:cgb0038@auburn.edu); Chandana Mitra, Auburn Univ., [czm0033@auburn.edu](mailto:czm0033@auburn.edu); Susan Pan, Auburn Univ., [panshuf@auburn.edu](mailto:panshuf@auburn.edu); Di Tian, Auburn Univ., [tiandi@auburn.edu](mailto:tiandi@auburn.edu); Michelle Worosz, Auburn Univ., [mrw0016@auburn.edu](mailto:mrw0016@auburn.edu); Nedret Billor, Auburn Univ., [billone@auburn.edu](mailto:billone@auburn.edu).

#### Theme Sessions

- T1. **Water Resources in the Southeastern U.S.** Shannon Vattikuti, Mississippi State Univ., [skv16@msstate.edu](mailto:skv16@msstate.edu).
- T2. **UAS Applications in the Geosciences.** Stephanie R. Rogers, Auburn Univ., [s.rogers@auburn.edu](mailto:s.rogers@auburn.edu); Edna Fernandez-Figueroa, Auburn Univ., [egf0013@auburn.edu](mailto:egf0013@auburn.edu); Kunwar K. Singh, AidData—College of William & Mary, [ksingh@aiddata.wm.edu](mailto:ksingh@aiddata.wm.edu); James Connors, James J. Connors & Associates, [jjc@jamesjconnors.com](mailto:jjc@jamesjconnors.com).
- T3. **Geologic Maps, Geophysical Maps, 3D Geological Models, Digital Mapping Techniques, Map Derivatives, and Digital Map Preparation.** Randy L. Kath, Univ. of West Georgia, [rkath@westga.edu](mailto:rkath@westga.edu); Thomas J. Crawford, Univ. of West Georgia, [crawfordthomasj@gmail.com](mailto:crawfordthomasj@gmail.com).
- T4. **Undergraduate Research (Posters).** *Cosponsored by the Council on Undergraduate Research.* Lee Phillips, Univ. of North Carolina at Greensboro, [plphilli@uncg.edu](mailto:plphilli@uncg.edu); Jeff Ryan, Univ. of South Florida, [ryan@mail.usf.edu](mailto:ryan@mail.usf.edu).
- T5. **Rivers Local to Global: Understanding Natural and Anthropogenic Influences on Fluvial Systems.** Stephanie L. Shepherd, Auburn Univ., [slshepherd@auburn.edu](mailto:slshepherd@auburn.edu); Edna Fernandez-Figueroa, Auburn Univ., [egf0013@auburn.edu](mailto:egf0013@auburn.edu); Kunwar K. Singh, AidData—College of William & Mary, [ksingh@aiddata.wm.edu](mailto:ksingh@aiddata.wm.edu).
- T6. **Impact Cratering on Planetary Surfaces: Structures and Processes.** Leticia De Marchi, Auburn Univ., [lzd0034@auburn.edu](mailto:lzd0034@auburn.edu); Vinamra Agrawal, Auburn Univ., [vza0013@auburn.edu](mailto:vza0013@auburn.edu).

- auburn.edu; David T. King Jr., Auburn Univ., kingdat@auburn.edu.
- T7. **Out of the Classroom, Out of the Box: Innovative Approaches to Geoscience Education.** Patricia H. Kelley, Univ. of North Carolina Wilmington, kelley@uncw.edu; Renee M. Clary, Mississippi State Univ., RClary@geosci.msstate.edu.
- T8. **Geology at High Latitudes.** Samantha Hansen, Univ. of Alabama, shansen@geo.ua.edu; Rebecca Minzoni, Univ. of Alabama, rminzoni@ua.edu; Thomas Tobin, Univ. of Alabama, ttobin@ua.edu.
- T9. **New Insights into Old Crust.** Lorraine W. Wolf, Auburn Univ., wolflor@auburn.edu; Rob Hawman, Univ. of Georgia, rob@seismo.gly.uga.edu.
- T10. **Geophysical Tools for Environmental, Engineering, and Other Near-Surface Investigations.** Lorraine W. Wolf, Auburn Univ., wolflor@auburn.edu; Ervan G. Garrison, Univ. of Georgia, egarriso@uga.edu; Rob Hawman, Univ. of Georgia, rob@seismo.gly.uga.edu; Md. Iftekhar Alam, Univ. of Tennessee at Knoxville, malam11@utk.edu.
- T11. **New Insights into the Proterozoic through Phanerozoic Evolution of Eastern Laurentia from Geochronology and Geochemistry.** David Moecher, Univ. of Kentucky, moker@uky.edu.
- T12. **Undergraduate Research.** Brittani D. McNamee, Univ. of North Carolina Asheville, bmcnamee@unca.edu; Marian Buzon, Univ. of West Georgia, mbuzon@westga.edu.
- T13. **Geoscience Education Research.** Karen McNeal, Auburn Univ., ksm0041@auburn.edu; Lindsay Maudlin, Auburn Univ., lcm0046@auburn.edu; Kelly Best Lazar, Clemson Univ., klazar@clemson.edu.
- T14. **Pathways for Diversity, Equity, and Inclusion (DEI) in the Geosciences.** Karen McNeal, Auburn Univ., ksm0041@auburn.edu; Kim Mulligan-Guy, Auburn Univ., kxm0001@auburn.edu; Stephanie Shepherd, Auburn Univ., slshepherd@auburn.edu; Katie Brown, Auburn Univ., ksn0006@auburn.edu.
- T15. **Fluids, Melts, and Metals in the Crust.** Laura Bilenker, Auburn Univ., ldb0036@auburn.edu; Thomas Hudgins, Univ. of Puerto Rico Mayagüez, thomas.hudgins@upr.edu.
- T16. **Water Resources and Geohealth: Sources, Fate, Transport, and Remediation of Environmental Contaminants.** Ann Ojeda, Auburn Univ., aso0013@auburn.edu; Yuehan Lu, Univ. of Alabama, yuehan.lu@ua.edu; Ming-Kuo Lee, Auburn Univ., leeming@auburn.edu.
- T17. **Eastern Activities of the USGS Earth Mapping Resources Initiative: Results and Progress of Phases I, II, and III Critical Minerals Research.** Arthur Merschat, U.S. Geological Survey, amerschat@usgs.gov; Anjana Shah, U.S. Geological Survey, ashah@usgs.gov; Dane S. VanDervoort, Geological Survey of Alabama, dvandervoort@gsa.state.al.us; John P. Whitmore, Geological Survey of Alabama, jwhitmore@gsa.state.al.us; Nora K. Foley, U.S. Geological Survey, nfoley@usgs.gov.
- T18. **Interactions of Environments and Life during the Paleozoic.** Takehito Ikejiri, Univ. of Alabama and Alabama Museum of Natural History, ikejiri1859@gmail.com; Man Lu, Univ. of Alabama, mlu8@crimson.ua.edu.
- T19. **Transforming Field-Based Geosciences Experiences: Strategies for Improving Safety, Inclusion, Remote Learning, and Accessibility.** Laura Bilenker, Auburn Univ., ldb0036@auburn.edu; Brennan van Alderwerelt, Auburn Univ., bmv0011@auburn.edu; Stephanie Shepherd, Auburn Univ., slshepherd@auburn.edu.
- T20. **Deep Disposal or Storage of Waste and Its Potential in the Southeastern U.S.** David T. King Jr., Auburn Univ., kingdat@auburn.edu; Rod Baltzer, Deep Isolation Inc., rod@deepisolation.com; Andrew Sowder, Electric Power Research Institute, asowder@epri.com; Richard Esposito, Southern Company, raesposi@southernco.com; John Kessler, Kessler Associates, john@kesslerassociates.com.
- T21. **From the Margins to the Deep: A Tribute to the Science and Art of A. Conrad Neumann.** Blair Tormey, Western Carolina Univ., btormey@wcu.edu; Al Hine, Univ. of South Florida, hine@usf.edu; Paul Hearty, Univ. of Texas at Austin, kaisdad04@gmail.com.
- T22. **Planetary Science: Surface Processing on Terrestrial Planets and Small Bodies.** Masatoshi Hirabayashi, Auburn Univ., thirabayashi@auburn.edu; David King, Jr., Auburn Univ., kingdat@auburn.edu.
- T23. **Applying New Techniques and Large Datasets to the Blue Ridge and Piedmont of the Southern Appalachians.** Harold Stowell, Univ. of Alabama, hstowell@ua.edu; Ryan Thigpen, Univ. of Kentucky, ryan.thigpen@uky.edu; Matthew McKay, Missouri State Univ., matthewmckay@MissouriState.edu; Elizabeth Bollen, Univ. of Alabama, embollen@crimson.ua.edu.
- T24. **Crashing Landing: Meteorites, Craters, Chronology, and Composition.** Julia Cartwright, Univ. of Alabama, jacartwright@ua.edu; Courtney Sprain, Univ. of Florida, csprain@ufl.edu; Stephen Elardo, Univ. of Florida, selardo@ufl.edu; Jenny Whitten, Tulane Univ., jwhitten1@tulane.edu; Colin Jackson, Tulane Univ., cjackson2@tulane.edu.
- T25. **The Appalachian–Caledonian Clastic Wedges and Their Analogs.** Ashraf Uddin, Auburn Univ., uddinas@auburn.edu; Willis Hames, Auburn Univ., hameswe@auburn.edu.
- T26. **New Insights on Lithotectonic Subdivisions in the Southern and Central Appalachian Piedmont.** Robert H. Morrow IV, South Carolina Dept. of Natural Resources

Geological Survey, [morrowr@dnr.sc.gov](mailto:morrowr@dnr.sc.gov); David E. Blake, Univ. of North Carolina Wilmington, [blaked@uncw.edu](mailto:blaked@uncw.edu); Peter J. Haproff, Univ. of North Carolina Wilmington, [haproffp@uncw.edu](mailto:haproffp@uncw.edu); Todd A. LaMaskin, Univ. of North Carolina Wilmington, [lamaskint@uncw.edu](mailto:lamaskint@uncw.edu).

## FIELD TRIPS

Trip registration opens in January. For additional information, please contact the Field Trip chair, David T. King, Auburn Univ., [kingdat@auburn.edu](mailto:kingdat@auburn.edu).

### CO<sub>2</sub> Storage in Geological Formations in the Southeast USA.

Richard A. Esposito, Southern Company, [raesposi@southernco.com](mailto:raesposi@southernco.com); Lauren Beckingham, Auburn Univ., [leb0071@auburn.edu](mailto:leb0071@auburn.edu)

**The Spiritual, Hands-on, and Naturalist Pedagogy of George Washington Carver: A Virtual Tour of the Carver Museum at the Tuskegee Institute National Historic Site, Tuskegee, Alabama, USA.** Marilyn Vogel, Auburn Univ., [mbv0008@auburn.edu](mailto:mbv0008@auburn.edu).

**Transect across an Early Paleozoic, Laurentian Suprasubduction System: Blue Ridge and Western Inner Piedmont of Alabama-Georgia.** Clint Barineau, Columbus State Univ., [barineau\\_clinton@columbusstate.edu](mailto:barineau_clinton@columbusstate.edu); James Tull, Florida State Univ., [jtull@fsu.edu](mailto:jtull@fsu.edu); Ben Davis, Florida State Univ., [bld13c@my.fsu.edu](mailto:bld13c@my.fsu.edu).

**A Late Cretaceous Paleodrainage System on the Coastal Plain Unconformity of Alabama-Georgia.** Clint Barineau, Columbus State Univ., [barineau\\_clinton@columbusstate.edu](mailto:barineau_clinton@columbusstate.edu); Diana Ortega-Ariza, Kansas Geological Survey, Univ. of Kansas, [dianalo@ku.edu](mailto:dianalo@ku.edu).

**Virtual Field Excursion to the Cretaceous–Paleogene Boundary Section, Moscow Landing, Western Alabama.** Charles E. Savrda, Auburn Univ., [svardce@auburn.edu](mailto:svardce@auburn.edu).

**Virtual Field Trip—Wetumpka Impact Structure, Alabama: Field Sites and Digital Modeling.** David T. King Jr., Auburn Univ., [kingdat@auburn.edu](mailto:kingdat@auburn.edu); Leticia De Marchi, Auburn Univ., [lzd0034@auburn.edu](mailto:lzd0034@auburn.edu); Vinamra Agrawal, Auburn Univ., [vza0013@auburn.edu](mailto:vza0013@auburn.edu); Lucille W. Petruny, Auburn Univ., [petrulb@auburn.edu](mailto:petrulb@auburn.edu).

**An Undergraduate's First Field Experience: A Virtual Tour through the Carolinas, Georgia, Alabama, and Florida.** Laura Mulrooney, Univ. of Florida, [LMulrooney@ufl.edu](mailto:LMulrooney@ufl.edu); Victoria Pavlovics, Univ. of Florida, [vpavlovics@ufl.edu](mailto:vpavlovics@ufl.edu); Emily Sonnenberg, Univ. of Florida, [sonnenberge@ufl.edu](mailto:sonnenberge@ufl.edu); Jamie Good, Univ. of Florida, [jamielgood@ufl.edu](mailto:jamielgood@ufl.edu); Anita Marshall, Univ. of Florida, [anita.marshall@ufl.edu](mailto:anita.marshall@ufl.edu); Ashlyn Spector, Rutgers Univ., [ashlyn.spector@rutgers.edu](mailto:ashlyn.spector@rutgers.edu); Nikita Kepezhinskas, Univ. of Alberta, [Kepezhin@ualberta.ca](mailto:Kepezhin@ualberta.ca).

**Tectonism and Metamorphism along a Southern Appalachian Transect across the Blue Ridge and Piedmont.** Harold Stowell, Univ. of Alabama, [hstowell@ua.edu](mailto:hstowell@ua.edu); Elizabeth Bollen, Univ. of Alabama, [embollen@crimson.ua.edu](mailto:embollen@crimson.ua.edu); Matthew McKay, Missouri State Univ., [matthewmckay@missouristate.edu](mailto:matthewmckay@missouristate.edu); Ryan Thigpen, Univ. of Kentucky, [ryan.thigpen@uky.edu](mailto:ryan.thigpen@uky.edu).

**Fall Line to the Flint: Geology and Hydrology of the Dougherty Plain and Nearby Destinations.** James B. Deemy, College of Coastal Georgia, [jdeemy@ccga.edu](mailto:jdeemy@ccga.edu); Todd C. Rasmussen, Univ. of Georgia, [trasmuss@uga.edu](mailto:trasmuss@uga.edu); Steven Brantley, The Jones Center at Ichauway, [sbrantley@jonesctr.org](mailto:sbrantley@jonesctr.org); Joe Honings, The Jones Center at

- T27. **Hydrology in the Dougherty Plain: Depressional Wetlands, Mantled Karst, and Highly Incised Streams.** James B. Deemy, College of Coastal Georgia, [jdeemy@ccga.edu](mailto:jdeemy@ccga.edu); Todd C. Rasmussen, Univ. of Georgia, [trasmuss@uga.edu](mailto:trasmuss@uga.edu); Steven Brantley, The Jones Center at Ichauway, [sbrantley@jonesctr.org](mailto:sbrantley@jonesctr.org); Joe Honings, The Jones Center at Ichauway, Louisiana State Univ., [jhonings@jonesctr.org](mailto:jhonings@jonesctr.org); Coleman Barrie, The Jones Center at Ichauway, Auburn Univ., [cbarrie@jonesctr.org](mailto:cbarrie@jonesctr.org).
- T28. **Paleontology of the North American Mesozoic.** John Fronimos, Auburn Univ., [jafonimos@gmail.com](mailto:jafonimos@gmail.com); Thomas Tobin, Univ. of Alabama, [ttobin@ua.edu](mailto:ttobin@ua.edu).
- T29. **Structural Geology: Small-Scale Observations Applied to Large-Scale Geologic Problems.** David Brink-Roby, Auburn Univ., [david.brink.robby@gmail.com](mailto:david.brink.robby@gmail.com); Laura Mulrooney, Univ. of Florida, [LMulrooney@ufl.edu](mailto:LMulrooney@ufl.edu); Victoria Pavlovics, Univ. of Florida, [vpavlovics@ufl.edu](mailto:vpavlovics@ufl.edu); Emily Sonnenberg, Univ. of Florida, [sonnenberge@ufl.edu](mailto:sonnenberge@ufl.edu); Jamie Good, Univ. of Florida, [jamielgood@ufl.edu](mailto:jamielgood@ufl.edu); Anita Marshall, Univ. of Florida, [anita.marshall@ufl.edu](mailto:anita.marshall@ufl.edu); Ashlyn Spector, Rutgers Univ., [ashlyn.spector@rutgers.edu](mailto:ashlyn.spector@rutgers.edu); Nikita Kepezhinskas, Univ. of Alberta, [kepezhin@ualberta.ca](mailto:kepezhin@ualberta.ca).
- T30. **Georgia's Barrier Islands: At the Intersection of Coastal Ecology, Geology, and Hydrology.** Kimberly K. Takagi, College of Coastal Georgia, [ktakagi@ccga.edu](mailto:ktakagi@ccga.edu); James B. Deemy, College of Coastal Georgia, [jdeemy@ccga.edu](mailto:jdeemy@ccga.edu); Robin McLachlan, College of Coastal Georgia, [rmclachlan@ccga.edu](mailto:rmclachlan@ccga.edu).
- T31. **Reconstructing Ancient Environmental Conditions.** Jeremy Owens, Florida State Univ., [jdownes@fsu.edu](mailto:jdownes@fsu.edu); Theodore Them, College of Charleston, [themtr@cofc.edu](mailto:themtr@cofc.edu); Chris Reinhard, Georgia Institute of Technology, [chris.reinhard@eas.gatech.edu](mailto:chris.reinhard@eas.gatech.edu); Seth Young, Florida State Univ., [sayoung2@fsu.edu](mailto:sayoung2@fsu.edu); Cole Edwards, Appalachian State Univ., [edwardsct4@appstate.edu](mailto:edwardsct4@appstate.edu); Benjamin Gill, Virginia Polytechnic Institute and State Univ., [bcgill@vt.edu](mailto:bcgill@vt.edu).
- T32. **Understanding Metamorphic and Tectonic Processes at Convergent Margins.** Besim Dragovic, Univ. of South Carolina, [dragovic@seo.sc.edu](mailto:dragovic@seo.sc.edu); Mark J. Caddick, Virginia Polytechnic Institute and State Univ., [caddick@vt.edu](mailto:caddick@vt.edu); J. Ryan Thippen, Univ. of Kentucky, [ryan.thigpen@uky.edu](mailto:ryan.thigpen@uky.edu).
- T33. **Recent Advances in Tectonic Studies from the Appalachian Foreland to the Inner Piedmont.** Clinton Barineau, Columbus State Univ., [barineau\\_clinton@columbusstate.edu](mailto:barineau_clinton@columbusstate.edu); James Tull, Florida State Univ., [jtull@fsu.edu](mailto:jtull@fsu.edu); Paul Mueller, Univ. of Florida, [pamueller@ufl.edu](mailto:pamueller@ufl.edu); Ben Davis, Florida State Univ., [bld13c@my.fsu.edu](mailto:bld13c@my.fsu.edu).

Ichauway and Louisiana State Univ., jhonings@jonesctr.org; Coleman Barrie, The Jones Center at Ichauway and Auburn Univ., cbarrie@jonesctr.org.

**The Carboniferous Foreland of the Southern Appalachians: A Virtual Field Trip in Alabama.** Willis Hames, Auburn Univ., hameswe@auburn.edu; Ashraf Uddin, Auburn Univ., uddinas@auburn.edu.

**Geology of the Golden Isles of Coastal Georgia.** Robin McLachlan, College of Coastal Georgia, mclachlan.rl@gmail.com; James Deemy, College of Coastal Georgia, jdeemy@ccga.edu; Kimberly Takagi, College of Coastal Georgia, ktakagi@ccga.edu; Damon Gannon, Univ. of Georgia Marine Institute, dgannon@uga.edu.

**Alabama Botany for Rock Jocks.** Patrick Thompson, Davis Arboretum of Auburn Univ., thomppg@auburn.edu; Marilyn B. Vogel, Auburn Univ., mbv0008@auburn.edu; Noah Yawn, Auburn Univ., ndy0002@auburn.edu.

**Are There Any Rocks Here Other Than Mylonites? A Virtual Field Trip to Honor the Career of Dr. Mark Steltenpohl.** Joshua Poole, Wellborn Mining Inc., pooleus@gmail.com; Randy L. Kath, Univ. of West Georgia, rkath@westga.edu; Willis Hames, Auburn Univ., hameswe@auburn.edu.

## SHORT COURSES

**Gemology Basics.** Lisa Forrester Clark, World Gem Foundation and the Gemological Society of America, lisaforrester@live.com; Mary Forrester Dalton.

**Fractionating The Earth: What Isotopes Can Tell Us about the Past, Present, and Future.** Ann S. Ojeda, Auburn Univ., aso0013@auburn.edu; Laura Bilenker, Auburn Univ., ldb0036@auburn.edu; Willis Hames, Auburn Univ., hameswe@auburn.edu; Matthew DeCesare, Auburn Univ., mrd0048@auburn.edu; Brennan van Alderwerelt, Auburn Univ., bmv0011@auburn.edu.

## REGISTRATION

**Early registration deadline: 22 Feb. 2021**  
**Cancellation deadline: 1 Mar. 2021**

Registration opens in January. For further information or if you need special accommodations, please contact the general meeting chair, Willis Hames, hameswe@auburn.edu.

## ACCOMMODATIONS

**Hotel registration deadline: 10 Mar. 2021**

A block of hotel rooms has been reserved at the Auburn University Hotel and Conference Center, 241 S. College Street, Auburn, Alabama, USA, in the center of downtown Auburn. The meeting rate for a double/king is US\$165 per night plus tax;

a triple/quad is US\$175 per night plus tax. Reservations can be made by calling +1-334-821-8200 or +1-800-228-2876. Please be sure to identify yourself with the group code **SEGSA19** and that you are attending the GSA Southeastern Section Meeting.

## OPPORTUNITIES FOR STUDENTS AND EARLY CAREER PROFESSIONALS

### Career Mentoring Luncheons

Ask your career-related questions and learn about non-academic pathways in the geosciences while networking with professionals at the Roy J. Shlemon and John Mann Mentor Luncheons. GSA student members are welcome.

### Career Workshop Series

This three-part series will feature career development planning, an exploration of geoscience job sectors, and information on best practices for crafting a résumé and cover letter. Non-technical skills and workforce statistics will be reviewed. The series will be led by workshop presenters and geoscientists. No registration is required, and everyone is welcome.

Learn more at <http://www.geosociety.org/mentors/>. Questions? Contact Jennifer Nocerino at [jnocerino@geosociety.org](mailto:jnocerino@geosociety.org).

## PROFESSIONALS

Interested in sharing information about your applied geoscience or hydrology career with students? Being a mentor is a rewarding experience. To learn more about serving as a mentor at SEGSA, contact Jennifer Nocerino at [jnocerino@geosociety.org](mailto:jnocerino@geosociety.org).

SEGSA also offers an excellent opportunity to earn CEUs toward your continuing education requirements for your employer, K–12 school, or professional registration. Please check the meeting website after the meeting to download your CEU certificate.

## LOCAL COMMITTEE

**General Chair:** Willis E. (Bill) Hames, hameswe@auburn.edu

**Technical Program Co-Chairs:** Karen McNeal, ksm0041@auburn.edu; Kathryn Brown, ksn0006@auburn.edu

**Field Trip Chair:** David T. King, kingdat@auburn.edu

**Sponsorships Chair:** Charles E. (Chuck) Savrda, savrdce@auburn.edu

**Exhibits Co-Chairs:** Laura Bilenker, ldb0036@auburn.edu; Ann Ojeda, aso0013@auburn.edu

**Treasurer:** Haibo Zou, hzz0006@auburn.edu

**Student Volunteer Chair:** Ashraf Uddin, uddinas@auburn.edu

**Education Programs Co-Chairs:** Marilyn Vogel, mbv0008@auburn.edu; Stephanie Rogers, s.rogers@auburn.edu

**Guest Activities Program Co-Chairs:** Brennan Vanalderwerelt, bmv0011@auburn.edu; Ann Ojeda, aso0013@auburn.edu

# Joint North-Central-South-Central Sections Meeting

55th Annual Meeting of the North-Central Section, GSA  
55th Annual Meeting of the South-Central Section, GSA  
Springfield, Missouri, USA  
18–20 April 2021

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



Photo courtesy of the Springfield, Missouri, Convention and Visitors Bureau.

## Meeting of the Midcontinent: Geosciences from Canada to Mexico

### LOCATION

On the edge of the environmental beauty of the Ozarks, Springfield, Missouri, USA, is home to delectable dining destinations, a vibrant nightlife, and exciting outdoor adventures. Take a short walk from the conference venue to explore downtown shops, multiple micro-breweries, and restaurants, or learn about the local history, from the Civil War to Route 66. Home to Bass Pro Shops and the Wonders of Wildlife Museum and Aquarium, Springfield is a great starting point for a wide range of adventures. We have assembled an exciting and diverse program for this joint Section Meeting and look forward to seeing you in Springfield in 2021.

### CALL FOR PAPERS

**Abstract deadline:** 12 Jan. 2021

**Submit online:** [www.geosociety.org/sc-mtg](http://www.geosociety.org/sc-mtg)

**Abstract submission fee:** GSA members: professionals: US\$30; students: US\$18. Non-members: professionals: US\$60; students: US\$36.

For additional information, please contact the local technical program chair, Kevin Mickus, [kevinmickus@missouristate.edu](mailto:kevinmickus@missouristate.edu).

### THEME SESSIONS

- T1. **Undergraduate Research Poster Session.** Robert D. Shuster, Univ. of Nebraska–Omaha, [rshuster@unomaha.edu](mailto:rshuster@unomaha.edu).
- T2. **Geophysical Investigations in the Central United States.** Kevin Mickus, Missouri State Univ., [kevinmickus@missouristate.edu](mailto:kevinmickus@missouristate.edu).
- T3. **Geophysical Investigations of Crust and Mantle Structure and Dynamics beneath Continents.** Kelly Liu, Missouri Univ. of Science and Technology, [liukh@mst.edu](mailto:liukh@mst.edu); Kevin Mickus, Missouri State Univ., [KevinMickus@MissouriState.edu](mailto:KevinMickus@MissouriState.edu).
- T4. **Patterns, Drivers, and Implications of Natural and Induced Continental Intraplate Earthquakes.** Tandis Bidgoli, Univ. of Missouri, [bidgolit@missouri.edu](mailto:bidgolit@missouri.edu); Mian Liu, Univ. of Missouri, [lium@missouri.edu](mailto:lium@missouri.edu).
- T5. **A Matter of Time: Using High-Resolution Stratigraphic and Sedimentologic Techniques to Investigate the Midcontinent Geologic Record.** *Cosponsored by the Great Lakes Section of SEPM (Society for Sedimentary Geology).* Bradley D. Cramer, Univ. of Iowa, [bradley-cramer@uiowa.edu](mailto:bradley-cramer@uiowa.edu); Stephanie Tassier-Surine, Iowa Geological Survey, Univ. of Iowa, [stephanie-tassier-surine@uiowa.edu](mailto:stephanie-tassier-surine@uiowa.edu).
- T6. **Geosciences in the Anthropocene.** Omar R. Harvey, Texas Christian Univ., [omar.harvey@tcu.edu](mailto:omar.harvey@tcu.edu).
- T7. **Human Impacts on Watersheds.** Robert T. Pavlowsky, Missouri State Univ., [Bobpavlowsky@missouristate.edu](mailto:Bobpavlowsky@missouristate.edu).
- T8. **Slope Stability, Mass Movements, and Hillslope Geomorphology.** Karen Gran, Univ. of Minnesota Duluth, [kgran@d.umn.edu](mailto:kgran@d.umn.edu); Carrie Jennings, Freshwater Society, [cjennings@freshwater.org](mailto:cjennings@freshwater.org).
- T9. **Unravelling Sedimentary Basins: A Session in Memory of Paul E. Potter.** Daniel Sturmer, Univ. of Cincinnati, [daniel.sturmer@uc.edu](mailto:daniel.sturmer@uc.edu); Craig Dietsch, Univ. of Cincinnati.
- T10. **Late Paleozoic Chronostratigraphy of the Midcontinent.** Stephan Oborny, Univ. of Kansas, [obornys@ku.edu](mailto:obornys@ku.edu); Franciszek Hasiuk, Univ. of Kansas, [franek@ku.edu](mailto:franek@ku.edu).
- T11. **The Finer Things: Granulometric Data in Fine-Grained Systems.** Lily Pfeifer, Univ. of Oklahoma, [lpfeifer@ou.edu](mailto:lpfeifer@ou.edu); Steve Adams, Univ. of Oklahoma, [steven.m.adams-1@ou.edu](mailto:steven.m.adams-1@ou.edu); Alicia Bonar, Univ. of Oklahoma, [alicia.bonar@ou.edu](mailto:alicia.bonar@ou.edu); Joseph Mason, Univ. of Wisconsin–Madison, [mason@geography.wisc.edu](mailto:mason@geography.wisc.edu).

- T12. **Turning Mountains into Sand: The Interplay between Tectonism, Climate, and Sedimentary Systems in Laurentia during the Mississippian to Permian.** Daniel Sturmer, Univ. of Cincinnati, Daniel.Sturmer@uc.edu; Tandis Bidgoli, Univ. of Missouri, bidgolit@missouri.edu.
- T13. **Advances in Micropaleontology.** Brittany Hupp, Univ. of Wisconsin–Madison, bhupp@wisc.edu; Damián Cárdenas, Missouri Univ. of Science and Technology, dcvvt@mst.edu; Chris Lowery, Univ. of Texas Institute for Geophysics, cmlowery@utexas.edu; Francisca Oboh-Ikuenobe, Missouri Univ. of Science and Technology, ikuenobe@mst.edu.
- T14. **Midcontinent Meteorite Impact Structures: Surficial and Subsurface Evidence of Deformation and Shock Metamorphism.** Kevin Ray Evans, Missouri State Univ.; kevinevans@missouristate.edu; Ryan J. Clark, Iowa Geological Survey, ryan-j-clark@uiowa.edu.
- T15. **Granites and Rhyolites as a Record of Crustal Magmatic Processes.** Gary Michelfelder, Missouri State Univ., garymichelfelder@missouristate.edu; Matthew Brueseke, Kansas State Univ., brueseke@ksu.edu; Clayton Reinier, Missouri State Univ., Clayton098@live.missouristate.edu.
- T16. **Ultramafic and Mafic Magmatism.** Alison Graettinger, Univ. of Missouri Kansas City, graettinger@umkc.edu; Gary Michelfelder, Missouri State Univ., garymichelfelder@missouristate.edu; Matthew E. Brueseke, Kansas State Univ., brueseke@ksu.edu.
- T17. **Carbonate-Hosted Base Metal Deposits of the U.S. Midcontinent: Genesis, Exploitation, and Remediation.** Aaron W. Johnson, American Institute of Professional Geologists, awj@aipg.org.
- T18. **Case Histories of Practicing Environmental and Engineering Geologist Investigations.** Chris Schaefer, Sunbelt Environmental Services Inc., Springfield, Missouri, cschaefer@sunbeltenv.com; Jason Smith; Environmental Works Inc., Springfield, Missouri, jason@environmentalworks.com.
- T19. **Agricultural Impacts on Hydrology and Water Quality in the Midwest.** Eric W. Peterson, Illinois State Univ., ewpeter@ilstu.edu; Benjamin Maas, Buena Vista Univ., maas2@bvu.edu.
- T20. **Fluvial Forms, Processes, and Sediments.** Robert T. Pavlowsky, Missouri State Univ., Bobpavlowsky@missouristate.edu.
- T21. **Geochemical Influences on Metal Contaminants in Subsurface Systems.** Madeleine Mathews, Univ. of Wisconsin–Madison, mmathews2@wisc.edu; Matthew Ginder-Vogel, Univ. of Wisconsin–Madison, matt.ginder-vogel@wisc.edu.
- T22. **Enhancing Capacity and Transdisciplinary Collaborations for Hydrologic Research and Education across the Midcontinent.** Aida Farough, Kansas State Univ., afarough@ksu.edu; Nicole Colston, Oklahoma State Univ., nicole.colston@okstate.edu; Cory Forbes, Univ. of Nebraska–Lincoln, Cory.forbes@unl.edu; Chelsie Romulo, Univ. of Northern Colorado, Chelsie.Romulo@unco.edu.
- T23. **Strategies and Approaches for Increasing Participation and Enhancing Diversity and Equity within the Geosciences Community.** Aida Farough, Kansas State Univ., afarough@ksu.edu; Dana L. Thomas, Univ. of Texas at Austin, dthomas@jsg.utexas.edu; Wendi J.W. Williams, South Texas College, wwilliam@southtexascollege.edu; Omar R. Harvey, Texas Christian Univ., omar.harvey@tcu.edu.
- T24. **Teaching Geoscience Online.** Beth A. Johnson, Univ. of Wisconsin–Oshkosh, Fox Cities Campus, johnsonba@uwosh.edu; David Voorhees, Waubonsee Community College, dvoorhees@waubonsee.edu; Katherine J. Lewandowski, Eastern Illinois Univ., kjlewandowski@eiu.edu.
- T25. **Recent Advances in Remote Sensing and GIScience and Their Applications in Geosciences.** Mohamed Aly, Univ. of Arkansas, aly@uark.edu; Jason Tullis, Univ. of Arkansas, jatullis@uark.edu; Jack Cothren, Univ. of Arkansas, jcothre@uark.edu.
- T26. **Karst Studies across the Midcontinent.** Douglas Gouzie, Missouri State Univ., douglasgouzie@missouristate.edu.

## FIELD TRIPS

For additional information, please contact the Field Trip co-chairs Matt McKay, matthewmckay@missouristate.edu, and Greg Dumond, gdumond@uark.edu.

- FT1. **Petrology and Structure of the Mesoproterozoic Igneous Rocks of the St. Francois Mountains, Southeast Missouri, USA.** Fri.–Sun., 16–18 April. Gary Michelfelder, Missouri State Univ., garymichelfelder@missouristate.edu; Cheryl Seeger, Missouri Dept. of Natural Resources, cheryl.seeger@dnr.mo.gov.
- FT2. **Chert-Bearing Lower Mississippian (Kinderhookian–Osagean) Strata, Southwestern Springfield Plateau, Arkansas and Missouri, USA.** Fri.–Sat., 16–17 April. Mac McGilver, Univ. of Arkansas, macmcgil@uark.edu; Walt Manger, Univ. of Arkansas, wmanger@uark.edu.
- FT3. **Fossils and Strata of the Springfield Plateau: The Burlington and Beyond.** Sat., 17 April. Asa Kaplan, ESCONI, pefty@aya.yale.edu; Matt Forir, Missouri Institute of Natural Science, info@monatsci.com.
- FT4. **Natural History of Karst in Southwest Missouri Tour.** Sat, 17 April. Brooke Benz, Missouri Institute of Natural Science, brooke.benz@monatsci.org; Matt Forir, Missouri Institute of Natural Science, info@monatsci.com.

FT5. **Selected Features of the Big Four Springs Region of the Ozarks, USA.** Sat., 17 April. Sherri Stoner, Dept. of Natural Resources and Missouri Geological Survey, Sherri.Stoner@dnr.mo.gov; Cecil Boswell, Dept. of Natural Resources and Missouri Geological Survey, Cecil.boswell@dnr.mo.gov; Bill Duley, Duley Environmental, LLC, Bill.j.duley@gmail.com.

FT6. **Ordovician and Mississippian Stratigraphy in Southwestern Missouri, USA.** Sat., 17 April. Damon Bassett, Missouri State Univ., dbassett@missouristate.edu; Charles Rovey, Missouri State Univ.

FT7. **Geologic Excursion to Decaturville and Weaubleau Impact Structures, Missouri, USA.** Wed., 21 April. Kevin Ray Evans, Missouri State Univ.; kevinevans@missouristate.edu.

## SHORT COURSES

SC1. **Getting Started with Drones and Structure from Motion Photogrammetry in Your Research and Teaching.** Sat., 17 April. Toby Dogwiler, Missouri State Univ.

SC2. **Representing the Best You: Professional Development Workshop for GSA On To the Future.** Sat., 17 April. Stephen K. Boss, Univ. of Arkansas, sboss@uark.edu; Tahlia Bear, Geological Society of America, tbear@geosociety.org.

SC3. **Using Project WET to Teach Earth and Environmental Science.** Sat., 17 April. Janice Greene, Missouri State Univ./Missouri Project WET, JaniceGreene@missouristate.edu.

SC4. **Taking an Intersectional Approach to Understand and Address Gender Inequality in STEM Fields.** Sat., 17 April. Abby Templer Rodrigues, Missouri State Univ., ATemplerRodrigues@MissouriState.edu.

SC5. **Machine Learning in Geoscience and Remote Sensing.** Sat., 17 April, 8 a.m.–5 p.m. Mortaza Pirouz, Univ. of Texas at Dallas.

SC6. **Impact Structure—Core Workshop.** Tues., 20 April, afternoon (half-day). Kevin Ray Evans, Missouri State Univ., kevinevans@missouristate.edu; Ryan J. Clark, Iowa Geological Survey, ryan-j.clark@uiowa.edu.

## OPPORTUNITIES FOR STUDENTS AND EARLY CAREER PROFESSIONALS

### Career Mentoring Luncheons

Ask your career-related questions and learn about non-academic pathways in the geosciences while networking with professionals at the Roy J. Shlemon and John Mann Mentor Luncheons. GSA student members are welcome to attend.

### Career Workshop Series

This three-part series will feature career development planning, an exploration of geoscience job sectors, and information on best practices for crafting a résumé and cover letter. Non-technical skills and workforce statistics will be reviewed. No registration is required, and everyone is welcome.

To learn more about mentors and career workshops, go to <https://www.geosociety.org/mentors> or contact Jennifer Nocerino at [jnocerino@geosociety.org](mailto:jnocerino@geosociety.org).

## PROFESSIONALS

If you like to share your interest, enthusiasm, and experience in applied geology, consider being a GSA mentor at the meeting. Being a mentor is a rewarding experience. To learn more, contact Jennifer Nocerino at [jnocerino@geosociety.org](mailto:jnocerino@geosociety.org).

This meeting also offers an excellent opportunity to earn CEUs toward your continuing education requirements for your employer, K–12 school, or professional registration. The CEU certificate can be downloaded from the meeting website after the meeting.

## ACCOMMODATIONS

**Hotel registration deadline:** 29 March 2021

A block of rooms has been reserved at the University Plaza, and the meeting rate is US\$101 per night plus tax for single or double occupancy. Reservations at the University Plaza should be made by calling +1-417-864-7333 or online using the link provided by the hotel and referencing NC/SCGSA21.

## REGISTRATION

**Early registration deadline:** 15 March 2021

**Cancellation deadline:** 22 March 2021

Registration opens in early January. For further information or if you need special accommodations, please contact the local organizing chair, Doug Gouzie, [douglasgouzie@missouristate.edu](mailto:douglasgouzie@missouristate.edu).

## ORGANIZING COMMITTEE

**Organizing Co-Chairs:** Doug Gouzie, [douglasgouzie@missouristate.edu](mailto:douglasgouzie@missouristate.edu); Mohamed Aly, [aly@uark.edu](mailto:aly@uark.edu)

**Technical Program Chair:** Kevin Mickus, [KevinMickus@missouristate.edu](mailto:KevinMickus@missouristate.edu)

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**Exhibit Hall/Sponsor Co-Chairs:** Matt McKay, [matthewmckay@missouristate.edu](mailto:matthewmckay@missouristate.edu); Glenn Sharman, [gsharman@uark.edu](mailto:gsharman@uark.edu)

**Short Course Co-Chairs:** Melida Gutierrez, [mgutierrez@missouristate.edu](mailto:mgutierrez@missouristate.edu); Melanie Carden-Jessen, [mcardenjessen@missouristate.edu](mailto:mcardenjessen@missouristate.edu); Stephen Boss, [sboss@uark.edu](mailto:sboss@uark.edu)

**Student Volunteer Co-Chairs:** Damon Bassett, [dbassett@missouristate.edu](mailto:dbassett@missouristate.edu); Adriana Potra, [porta@uark.edu](mailto:porta@uark.edu)

**Judging Coordinator:** Celina Suarez, [casuarez@uark.edu](mailto:casuarez@uark.edu)

# 2021 GSA Section Meetings



## Northeastern

14–16 March  
Connecticut Convention Center  
Hartford, Connecticut  
<https://www.geosociety.org/ne-mtg>

The skyline of Hartford, Connecticut, as seen from across the Connecticut River. Image by Jimaro Morales from Pixabay.



## Southeastern

1–2 April  
The Hotel at Auburn University  
and Dixon Conference Center  
Auburn, Alabama  
<https://www.geosociety.org/se-mtg>

William J. Samford Hall, Auburn University. The George F. Landegger Collection of Alabama Photographs in Carol M. Highsmith's America, Library of Congress, Prints and Photographs Division.



## Joint North-Central/South-Central

18–20 April  
University Plaza Hotel  
Springfield, Missouri  
<https://www.geosociety.org/nc-mtg>

Downtown Springfield Park Central Square. Photo courtesy of the Springfield, Missouri, Convention and Visitors Bureau.



## Cordilleran

12–14 May  
Whitney Peak Hotel  
Reno, Nevada  
<https://www.geosociety.org/cd-mtg>

Volcanic geology of the Virginia Mountains, Nevada. Photo courtesy of Dr. Philipp Ruprecht, UNR faculty member.



## Rocky Mountain

25–27 May  
Colorado State University  
Fort Collins, Colorado  
<https://www.geosociety.org/rm-mtg>

Pineridge Natural Area. Image by Jan Alexander from Pixabay.

Ads (or cancellations) must reach the GSA advertising office no later than the first of the month, one month prior to the issue in which they are to be published. (Note: Combined March/April issue releases on March schedule.) Print ads will also appear on the Geoscience Job Board to coincide with the month of print issue. **Contact: [advertising@geosociety.org](mailto:advertising@geosociety.org), +1-800-472-1988 ext. 1053, or +1-303-357-1053.** Email correspondence should include complete contact information (including phone and mailing address). Rates are in U.S. dollars.

Classification	Per Line for 1st month	Per line each add'l month (same ad)
Positions Open	\$9.40	\$9.35
Fellowship Opportunities	\$9.35	\$9.30
Opportunities for Students		
First 25 lines	FREE	\$5.00
Additional lines	\$5.00	\$5.00

**POSITIONS OPEN**

**Environmental Data Sciences Professor, University of Virginia**

The Department of Environmental Sciences (EVSC) and the School of Data Science (SDS) at the University of Virginia invite applicants for a full-time tenured position at the level of Associate or Full Professor in the area of Environmental Data Science, with rank commensurate to experience level. We seek applicants whose research and teaching address questions in environmental science using novel approaches to the data cycle to advance knowledge of environmental systems, and to solve problems of societal relevance. Approaches of interest include, but are not limited to, data acquisition, analytical workflows, and data-driven computational methods (e.g. machine-learning, statistical or simulation approaches). The ideal candidate is data-oriented, has a track record of open collaborative, cross-disciplinary work, and holds a PhD or equivalent in a relevant field. This position is open to all areas of the environmental sciences but will prioritize data science research and teaching in the hydrologic, atmospheric, or geoscience domains.

The successful candidate will be cross-appointed in Environmental Science and Data Science and is expected to develop an externally funded and internationally recognized research program, manage and mentor a diverse research group, and teach undergraduate and graduate courses. They will take a central role that bridges and leverages research strengths between both programs and will incorporate data science computation in the undergraduate and graduate curriculum. Opportunities for collaboration/affiliation with other units in the University include the Environmental Resilience Institute [ <https://eri.virginia.edu/> ] and the Department of Engineering Systems and Environment. [ <https://engineering.virginia.edu/departments/engineering-systems-and-environment> ] Environmental Resilience and Digital Technologies and Society have been named as two of the five priority initiatives in the new university Strategic Plan, [ <https://strategicplan.virginia.edu/key-initiatives/> ] emphasizing the importance of this collaboration.

EVSC, in the College of Arts and Science, was formed in 1970, with research and teaching interests that span Atmospheric Science, Geoscience,

Hydrology and Ecology (<https://evsc.as.virginia.edu/research>). The School of Data Science is the 12th and newest school at the University of Virginia, formed with the largest gift in the university's history. The School covers all aspects of the data life cycle and emphasizes interdisciplinary, open, ethical research and education that address societal challenges. Environmental Data Science is one of the priority areas for the School.

Please apply online at [https://uva.wd1.myworkdayjobs.com/en-US/UVAJobs/job/Charlottesville-VA/Associate-or-Full-Professor-in-Environmental-Science-and-the-School-of-Data-Science\\_R0015097](https://uva.wd1.myworkdayjobs.com/en-US/UVAJobs/job/Charlottesville-VA/Associate-or-Full-Professor-in-Environmental-Science-and-the-School-of-Data-Science_R0015097) and attach the following required applicant documents:

1. A cover letter, two page maximum, including a summary of research interests and accomplishments, and potential UVA collaboration.
2. A detailed curriculum vitae, including a link to a full ORCID Profile.
3. A one page summary of your five year research plan.
4. A one page statement of teaching philosophy.
5. A one page statement describing your experience working with a diverse student body, as well as your past, present, and/or future contributions to creating/advancing a culture of diversity, equity and inclusion.

Please note that multiple documents can be uploaded in the link referenced above.

Review of applications will start November 1, 2020, but the position will remain open until filled.

The University will perform background checks on all new faculty hires prior to making a final offer of employment.

For questions about the application process, please contact Rich Haverstrom, Faculty Search Advisor, at [rkhgj@virginia.edu](mailto:rkhgj@virginia.edu).

The University assists UVA faculty spouses and partners seeking employment in the Charlottesville area. To learn more about these services, please see <http://provost.virginia.edu/dual-career>.

The University of Virginia is an equal opportunity/affirmative action employer. Women, minorities, veterans and persons with disabilities are encouraged to apply. Equity and diversity are essential to academic excellence and a requirement for the provision of beneficial outcomes in the Environmental Data Sciences. An open and diverse community fosters the inclusion of voices that have been underrepresented or discouraged.

The University of Virginia, including the UVA Health System which represents the UVA Medical Center, Schools of Medicine and Nursing, UVA Physician's Group and the Claude Moore Health Sciences Library, are fundamentally committed to the diversity of our faculty and staff. We believe diversity is excellence expressing itself through every person's perspectives and lived experiences. We are equal opportunity and affirmative action employers. All qualified applicants will receive consideration for employment without regard to age, color, disability, gender identity or expression, marital status, national or ethnic origin, political affiliation, race, religion, sex (including pregnancy), sexual orientation, veteran status, and family medical or genetic information.

**Scripps Postdoctoral Scholar Award, 2021, Scripps Institution of Oceanography, UC San Diego**

Scripps Institution of Oceanography at UC San Diego in La Jolla, California, invites applications for one or more Institution-wide Postdoctoral positions in any of the major areas of research conducted at Scripps. Scripps Institution of Oceanography is one of the oldest, largest, and most important centers for marine science research in the world. Research at Scripps encompasses physical, chemical, biological, geological, and geophysical studies of the oceans, earth, and atmosphere.

Scripps Postdoctoral scholars are expected to interact with existing programs. Research activities at Scripps can be explored by viewing profiles of the Principal Investigators at Scripps (<https://scripps.ucsd.edu/people/faculty>). The intention of this program is to expose early career postdocs to new research opportunities and the facilities available at SIO/UCSD. Awards are competitive with a major emphasis on potential for independent, creative research. The Postdoc positions are for one year, and award twelve months of salary with a minimum stipend of \$62,000 plus benefits and a one-time research allowance of \$5,000. An additional twelve months of support will be granted (subject to satisfactory review), totaling 24 months. Appointees are eligible for health insurance through UC San Diego.

Candidates are required to have a PhD degree in ocean, earth or atmospheric sciences, mathematics, physics, chemistry, biology, environmental policy or a related field conferred by November 30, 2021. Candidates are required to have no more than 3 years postdoctoral experience at the time of appointment.

Candidate application materials include a current CV, summary of doctoral dissertation, statement of research, mentor support letter and two confidential letters of recommendation. Candidates are required to contact potential mentors and identify mutual research interests prior to submitting their applications. Successful candidates are expected to start before December 1, 2021. For full consideration, candidates should apply by October 25, 2020 at: <https://apptkr.com/1995694>

For instructions about the Scripps Postdoctoral Program, Reference Letters, and Mentor Support Letters, go to: <https://scripps.ucsd.edu/postdocs/program>

UCSD is an Equal Opportunity Employer, with a strong institutional commitment to excellence through diversity. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, or status as a protected veteran.

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# 2021 CALENDAR

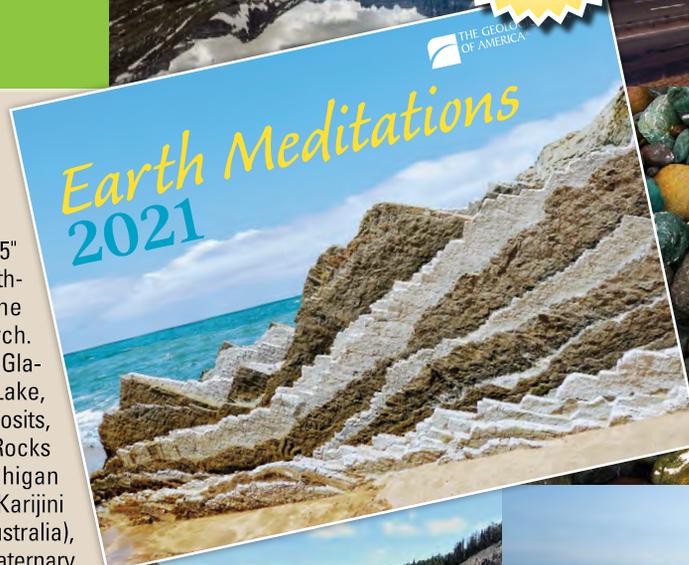
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## 2021 Earth Meditations

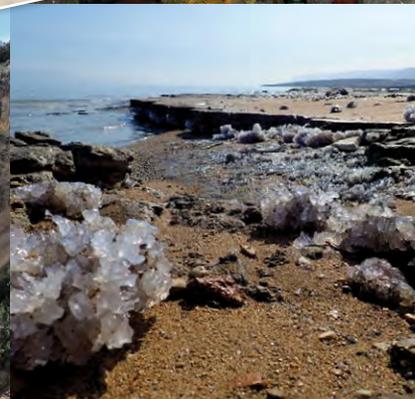
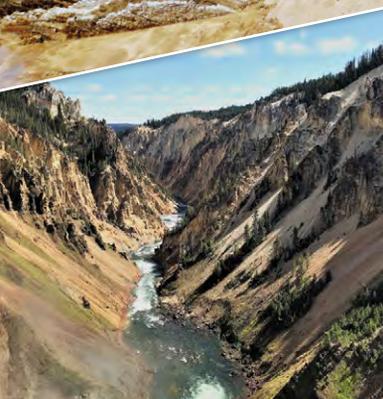
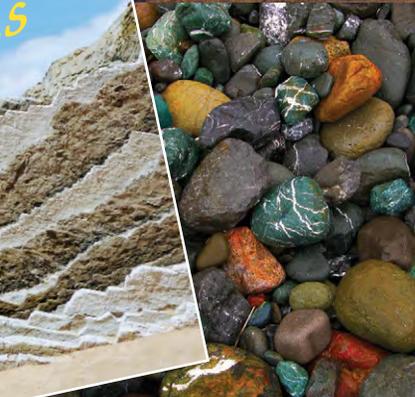
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# Does Our Vision of Diversity Reduce Harm and Promote Justice?

**Benjamin Keisling\***, **Raquel Bryant**, Dept. of Geosciences, Univ. of Massachusetts, 627 North Pleasant Street, Amherst, Massachusetts 01003, USA; **Nigel Golden**, Dept. of Environmental Conservation, Univ. of Massachusetts, 160 Holdsworth Way, Amherst, Massachusetts 01003, USA; **Laura A. Stevens\*\***, Marine Geology and Geophysics, Lamont-Doherty Earth Observatory, 61 Route 9W, Palisades, New York 10964, USA; and **Ellen Alexander**, Dept. of Earth, Planetary, and Space Sciences, Univ. of California, 595 Charles Young Drive, Los Angeles, California 90095, USA

Geoscientists have a unique responsibility to cultivate diversity among our ranks. First, geoscience is the least diverse STEM field, so we have the most room for improvement (NSF, 2019). Second, our field faces a workforce shortage, despite growing demand for our expertise, due to the lack of robust mechanisms to recruit, train, and retain diverse cohorts (Wilson, 2014). Third, calling Earth “home” is perhaps the only common experience between all people and thus access to understanding and appreciating Earth must not be limited by societal inequities. Decades of concerted efforts to broaden participation of marginalized groups in geoscience have resulted in no progress on a demographic scale (Bromery et al., 1972; Bernard and Cooperdock, 2018). Therefore, we must go above and beyond if we stand a chance of fulfilling our responsibility.

Here we argue that efforts to advance diversity, equity, and inclusion (DEI) in the geosciences must be rooted in a common understanding of the role of harm and justice in our vision of diversity. We provide three principles and a set of recommendations that are widely applicable and relevant to the cultural and historical specificities of our field.

## PRINCIPLE 1. EVERYONE BENEFITS FROM A DIVERSE, VIBRANT GEOSCIENCE COMMUNITY THAT CENTERS OUR MOST MARGINALIZED MEMBERS

Guiding frameworks for maximizing the efficacy of DEI efforts can be found in the literature. Much of this work rejects the premise that the inclusion of one group necessarily comes at the expense of others, a

pervasive myth that is especially harmful to geoscientists who claim multiple marginalized identities (e.g., Mattheis et al., 2019). That dimensions of diversity are interconnected is central to Kimberlé Crenshaw’s seminal analysis of Black women’s experience, where she coined the term *intersectionality* (Crenshaw, 1989). In fact, Núñez et al. (2019) leveraged this theoretical concept to develop geoscience-specific recommendations for practicing intersectionality toward greater equity.

Rather than the inclusion of one group resulting in the exclusion of another, intersectionality posits that DEI work centering individuals who are the most marginalized results in greater inclusion for everyone (Crenshaw, 1989). An intersectional approach to DEI asks that we invest our energy in removing the barriers to participation for people who have multiple underrepresented or marginalized identities: those who are most at risk of being excluded.

## PRINCIPLE 2. THE ROAD TO INCLUSION IS UNCOMFORTABLE FOR EVERYONE—THE MAJORITY AND THE MARGINALIZED

We must not conflate being uncomfortable with being marginalized. *Harm is inseparable from, and central to, marginalization.* Therefore, the reduction of harm must be prioritized in our DEI work. A recent example from the geosciences illustrates this distinction. Last fall, advertisements for a faculty job in Brigham Young University’s (BYU) geology department were removed from numerous job boards because BYU’s honor code, which prohibited “homosexual behavior,” was

found to be incompatible with the diversity statements of several international organizations, the Geological Society of America (GSA) included. Some BYU faculty members saw this removal as its own kind of discrimination (Abbott et al., 2019). The identities and perspectives of LGBTQ+ people cannot be separated from their lived experiences of harm. Discriminating against LGBTQ+ people in hiring is part of a larger system of discrimination that results in higher rates of harm, including homelessness, attempted suicide, and murder (Durso and Gates, 2012; Human Rights Campaign, 2015; Dinno, 2017). Our principles provide a way to distinguish separate experiences of harm and discomfort: an honor code violation may be uncomfortable, but does not cause harm.

Alternative frameworks, for example those that center on treating people with “love” and/or “kindness,” obscure the fact that difference is not innate but emerges within a network of established power relationships (Hearn and Louvrier, 2016). As we dismantle systems of oppression in geoscience, having opinions that conflict with the core goals of inclusion will be uncomfortable. This is not marginalization, and reckoning with our discomfort moves us toward greater inclusion.

## PRINCIPLE 3. WE CANNOT ASK MARGINALIZED PEOPLE TO DO THE WORK TO ENSURE THEY ARE INCLUDED

Inclusion must not require that people advocate for themselves, their own rights, or their own humanity. As Black queer writer and activist Audre Lorde laments, “It is the members of the oppressed, objectified groups

*GSA Today*, v. 30, <https://doi.org/10.1130/GSATG429GW.1>. Copyright 2020, The Geological Society of America. CC-BY-NC.

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who are expected to reach out and bridge the actualities of our lives and the consciousness of our oppressor. ... Whenever the need for some pretense of communication arises, those who profit from our oppression call upon us to share our knowledge with them. In other words, it is the responsibility of the oppressed to teach the oppressors their mistakes” (Lorde, 1984, p. 114). Rather than rely on this limiting, exploitative model, we must anticipate the needs of diverse communities and proactively meet them. To put it differently, a coherent framework for inclusion need never be expanded to cover new groups—rather, it critically examines existing structures that prohibit broader participation and dismantles them. In this way, representation and inclusion fundamentally differ. For example, the presence of an LGBTQ+ faculty member may help LGBTQ+ students feel a sense of belonging (Yoder and Mattheis, 2015). Yet, a department or organization does not need to hire an LGBTQ+ faculty member in order to be inclusive of LGBTQ+ people. In fact, such an approach reduces someone along a singular axis of their identity and expects them to represent a community whose experiences are manifold. A wide variety of resources, including on-campus groups, national affinity networks, and professional organizations provide suggestions about making a department more inclusive of marginalized people. We should use them.

## WHERE DO WE GO FROM HERE?

Geosciences departments, professional societies, and funding agencies are reaffirming their commitments to DEI. But the discourse is muddled by the lack of a shared framework for what it means and why we pursue it. We have identified broadly applicable principles to form the core of a coherent, sustainable, and effective model of inclusion. There are also many hopeful and effective examples of how you can advance DEI goals:

1. **Leverage your position and privilege to improve your community.** Identify contexts in which you personally have power and influence. Be it a meeting with administrators, the graduate student union, or sorority, we all inhabit spaces where our voices are valued. Share your interest in advancing DEI in the geosciences within these spaces, and use your influence there to motivate others.

2. **Practice inclusive pedagogy.** Just like we engage with scholarly literature to inform our understanding of our geological subfields, a vast literature on DEI exists that can inform our efforts in this space. Start a for-credit seminar or reading group to ignite and continue the conversation.

3. **Become a DEI leader.** Organize for change and get involved on your own campus (see efforts by graduate students at the University of Massachusetts Amherst, <https://eos.org/opinions/whats-in-a-seminar>), within a broader affinity group (see the GeoLatinas: <https://twitter.com/geolatinas>), or with an international professional organization (volunteer for a leadership/diversity position with, for example, GSA, the American Geophysical Union (AGU), or the American Meteorological Society).

4. **Hold institutions accountable to their most vulnerable members.** The successful social media campaign (Tanner, 2019) to remove the BYU job advertisement from the GSA and AGU job boards because it was inconsistent with the associations’ commitments to diversity and inclusion demonstrates the power that individuals have to effect change, especially when we uplift and amplify marginalized voices.

All institutions have room to improve with regard to broadening participation, but half a century of efforts to diversify the geosciences have been stonewalled by myriad obstacles (Bromery et al., 1972; Bernard and Cooperdock, 2018). We cannot expect that rearticulating the same tired commitments will result in a different outcome. Instead, we must be bold and brave in pursuit of our goals. Use the principles laid out here to inform the everyday decisions that over time create the fabric of geoscience culture we inhabit. The responsibility to fulfill our vision of diversity falls to every one of us. What action will you take to achieve it?

## ACKNOWLEDGMENTS

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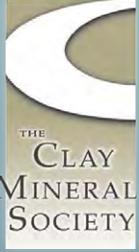


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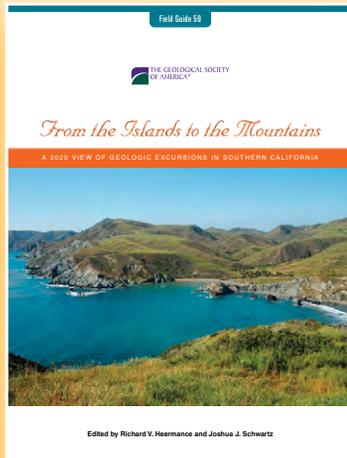
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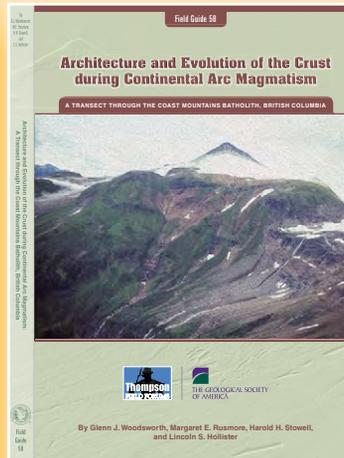
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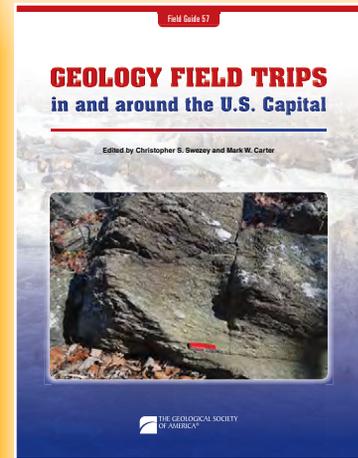
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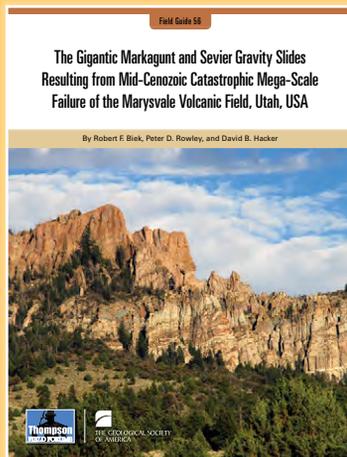
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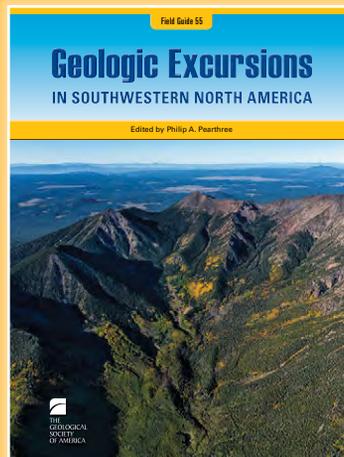
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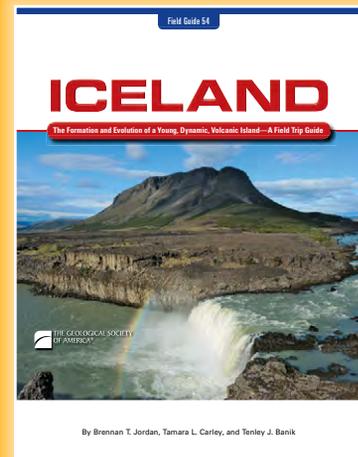
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## Quizzes, Trivia, and Virtual Chats— All That and More at GSA 2020 Connects Online

The Foundation has been busy planning some fun activities for GSA 2020 Connects Online. We'll continue the popular rock/mineral identification quiz that was a great hit at our booth during the last two annual meetings. If you find yourself in need of a mental break between sessions or you want to start your day exercising your mind along with a cup of coffee, you can take this year's virtual rock/mineral identification quiz at any time during the meeting. Test your knowledge on the samples submitted by the Foundation Board of Trustees. A winner will be announced every day and will receive a "gneiss" prize, which will be shipped. Trust us, you don't want to miss out on these prizes, and we promise the quiz isn't too "tuff."

We will also have a live trivia event scheduled during exhibitor hours. The subject will be geology in pop culture. If you're a geologist who is also a movie buff, video-game enthusiast, general fan of pop culture, or, if you just have an "apatite" for trivia, this event is for you. All you need is a computer and a phone with Internet

access. No need to download an app. It's very easy to navigate, and adds a chance for fun, friendly competition with other meeting attendees.

For Penrose Circle Members, we are still planning a special virtual event for you during our usual Monday evening time slot. We will have more details as the date approaches, so please keep an eye on your email for an invitation.

Finally, one of our favorite parts of the annual meeting is the chance to visit with all of you. We enjoy talking with you between sessions or after you have perused the poster hall. Despite not seeing you in person, the Foundation staff will still be available to chat at any time during exhibitor hours. Several members of the Foundation Board of Trustees will also be available at various points over the course of the meeting. If you have questions for us or just want to say hello, we'll be there.

Even though this year is going to be different, one thing certainly remains the same—that's how much we look forward to seeing you.



Students participate in the GSA Foundation rock/mineral identification quiz at GSA 2018 Indianapolis (left) and rock/mineral map matching quiz at GSA 2019 Phoenix.



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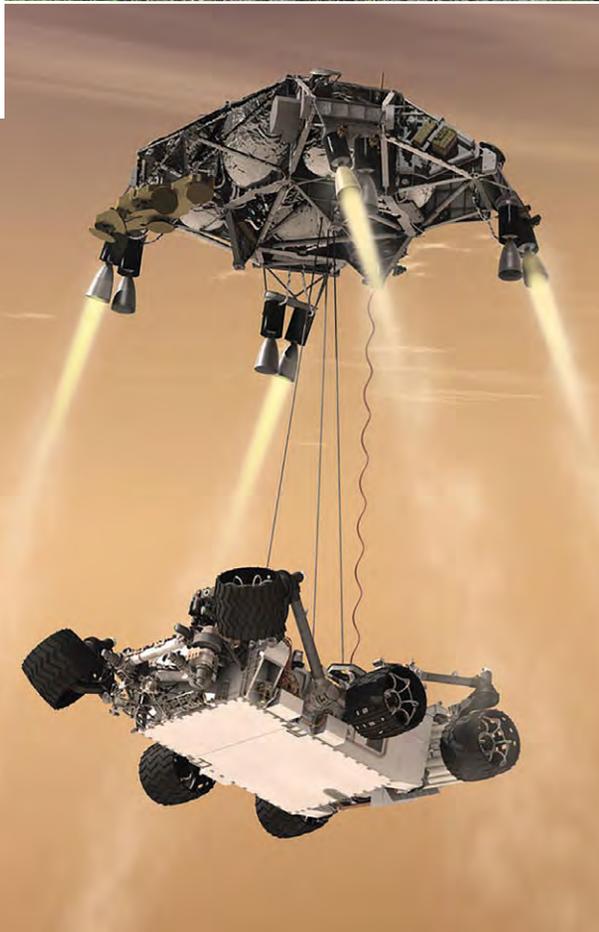


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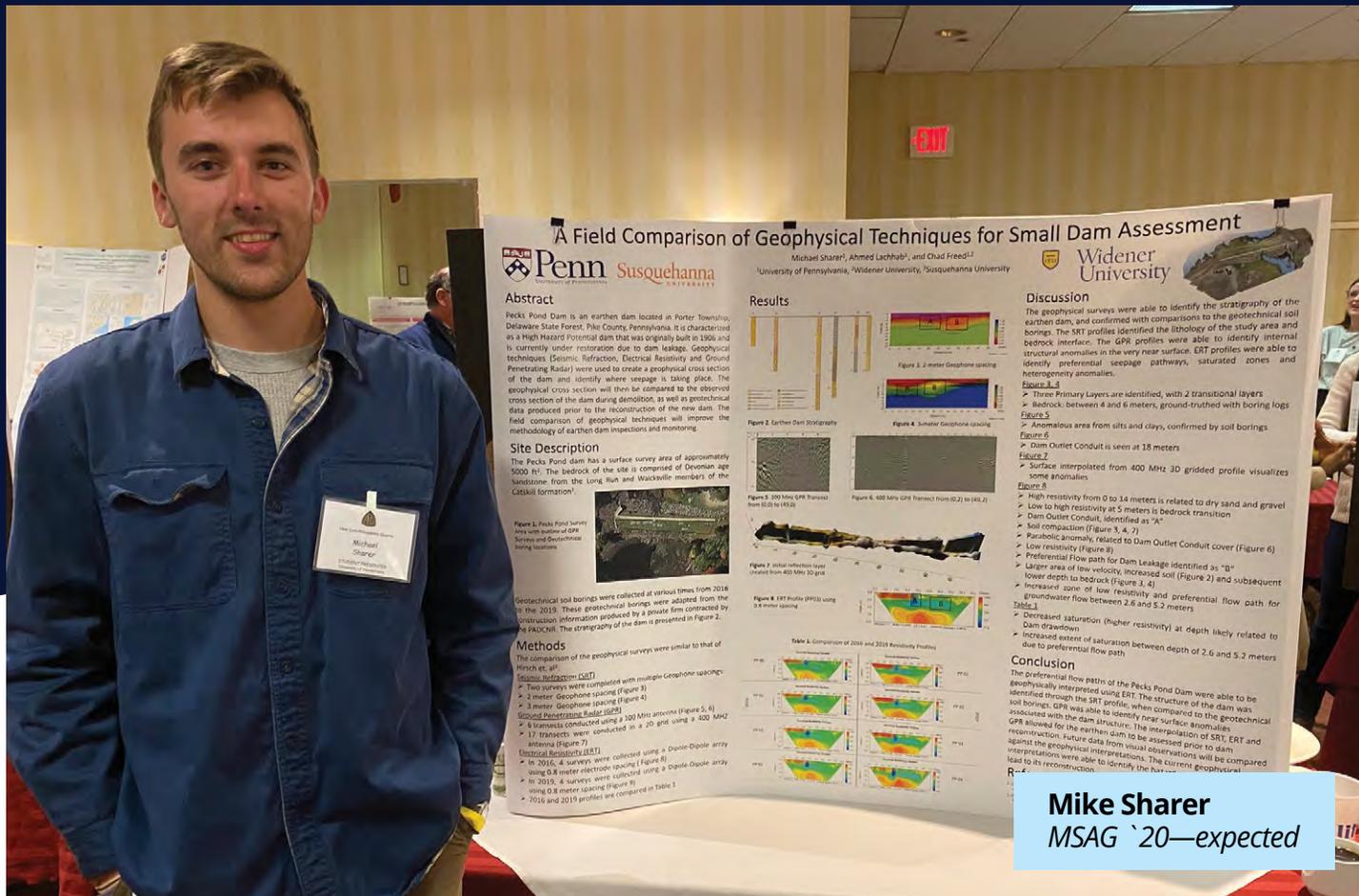
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