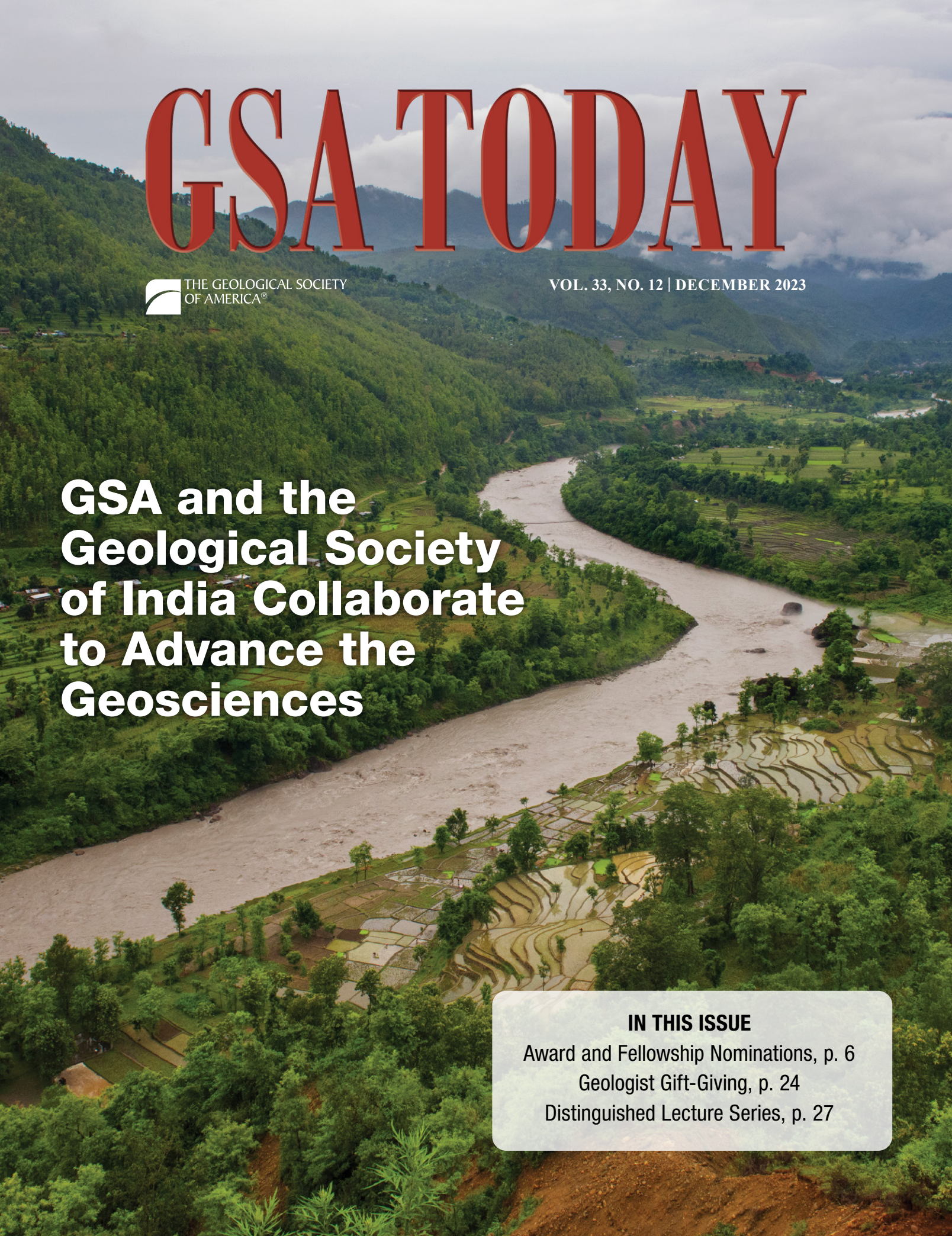

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THE GEOLOGICAL SOCIETY OF AMERICA®

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GSA and the Geological Society of India Collaborate to Advance the Geosciences

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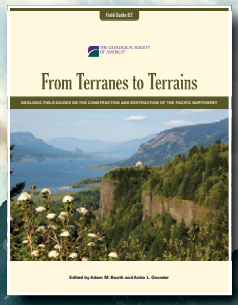

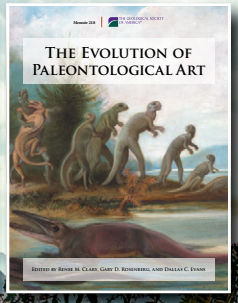

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Cover: Nepal, Ghorkha District. River and mudslides due to monsoon rains and the earthquake. See related article on pages 4–6. Photo credit: Alison Wright/Corbis Documentary via Getty Images.

GSA NEWS

ERRATUM: The November 2023 issue of *GSA Today* listed the awards deadline as 10 April 2024. The correct date is 1 February 2024.

Fostering Global Collaboration: Building Bridges Between GSA and the Geological Society of India for Scientific Advancement

On 6 September 2023, the Geological Society of America (GSA) hosted a webinar featuring Mark Little, immediate past president of GSA, Dr. Harsh Kumar Gupta, president of the Geological Society of India (GSoI), and Dr. Abhijit Mukherjee, a professor of geology and geophysics at the Indian Institute of Technology in Kharagpur and a GSA Council member. This hour-long conversation spanned the early careers and interests of the participants, major issues facing the geoscience community, and ways that GSA and GSoI can work together for the advancement of science and society. The discussion has been condensed and edited for clarity.

Mark Little: Welcome. My name is Mark Little. I'm the immediate past president of the Geological Society of America, and I am very excited today to have two wonderful folks to talk with about the Geological Society of India, and possible areas of collaboration between our two societies. I have with me Dr. Harsh Kumar Gupta, who is the president of the Geological Society of India. He's an earth scientist and seismologist, and especially known for pioneering work on estimation of reservoir-induced earthquakes.

And we also have Dr. Abhijit Mukherjee, who is a professor of geology and geophysics at the Indian Institute of Technology in Kharagpur, West Bengal, India. Abhijit is in a special position because he is a member of the Geological Society of India and the Geological Society of America and also is on Council with me and others at GSA, and has been really instrumental in this new partnership between the two societies.

So we have a lot of interesting things to talk about, Harsh. But first, I was wondering if you could just tell us a little bit about why you're a geoscientist. And maybe a little bit about the Geological Society of India as well.

Harsh Gupta: Okay, I think first question first. I'm a geophysicist. After completing my intermediate education, my elder brother, who was working for the oil and natural gas commission, advised me to go for geophysics. I had no idea what geophysics was. There's one Indian School of Mines in India, located in Dhanbad. So I entered for the entrance examination with geophysics as my choice, and I was fortunate to be selected. My first posting was at a seismological observatory in Shillong. The first task I had was to assist a team of U.S. Geological Survey people to set up the worldwide standard seismograph network (WWSSN). After Shillong I then came to the National Geophysical Research Institute because at that time they wanted to set up a station similar to WWSSN in Hyderabad. Finally, I had quite a bit of training in Japan with Kiyoo Mogi.

The Geological Society of India was created in 1958. The idea was to provide a forum for Indian earth scientists to put their research in a journal. So the *Journal of the Geological Society of India* started in 1959. From 1977 onward it has become a monthly [publication]. We are currently switching over to GeoScienceWorld, which will be collaborating with us to publish it. So that has been a very successful thing, and it has given us a lot of visibility. There is also a lot of focus on popularizing science and we publish books on the geology of all the states of the country.

One activity which I find extremely useful is the International Earth Science Olympiad. One Olympiad was just completed and we had around 3,500 high school students apply to be selected. Out of them, we selected 30, and these 30 students were put through a very rigorous training of 30 days and then we had to select eight of them. These students had no knowledge of geology because geology is not taught as a subject in India and in many other countries. So after they participated, I'm very proud to say that eight of them won either a silver or a bronze or a gold medal.

Most of us join geology by chance, not by choice. Because, as a high school student, I did not know what geology is. I had learned a little bit of geography, but geology is a totally different game. So somehow we are trying to propagate that in India, and in some [other] places it has not come to the school level, but post high school and at intermediate level.

I think we are developing and we are growing. And I'm very hopeful that the collaboration we are going to have with the Geological Society of America will further strengthen us.

ML: Thank you so much, Harsh. I have many, many follow up questions, but I'll hold off on those for just a moment. Abhijit, maybe if you want to just tell us a little bit about yourself and how you see these two organizations.

Abhijit Mukherjee: Thanks, Mark. My introduction to GSA happened when I moved from India [to the U.S.] as a graduate student back in 2001, which is almost 23 years back. I didn't know about professional societies, but that first introduction to GSA kind of became my life-changer, and since then GSA has been my professional home. And as you said, in the last few years I've been serving on Council, in the leadership, in the international committee and taking the goal forward.

When I decided to come back to India after graduating and working in the U.S. for almost a decade, I thought, you know, in India there are a lot of very bright geology students as well as geoscientists who are professionals working in both academia and industry. However, I could definitely see that there is less outreach, less footprint of these geoscience students and the professionals. So when I got this invitation to start in the leadership of

GSA, one of the things I definitely thought about was a way GSA and GSoI can work together, because GSA has this universal and global footprint. I thought it was a natural thing to bring the two societies together, and introduce them to each other, and try to make a bridge which I think personally would act as a kind of a trigger to grow both societies in a global forum. I think it's the right time to have the two societies work together for the advancement of science and society.

"I thought it was a natural thing to bring the two societies together...and try to make a bridge which I think personally would act as a kind of a trigger to grow both societies in a global forum." —Abhijit Mukherjee

ML: Well, thank you. One of the areas that you mentioned, Harsh, was that you got into the geosciences and geophysics by accident and you're very correct. I had a similar experience in college. I was just looking through the classes, like, "Oh, these seem interesting." And that's how I went down this path. Here in the U.S. we've also been having a conversation about how to increase the number of students who go to graduate school in geophysics, geochemistry, geology, and any of the earth sciences.

You mentioned the Olympiad. I'm wondering what other types of activities you have been thinking about to get more younger people aware of the geosciences. I think that's another area where there could be some collaboration, because we're facing the same challenge here.

HG: When I was Secretary at the Department of Ocean Development, the Geological Society of India prepared a booklet, *The Story of the Oceans*. It's about a 50-page book very simply telling all the concepts about oceans. And then we had a few enthusiastic people, knowledgeable people, trained as lecturers who went from school to school with these booklets, which were free.

And that created so much interest among the students. Putting something in a curriculum is not easy, because there are education boards you have to convince. But this approach, if we are able to send some volunteers to schools, some students will get interested in it.

We are planning to enlarge the International Earth Science Olympiad[1] further, and to make it more attractive, so more people will get to know about geology, and what the geological sciences are. And today, Mark, the very existence of planet Earth depends upon how well we understand it and what we do for it.

ML: I agree. Climate change, hazards, mining for resources for solar panels, for the batteries that are required for renewable energy—these are all part of the global conversation in the news every day. But then there's this big disconnect where people aren't aware that these are actual careers. There's training, and you can have a career where you sit behind a desk, you can have a career where you're walking through mountains, you can have a career where you're under the sea. There are very different ways that you can experience the professional life of a geoscientist.

Another area for collaboration you mentioned was the potential for preparation around geological hazards. Here, and I think outside of the U.S. as well, a lot of the conversation is about buildings. But it sounds like one of the things that you are also talking about is early warning systems and evacuations—how to get people out of harm's way as opposed to focusing on making buildings resistant.

HG: The most important thing is to observe an Earthquake Day. There's a book, *Elementary Seismology* by Charles Richter, about five damaging earthquakes in India. It so happens that this year, earthquakes have occurred at all five places described in the book, and everywhere the number of deaths has multiplied with the increasing population. For example, the 1819 Kutch earthquake killed some 300 people, and the 2001 Bhuj earthquake in the same area killed 20,000 people.

The only difference we found was for the Gorkha earthquake in Nepal. In 1934, the Bihar–Nepal earthquake killed around 22,000 people. Whereas [the Gorkha] earthquake [in Nepal] on 25 April 2015 killed just 8,000 people. I discovered the reason behind that is that they have started observing 16 January as an Earthquake Day, and on that Earthquake Day they train people in Kathmandu. They have located about 100 safe places where people can shelter in the event of an earthquake.

I think this message can be taken to all nations, to various developing places through the support of our two societies.

ML: One of the things that the Geological Society of America does on some of these policy issues is, we develop what we call position statements on topics like geoscience education. Once they're done, they're a tool for members of the society to use when they are talking with local elected officials or the school board.

I'm wondering if there could be some interesting ways of collaboration between the Geological Society of America and the Geological Society of India in communicating hazards. To your point, what are things that nations can do, whether it's observing Earthquake Day, or identifying those buildings that are safe places? Knowing those kinds of things I think could be important.

And then the other thing I keep thinking about is these are the kinds of activities that will make more people aware of the geosciences generally, and will connect to the education part, too, because people are like, "Oh, Harsh has come to tell us about something. Why is he here? Oh, he knows about these things because he's a seismologist. What's a seismologist?" And then it also is a way to increase the pipeline for the geosciences.

"The very existence of planet Earth depends upon how well we understand it and what we do for it." —Harsh Kumar Gupta

HG: I think you have provided a very good lead to action that can be taken to find volunteers who are interested in spreading information in schools. Because changing curriculum is not easy. But most schools would not mind if Harsh Gupta just goes there and tells them about earthquakes. And that way, indirectly, you generate interest in geology, in earth sciences.

ML: I want to take a step into the kinds of activities that GSoI and GSA do. There's a lot of overlap. And I think these are also maybe areas of collaboration. We're also part of GeoScienceWorld. So once that transition happens for you, I think it'll make it easier for

[1] http://www.igeoscied.org/activities/ieso-2/what-is-ieso/

our members to have access to each other's publications. We've also talked about ways that we can collaborate on meetings. The meetings are far away from each other, generally, but I think with some planning, there could be some interesting ways of hearing more of the topics and the content that's at your meetings. And then another area that I think there is some potential as well is on the student side.

HG: Yes.

ML: Because students now are so familiar with doing things virtually, I think there's a lot of opportunity. What are the ways that we can get students in India and students in the United States and other places more connected earlier in their careers? So that whether they travel somewhere for training or they want a research collaborator, those kinds of connections have been made early on. I think that's something that we can facilitate. We also have several folks from GSA visiting your annual meeting in Dharamshala very soon, and I believe we'll be welcoming a vice president from the Geological Society of India to attend our GSA Connects meeting in Pittsburgh, so there are lots of opportunities to continue the conversation.

Harsh, Abhijit, thank you so much for your time. Looking forward to building this collaboration between the Geological Society of America and the Geological Society of India.

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Our Rock and Mineral Exams Could Be Better

David R. Cordie,* *Edgewood College, Division of Physical, Computational, and Mathematical Sciences, Madison, Wisconsin 53711, USA;* ***Elizabeth G. Ceperley,*** *Wisconsin Geological and Natural History Survey, Division of Extension, University of Wisconsin–Madison, Madison, Wisconsin 53705, USA*

TRADITIONAL METHODS OF ASSESSMENT

The method by which we assess our students' learning is just as important as the way in which we deliver content. With regard to the latter, workshops and conference sessions often display the value of updated pedagogical styles that include more active learning, discussions, and hands-on practice. Yet the assessment method of one of the most hands-on units—rocks and minerals—remains the same: the standard "rock exam." In our personal experience, these rock exams most often take the form of an instructor providing 20–30 hand samples for students to identify in a one-shot exam. This format dates to the early 1800s, when the United States was expanding and qualified land surveyors were needed (Johnson, 1977). Combined with European traditions grounded in categorizing Earth's materials, a standard curriculum emerged, focused on memorization and identification of rocks and minerals, that is still used in university classrooms today.

While this method is standard, it may not be ideal. For one, this format can resemble a test that even we as instructors can sometimes fail. The scenario is all too familiar: a student proudly presents a rock from their personal collection, and it is difficult to immediately identify it. Beaten up, dirty, weathered, rounded, and devoid of context, it is not hard to imagine a granite being mistaken for a diorite. Yet, presenting a single specimen as the only opportunity to identify a rock is exactly what these exams are asking our students to do. Furthermore, a one-shot exam promotes unease in a population for which 20%–40% self-report some form of test anxiety (Maier et al., 2021). As our introductory classrooms are typically filled with students seeking general education requirements—as much as 76.5%, according to Gilbert et al. (2012)—it is worth looking into a new method of assessing our students that motivates them to study and learn (Lukes and McConnell, 2014).

AN ALTERNATIVE METHOD

While exams have their downside, it might not be necessary to completely discard them. They are beneficial in providing an objective assessment of an individual student's understanding of course material unlike subjective projects or group work. If we want to properly assess our students, what qualities should exams have to provide students with a better opportunity to show us what they know? Ideally, assessment of any type will (1) provide feedback, (2) have a clearly defined pathway to success, and (3) be iterative. Since fall 2021, we have used the following method, which is grounded in the concepts of mastery grading (see Farah, 2021, for background), for rock and mineral identification exams in an introductory-level geology course.

The course starts with lessons on the nature of science as well as broad topics in geology (e.g., plate tectonics, structure of Earth, rock cycle) to provide some grounding in the field. Around week five, we start lessons on minerals and then the three rock types. The purpose of this sequence is to provide students with context prior to starting the more detailed work of mineral and rock identification. Starting with the mineral lessons, the first half of class features a mixture of lectures and activities designed to show students why a geologist might want to know what minerals are in a sample. The second half of class is recognizable to many instructors as a standard geology lab with hand samples and guided practice on their identification. However, the final 30 minutes of class are reserved for work on their identification exam.

For these exams, students rotate through stations composed of samples in numbered trays. On their exam sheet, they are asked to identify which numbered tray corresponds to each sample. At the end of class, these exam sheets are turned in and graded (Fig. 1). This process is repeated for four consecutive classes, with new samples, arranged in a new order, for every attempt. A student only receives credit if they correctly identify a sample twice (they do not need to be sequential) during their four attempts. If a student correctly identifies a sample twice prior to their final attempt, they are not required to identify those samples further and are instead free to focus on those they still need to identify. In this manner, a student can focus on troublesome samples without being forced to repeatedly identify those they already know, as can happen in exam formats that take the highest score out of multiple attempts. At the end of the exam, the total number of completed samples determines the student's final grade.

For the instructor, there is a lot of flexibility with this method. For example, an instructor may choose to assess only a portion of the required samples on the first attempt. To make the exam more challenging, one could add more samples, require more correct identifications, or require that correct identifications be sequential. Another option is to allow one of the attempts to be done in groups, knowing that each individual student will still need to learn how to identify all the samples on their own in the future. This method also means that a single poor sample will not spoil an exam for a student, since for

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CITATION: Cordie, D.R., and Ceperley, E.G., 2023, Our rock and mineral exams could be better: GSA Today, v. 33, p. 8–9, https://doi.org/10.1130/GSATG578GW.1.

Name: Zidane Final Score 7/7 100%

Sample	Attempt 1	Attempt 2	Attempt 3	Attempt 4	Complete?
Quartz	3	4			✓
Halite	4	2			✓
Orthoclase	1	1	6		✓
Granite	2	3			✓
Diorite	X	6	2		✓
Arkose	X	7	4	2	✓
Shale	X	5	7		✓
Gneiss					

Name: Tidus Final Score 6/7 86%

Sample	Attempt 1	Attempt 2	Attempt 3	Attempt 4	Complete?
Quartz	4	4	7	1	✓
Halite	3	3	5	5	✓
Orthoclase	2	1	6	6	✓
Granite	1	6	3	3	✓
Diorite	X	5	2	4	✓
Arkose	X	7	4	2	✓
Shale	X	2	1	7	✗
Gneiss					

Figure 1. Hypothetical exam sheet with grading (green rectangle for correct, yellow circle for incorrect). *X*s on bottom of attempt 1 indicate that these samples were not present on their first attempt. Zidane was an early high scorer. They got everything correct on the first attempt and missed only two on the second attempt. On the final two attempts, they only had to identify samples yet to be correctly identified twice to complete the assignment. Tidus started poorly, but with the flexibility of this format was able to make up for a slow start and still do well on the exam as opposed to being punished for early struggles.

the next class new samples will be provided. It also eliminates make-up exams; if a student misses a class, they still have multiple attempts on subsequent days.

RESULTS AND DISCUSSION

As an assessment tool, there are numerous advantages to this method. First, it provides more frequent feedback. Each class, a student knows which samples they misidentified and can ask questions prior to the next attempt. Second, a student knows how many more samples they must identify each day, giving them a well-defined goal to work toward. And third, the iterative process not only eliminates the stress associated with a single-day exam, but also forces students to repeatedly show their understanding over the course of a few weeks. Students can no longer "cram" the night before, since they must identify the samples again on another occasion.

Since implementing this system in 2021, the median score on the exam has increased 5.3 percentage points (p-value = 0.03); however, statistical power is low with fewer than 50 students compared. Anecdotally, students appear to be less stressed in this environment as opposed to the traditional way, an observation backed up by research (Branco, 2021). After turning in their assignments, exam sheets are graded on the spot and students will often look over samples they got wrong and take notes in preparation for the next attempt. This is a sign that they are taking in feedback and planning for their future success. Additionally, by the third or fourth attempt, many students are gaining confidence in their identifications and rarely take more than 15 minutes to complete the exam. In one conversation, a student mentioned that they could not just memorize appearances of samples from pictures—they actually had to learn the properties of materials, since they knew that there would be multiple samples used throughout the exam. With some reimagining, a rock exam can be a valuable tool in assessing student learning.

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Northeastern Section Meeting

Manchester, New Hampshire
17–19 March

www.geosociety.org/ne-mtg

Left: Beach near Portsmouth, New Hampshire.

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Below: Spokane Falls. Photo credit: Chad Pritchard.

Southeastern Section Meeting

Asheville, North Carolina
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Above: Blue Ridge Mountains. Photo credit: Ashley Lynn.

Joint North-Central/ South-Central Section Meeting

Springfield, Missouri
21–23 April

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Right: Smallin Civil War Cave. Photo credit: Springfield CVB.

SECOND ANNOUNCEMENT AND FINAL CALL FOR PAPERS

Northeastern Section

59th Annual Meeting of the Northeastern Section

Manchester, New Hampshire, USA
17–19 March 2024

www.geosociety.org/ne-mtg

Photo credit: iStock.com/William Reagan

LOCATION

The meeting will be held in Manchester, New Hampshire, USA, the largest city in northern New England. Manchester is situated on the Merrimack River about 50 miles northwest of Boston and 60 miles south of the White Mountains. The meeting location is the DoubleTree by Hilton, in the heart of downtown Manchester, less than 10 miles from the Manchester-Boston Regional Airport (MHT) and proximal to a wide variety of shops and restaurants. Situated between the Atlantic coast and White Mountains, Manchester offers many opportunities to experience picturesque New England. We invite you to join us at Manchester 2024 where we have developed a strong technical program that covers a broad scope of geologic topics and discussions on the recruitment of the next generation of geoscientists.

CALL FOR PAPERS

Abstracts deadline: 12 Dec. 2023, 11:59 p.m. PST
Submit online at **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, hclark@geosociety.org.

ACCOMMODATIONS

Hotel registration deadline: 23 Feb. 2024

A block of rooms has been reserved at the DoubleTree by Hilton Manchester Downtown, 700 Elm Street, Manchester, New Hampshire 03031. The meeting rate is US$159 per night plus tax. The hotel offers many amenities (restaurants, bar, pool, Wi-Fi) and a complimentary shuttle to and from the Manchester-Boston Regional Airport (MHT). Reservations can be made by calling +1-603-625-1000. Please be sure to identify yourself with the group code GEO and say that you are attending the GSA Northeastern Section Meeting. Parking is available at the hotel.

REGISTRATION

Early registration deadline: 13 Feb. 2024
Cancellation deadline: 19 Feb. 2024

Registration opens in December. For further information or if you need special accommodations, please contact the general co-chair, David West, dwest@middlebury.edu.

REGISTRATION FEES

(all fees are in U.S. dollars)

Member Type	Early		Standard	
	Full Mtg.	One Day	Full Mtg.	One Day
Professional Member	US$200	US$150	US$250	US$175
Professional Member 70+ & 30-year member	US$100	US$100	US$150	US$150
Professional Nonmember	US$250	US$175	US$300	US$200
Early Career Professional Member	US$150	US$100	US$200	US$175
Student Member	US$85	US$60	US$100	US$75
Student Nonmember	US$100	US$75	US$125	US$100
K-12 Professional	US$85	US$60	US$100	US$75
Guest or Spouse	US$65	US$50	US$75	US$65
Field Trip/Short Course Only	US$25	n/a	US$25	n/a

TECHNICAL PROGRAM

Symposia

S1. **Applied Investigations by Northeastern State Geological Surveys: Honoring the Tradition of Robert Marvinney.** Amber Whittaker, Maine Geological Survey, amber.h.whittaker@maine.gov; Shane Csiki, New Hampshire Geological Survey, shane.csiki@des.nh.gov; Benjamin DeJong, Vermont Geological Survey, benjamin.dejong@vermont.gov.

This session will provide the opportunity for staff members of State Geological Surveys and their coauthors to provide updates on their technical investigations and how such work directly supports and integrates with societal needs.

S2. **Neoproterozoic and Paleozoic Geological Connections among Northwest Africa, Europe, and Eastern North America: A Session Honoring the Career of Sandra M. Barr.** *Endorsed by GSA Structural Geology and Tectonics Division; GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* Yvette Kuiper, Colorado School of Mines, USA, ykuiper@mines.edu; Margaret Thompson, Wellesley College, USA, mthompso@wellesley.edu; Chris White, Acadia University, Canada, chrisewhite@gmail.com; Saïd Belkacim, Ibn Zohr University, Morocco, s.belkacim@

uiz.ac.ma; Faouziya Haissen Hassan II, University of Casablanca, Morocco, faouziya.haissen@gmail.com; Pilar G. Montero, University of Granada, Spain, pmontero@ugr.es.

We invite contributions focused on geological comparisons and potential correlations among Neoproterozoic (or older) and Paleozoic rocks in northwest Africa, Europe, and eastern North America, or on the Alleghanian/Variscan/Hercynian orogen, as part of IGCP 683. This session is a celebration of the career of Sandra M. Barr.

Theme Sessions

T1. **Unveiling Pathways into the Geological, Atmospheric, Marine, and Environmental Sciences.** Julie Bryce, University of New Hampshire, julie.bryce@unh.edu; Jennifer Bourgeault, University of New Hampshire, jen.bourgeault@unh.edu; Florencia Fahnestock, University of New Hampshire, florencia.fahnestock@unh.edu; Lara Gengarelly, University of New Hampshire, lara.gengarelly@unh.edu; Gulnihal (Rose) Ozbay, Delaware State University, gozbay@desu.edu; Ruth Varner, University of New Hampshire, ruth.varner@unh.edu.

The geological, atmospheric, marine, and environmental sciences (GAMES) play crucial roles in addressing twenty-first-century global challenges. Here we invite presentations from those working to enhance participation in GAMES with innovative programs engaging the K–12 community, convergent research, citizen science, private-public partnerships, and collaboration with communities insufficiently represented in GAMES.

T2. **What Is the Future of Field Camp?** Sara Mana, Salem State University, smana@salemstate.edu; Lauren Neitzke Adamo, Rutgers University, lneitzke@eps.rutgers.edu; Morgan Schaller, Rensselaer Polytechnic Institute, schall@rpi.edu.

This session aims to advance the conversation about creating effective field-based learning experiences, emphasizing the skills, workforce needs, sustainable and inclusive best practices, and technological advances that will shape the next generation of geoscientists. Diverse perspectives and presentations on pilot studies, curriculum design, and measured results are encouraged.

T3. **Northern Appalachian Magmatism: From the Precambrian to the Cretaceous.** Michael J. Dorais, Brigham Young University, dorais@byu.edu; Sean Kinney, Columbia University, kinney@ldeo.columbia.edu; Jennifer Cooper Boemmels, Southern Connecticut State University, cooperjl@southernct.edu.

The northern Appalachians contain igneous rocks with a variety of compositions and ages between the Precambrian through the Cretaceous. Tectonic settings include subduction zones, continent-to-continent collisions, supercontinental rifting, passive margin, and anorogenic settings. We invite submissions to portray the diversity of igneous rocks throughout the region.

T4. **Recent Advances in the Crystalline Basement of the Adirondack and Appalachian Orogens.** Erkan Toraman, Salem State University, etoraman@salemstate.edu; Gregory J. Walsh, U.S. Geological Survey, gwalsh@usgs.gov.

Basement massifs form the foundation of the Appalachian and Adirondack Mountains. This session will focus on a broad range of approaches from field and analytical studies that will provide insight into the origins of the crystalline basement and improve our understanding of the terrane affinities in both orogenic belts.

T5. **The Missing, Near-Missing, and Cryptic Geologic Record of the Northern Appalachian Orogen.** Dwight Bradley, Dartmouth College Visiting Scholar, bradleyorchard2@gmail.com; Justin Strauss, Dartmouth College, justin.v.strauss@dartmouth.edu; Doug Reusch, University of Maine Farmington, reusch@maine.edu.

This session focuses on gaps and near-gaps in the geologic record of the Northern Appalachians, and on the tools that help to elucidate them. We invite submissions on detrital geo-thermo-chronology and provenance, xenoliths and roof pendants, crystallization depths of plutonic rocks, reconstructed crustal thicknesses, cryptic metamorphic events, and more.

T6. **New Insights into Convergent Margin Processes from Collaborative Field and Laboratory Studies Programs in Northern New England and Quebec.** David Converse, New Hampshire State Map Program, USA, drconverse7@gmail.com; Joshua Keeley, New Hampshire Geological Survey, USA, joshua.a.keeley@des.nh.gov; Morgann Perrot, McGill University, Canada, perrot.morgann@uqam.ca; Wallace Bothner, University of New Hampshire, USA, wally.bothner@unh.edu; Lori Summa, Rice University, USA, llsumma@att.net.

The Appalachians of northern New England and Quebec preserve a unique record of overlapping orogenic events. Recent multidisciplinary field and laboratory studies have provided an exceptional opportunity to gain insights into regional orogenic processes through collaboration among multiple government agencies and universities. This session showcases highlights of recent efforts.

T7. **Unraveling Appalachian Orogenic Events Using Geological and Geophysical Methods.** *Endorsed by GSA Geophysics and Geodynamics Division; GSA Structural Geology and Tectonics Division.* Maureen Long, Yale University, maureen.long@yale.edu; Yvette Kuiper, Colorado School of Mines, ykuiper@mines.edu; Paul Karabinos, Williams College, pkarabin@williams.edu; Laura Webb, University of Vermont, lewebb@uvm.edu.

We invite any contributions that focus on unraveling the tectonic history of the Appalachians using geological and geophysical methods. Work based on geological OR geophysical methods, where the other method is desired, is welcome too. The purpose is to enhance discussion between geologists and geophysicists.

T8. **Micro to Macro: Linking Structural Geology, Petrology, Geochronology, and Tectonics across Scales.** *Endorsed by GSA Geochronology Division; GSA Structural Geology and Tectonics Division; GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division.* Emily Peterman, Bowdoin College, epeterma@bowdoin.edu; Nicholas Roberts, Hamilton College, nmrobert@hamilton.edu.

This session will highlight research in structural geology, petrology, and geochronology that connects microscale observations and data to their macroscopic structural and/or tectonic settings. We welcome contributions from experimental, laboratory, and/or field research and encourage contributions from early career researchers and students.

T9. **Clocks in Rocks: Radiogenic Isotope Tracers for Tectonic, Climatic, and Biotic Processes.** *Endorsed by GSA Geochronology Division; GSA Structural Geology and Tectonics Division; GSA Geobiology Division.* Athena Eyster, Tufts University, athena.eyster@tufts.edu; Emily Peterman, Bowdoin College, epeterma@bowdoin.edu; Cullen Kortyna, University of Connecticut, cullen.kortyna@uconn.edu; Kyra Croft, Boston College, croftky@bc.edu; Dylan Seal, Boston College, seald@bc.edu.

Geochronologic and radiogenic isotope datasets are critical for understanding the interdependent processes involved in the evolution of Earth. We invite contributions that quantify timing, calibrate tempos, and/or test models for the evolution of tectonic, climatic, and biotic processes in the Appalachians and globally, across all spatial and temporal scales.

T10. **Glacial Geology and Geomorphology of Northeastern North America: Current Gaps and Future Directions.** *Endorsed by GSA Quaternary Geology and Geomorphology Division.* Simon Pendleton, Plymouth State University, simon.pendleton@plymouth.edu; Alia Lesnek, CUNY Queens College, alia.lesnek@qc.cuny.edu; Aaron Barth, Rowan University, bartha@rowan.edu.

While glaciation and its impacts on northeastern North America have been widely studied for more than a century, gaps still remain in our understanding of regional glacial histories and processes. We propose a session that highlights the current state of glacial geology and geomorphology research in northeastern North America.

T11. **Phosphorus Contributions to Cyanobacteria Blooms by Groundwater, Surface Water, and Internal Sediment Loading in Northeastern Lakes.** Edwin Romanowicz, SUNY–Plattsburgh, romanoea@plattsburgh.edu; Peter Ryan, Middlebury College, pryan@middlebury.edu; Jonathan Kim, Vermont Geological Survey, jon.kim@vermont.gov.

Many lakes are impacted by high phosphorus concentrations. Quantifying the phosphorus budget of lakes requires an understanding of external loading and the recycling of phosphorus from lake sediments due to water temperature and anoxia. We seek presentations on lake phosphorus budgets and the effects of phosphorus loading on water quality.

T12. **Current Research in Lacustrine Sedimentary Records and Processes for Understanding Climate and Environmental Change.** *Endorsed by GSA Limnogeology Division; GSA Quaternary Geology and Geomorphology Division; GSA Sedimentary Geology Division.* Mike Retelle, Bates College, mretelle@bates.edu; Tim Cook, University of Massachusetts, tlcoo0@umass.edu; Catherine Beck, Hamilton College, ccbeck@hamilton.edu; Brad Hubeny, Salem State University, bhubeny@salemstate.edu.

Lacustrine sediments provide reconstructions of climate and environmental change across a range of spatial and temporal scales, allowing for assessment of recent changes in a long-term context. We encourage presentations on lake sediment records and process studies that aid in calibration of the sediment archive and record current changes in the lacustrine system.

T13. **Reassessing New England's Post-glacial Paleoclimate Record.** Lisa Doner, Plymouth State University, ladoner@plymouth.edu.

New England lakes were some of the first locations in studies focused on postglacial climate change. Many of these publications are over 40 years old and focused primarily on stadials. This session invites reports that use new and traditional methods to understand transitions into warm intervals in northeastern North America.

T14. **Phanerozoic Paleoceanographic and Climatic Changes (Posters).** Adriane R. Lam, Binghamton University, alam@binghamton.edu; Stephen Pekar, CUNY Queens College, stephen.pekar@qc.cuny.edu.

This poster session brings together modeling and proxy studies to improve our understanding of past ocean and climate events and changes between long-term climate/ocean conditions throughout the Phanerozoic.

T15. **Development and Application of Organic Geochemical Proxies for Paleoclimate Reconstruction.** Boyang Zhao, Brown University, boyang_zhao@brown.edu; Emily Tibbett, University of Massachusetts Amherst, etibbett@umass.edu.

Organic biomarkers preserved in natural archives offer important insights into Earth's paleoclimate. We seek studies investigating lipids and their stable isotopic composition to infer environmental and climatic conditions in the present or past. The contributions can be from any timescale and depositional environment, including proxy development studies.

T16. **Global Change During the Late Triassic Hothouse.** Michael Naylor Hudgins, Rensselaer Polytechnic Institute, hudgim@rpi.edu; Morgan F. Schaller, Rensselaer Polytechnic Institute, schall@rpi.edu; Sara Mana, Salem State University, smana@salemstate.edu.

The Late Triassic hothouse is Earth's most recent example of a truly ice-free world, witnessing major evolutionary and climatic changes, and terminated by a mass extinction and emplacement of the Central Atlantic Magmatic Province. This session invites research in geochemistry, paleogeography, paleontology, paleoclimate, and earth system dynamics during the Late Triassic.

T17. **Trace Elements in the Environment.** Melissa Lombard, U.S. Geological Survey, mlombard@usgs.gov; Benjamin Bostick, Columbia University, bb2461@columbia.edu; Florencia Fahnestock, University of New Hampshire, florencia.fahnestock@unh.edu.

This session will highlight current research that focuses on the sources, occurrence, fate, and transport of trace elements such as arsenic, lead, mercury, and uranium. Presentations and posters are welcome that include trace element occurrence in biota, soil, sediment, groundwater, and surface water, as well as their interfaces and/or interactions.

T18. **Naturally Occurring Radon in the Northeast U.S. and Globally: Geologic, Hydrologic, and Geochemical Controls on Occurrence and Distribution.** Philip T. Harte, U.S. Geological Survey, ptharte@usgs.gov; William C. Brandon, U.S. Environmental Protection Agency, brandon.bill@epa.gov.

This session examines geologic and structural controls on occurrence and distribution of radon-222 (and associated uranium-238) in rocks and soil, including geochemical and hydrogeologic influences on formation and migration of radon-222 in vapor and aqueous phases, and methods for mapping, assessing, and mitigating radon occurrence and exposure, including innovative methods.

T19. **Recent Advances in PFAS and Emerging Contaminant Science: From Human Health Risk Assessment to Fate and Transport.** Andrea Tokranov, U.S. Geological Survey, atokranov@usgs.gov; Zachary Hopkins, U.S. Geological Survey, zrhopkins@usgs.gov; Andrew Shapero, Roux, ashapero@rouxinc.com; Sara Barrientos, Roux, sbarrientos@rouxinc.com.

Human health risk assessment for PFAS and emerging contaminants relies on the best available science to support decision making. This session welcomes abstracts on PFAS and emerging contaminant risk assessment, fate and transport, food web transfer, site investigation and remediation, occurrence, regulatory compliance, product testing, air pollution, and litigation.

T20. **Groundwater–Surface Water Interactions: Hydrological and Chemical Processes Across Interfaces.** James W. Heiss, University of Massachusetts Lowell, james_heiss@uml.edu; Andrew S. Reeve, University of Maine, asreeve@maine.edu.

Groundwater interaction with surficial systems influences biogeochemical processes, water availability, and ecosystem health. This session includes presentations using monitoring and modeling tools to understand groundwater's importance in near-surface coastal and freshwater environments.

T21. **Advances in Hydrologic Modeling of Groundwater and Surface Water.** Janet Barclay, U.S. Geological Survey, jbarclay@usgs.gov; Kalle Jahn, U.S. Geological Survey, kjahn@usgs.gov.

This session is focused on hydrologic modeling of groundwater and surface water. We welcome submissions across the range of: (1) model purposes (flow, transport, water quality, water levels etc.); (2) modeling approaches (mechanistic, statistical, machine learning, hybrid, etc.); and (3) model development (data compilation, model set up, calibration, uncertainty analysis, prediction).

T22. **The Functions of Floodplains and Wetlands.** Rebecca Diehl, University of Vermont, Rebecca.Diehl@uvm.edu; Kristen Underwood, University of Vermont, kristen.underwood@uvm.edu.

This session encourages contributions addressing research focused on the measurement or modeling of the multiple functions of floodplains and wetlands, including sequestration of sediment and nutrients, storage of flood waters, and support of diverse riparian plant and animal communities.

T23. **Watershed Processes and the Fluvial Forms and Dynamics They Produce.** Sean Smith, University of Maine, sean.m.smith@maine.edu; Anne Lightbody, University of New Hampshire, anne.lightbody@unh.edu.

Water and sediment supplies govern the shapes and dynamics of streams and rivers and the ecosystem services they provide. This session focuses on fluvial geomorphology, responses of fluvial systems to changes to water and sediment flux from human interventions and climate change, and related watershed management decision-making and sustainability solutions.

T24. **Current Research Along the Land-Ocean Continuum.** Robert Letscher, University of New Hampshire, robert.letscher@unh.edu; Kai Ziervogel, University of New Hampshire, kai.ziervogel@unh.edu; Cristina Schultz, Northeastern University, c.schultz@northeastern.edu.

Lacustrine, riverine, and coastal marine systems are dynamic incubators of biomass, organic matter, nutrient, and lithogenic particle transformations and transport. These processes are rapidly changing under anthropogenic influence. This session welcomes all research on processes along the land-ocean continuum using field, laboratory, engineering, remote sensing, and modeling approaches.

T25. **Estuary and Tidal Marsh Dynamics, Resiliency, and Restoration.** Tim Cook, University of Massachusetts Amherst, tlcoo0@umass.edu; Brian Yellen, University of Massachusetts Amherst, byellen@umass.edu; Zoe Hughes, Boston University, zoeh@bu.edu.

This session is focused on understanding changes in estuaries and tidal marshes due to human activity, sea-level rise, and changing sediment dynamics. We welcome studies utilizing diverse approaches and are particularly interested in work that diagnoses vulnerabilities to climate change and/or assesses restoration and climate adaptation strategies.

T26. **Current Research in Coastal and Nearshore Processes.** *Endorsed by GSA Marine and Coastal Geoscience Division,* Bryan Oakley, Eastern Connecticut State University, oakleyb@easternct.edu; Mark Borrelli, University of Massachusetts Boston, mark.borrelli@umb.edu.

Marine and lacustrine coastal systems are dynamic. Studies of past and ongoing coastal processes allow for a better understanding of the future impacts of sea-level rise, storms, and the resulting coastal change. This session welcomes all research on coastal/nearshore processes using field, laboratory, engineering, remote sensing, and modeling studies.

T27. **Artificial Intelligence in the Geosciences.** William Odom, U.S. Geological Survey, wodom@usgs.gov; Mary DiGiacomo-Cohen, U.S. Geological Survey, mdicohen@usgs.gov; Phillip Goodling, U.S. Geological Survey, pgoodling@usgs.gov; Aaron Maxwell, West Virginia University, aaron.maxwell@mail.wvu.edu.

Machine learning and deep learning techniques are increasingly used in the geosciences to identify trends in large datasets, classify geologic materials, and model complex systems. This session welcomes all research using AI-based techniques to address geoscientific questions over a range of spatial and temporal scales.

T28. **Mapping in the Geosciences: Processes and Products (Posters).** Gregory Walsh, U.S. Geological Survey, gwalsh@usgs.gov; Jonathan Kim, Vermont Geological Survey, jon.kim@vermont.gov; David Soller, U.S. Geological Survey, drsoller@usgs.gov.

This session creates an opportunity for researchers to share geoscience maps and mapping techniques that are best presented as posters. We welcome all submissions, but especially encourage examples of new bedrock and surficial geological maps, geophysical maps, and derivative maps plus topics addressing mapping techniques, data management, and web accessibility.

T29. **Geohazards in the Northeastern U.S.: Investigation and Mitigation.** Lindsay Theis, Maine Geological Survey, lindsay.theis@maine.gov; Peter Slovinsky, Maine Geological Survey, peter.a.slovinsky@maine.gov.

Geohazards have the potential to impact millions of people in the northeast U.S., especially in the face of changing climate. This session seeks submissions of new research related to characterization of mass wasting, erosion, flooding, and drought events in the northeast U.S. (coastal or inland), as well as mitigation and remediation strategies.

T30. **Opportunities and Challenges for Geothermal Energy in the Northeast.** J. Matthew Davis, University of New Hampshire, matt.davis@unh.edu.

This session will focus on the growing use of geothermal energy to electrify heating in the Northeast and seeks contributions from researchers, practitioners, policymakers, and other stakeholders. Both low-temperature heat pump applications and higher-temperature direct use applications are of interest.

T31. **Economic Geology and Critical Mineral Resources.** Myles Felch, Maine Mineral and Gem Museum, mfelch@mainemineralmuseum.org; John F. Slack, U.S. Geological Survey (Emeritus), jfslack@gmail.com.

In 2022, USGS published a list of 50 "critical minerals" and commodities. These resources play a significant role in national security and renewable energy technologies. This session will provide an overview of recent work of newly discovered and revisited critical mineral deposits in northeastern North America.

We encourage abstract submissions that do not necessarily fit into the above symposia and theme session topics. Additional discipline sessions, organized by topic, will be created to accommodate abstracts that are not submitted to the specific sessions listed above.

Photo credit: SeventyFour / iStock / Getty Images Plus via Getty Images.

TOWN HALL PANEL DISCUSSION: Recruiting the Next Generation of Geoscientists

This panel discussion will feature individuals from colleges and universities, the K–12 community, federal and state geological agencies, and the private consulting industry to discuss the future needs across all sectors of the geoscience community and the importance of recruiting younger individuals into the geosciences to fulfill these needs.

FIELD TRIP

Bedrock Quarries of Southeastern New Hampshire. Michael Wright, RESPEC, michael.wright@respec.com; Kirsten Egan, RESPEC, kirsten.egan@respec.com; Keith Gray, RESPEC, keith.gray@respec.com.

This field trip explores the general geology and production history of active quarry sites located within a 25-mile straight-line radius of Manchester, New Hampshire. Early Paleozoic rocks observed will include the Rangeley, Berwick, and/or Perry Mountain formations, plus the Concord Granite and/or Ayer Granodiorite. Major structures at each site will be discussed.

SHORT COURSES

Teaching Environmental Justice with Geoscience. Gary Gomby, Central Connecticut State University, garygomby@ccsu.edu.

This highly relevant and timely short course describes the rationale for and process involved in teaching environmental justice with a geoscience focus. Case studies contextualize geoscience within a framework of justice and equity, thereby increasing the relevance of basic geoscience to addressing societal issues.

Using GMDE and LiDAR Texture Shading in the Field and Lab. Richard W. Allmendinger, Cornell University, rwa1@cornell.edu.

This short course covers how to use the GMDE family of desktop and iOS programs for field work and in your teaching with emphasis on workflows. Examples will use texture-shaded LiDAR digital terrain models (DTMs), which are reminiscent of X-rays through tree cover.

OPPORTUNITIES FOR STUDENTS AND EARLY CAREER PROFESSIONALS

Career Mentoring Luncheons

Ask your career-related questions and learn about nonacademic 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. Nontechnical 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 **www.geosociety.org/mentors/.** Questions? Contact Jennifer Nocerino at 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 Sara Mana, Salem State University, smana@salemstate.edu.

PROFESSIONALS

If you'd like to share your interest, enthusiasm, and experience in applied geology, consider being a GSA mentor. Being a mentor is a rewarding experience. To learn more, contact Jennifer Nocerino at jnocerino@geosociety.org.

The Northeastern Section 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 may be downloaded from the meeting website after the meeting.

LOCAL COMMITTEE

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Insung Jeon/Moment via Getty Images

The 37th International Geological Conference (IGC) Mentoring and Travel Grant Program

BEXCO, Busan, South Korea | 25–31 Aug. 2024

GSA, the GSA Foundation, and the U.S. National Committee for Geological Sciences (of the National Academy of Sciences) are accepting applications for their Mentoring and Travel Grant Program to the 37th International Geological Conference (IGC) in Busan, South Korea.

Who should apply: Graduate students and early career professionals (within seven years of receiving their last degree). Applicants must be residents or citizens of the United States and be enrolled in, or employed at, a U.S. institution. Awards will be a maximum of US$3,500.

Deadline to apply: 10 Apr. 2024

www.geosociety.org/field-experiences

Questions? Contact Jennifer Nocerino, jnocerino@geosociety.org

Announcing GSA's First Annual

GEOLOGY CLUB TEE-OFF

Calling all geology enthusiasts!

Unleash your creativity and geological passion in the ultimate competition, the Geology Club Tee-Off! Submit your club's geologically inspired t-shirt logo into a thrilling bracket-style tournament and win!

Submit your logo by 31 Mar. 2024.

www.geosociety.org/tee-off

Questions? Contact Jennifer Nocerino, jnocerino@geosociety.org

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Challenges, Time, and Change: Similarities Between Science and Policymaking

Hannah M. Palmer

Throughout the 4.5-billion-year history of Earth, one thing has been constant: change. Similarly, during my year as the 2022–2023 Geological Society of America and U.S. Geological Survey Congressional Science Fellow, the only constant was change. Coming to the end of my service, I reflected on two big questions: What makes good science? And what makes good policy? Throughout my fellowship, I learned that what drives science and policy can be very similar, including the creation of projects from necessity and challenge, the importance of multiple timescales, an iterative development process, and communication as a key feature of success.

As the 2022–2023 GSA-USGS Congressional Science Fellow, I served in the Office of Senator Tammy Baldwin (D-WI), working on energy, environment, and agriculture policy and the many other policy areas with which they intersect. This year I had the opportunity to draft several bills from scratch as well as to collaborate on bill reintroductions, bill co-sponsorships, and oversight letters. Throughout this process, I was continually surprised to find that the principles that drive good science can be utilized to drive policymaking. Both science and policy are meant to serve the public; therefore, both require active listening, iterative development, and clear communication to diverse audiences.

MOTIVATED BY CHALLENGES

Both good science and good policy begin by identifying a challenge. In geoscience, this is typically a question that helps us understand the world, while in policy it may come from a fundamental challenge in society that current solutions do not address. As a first step in developing new research or legislative projects, it is critical to research current knowledge, current policies, and previous attempts to address this challenge. Once the current landscape has been established and the outstanding questions are clear, it is time to move to an iterative project development process. During my fellowship year, I regularly met with constituents and groups to discuss challenges on both local and international scales, such as addressing water quality issues within a single township and planning for extreme events due to global climate change.

ITERATIVE CONVERSATIONS

Next, both good science and good policy are iterative. As I developed a new bill for introduction this year, I found that conversations were fundamental to developing sound policy. Because public policy is meant to serve the public, great ideas for policies and identification of the cornerstone of a local or national issue come from conversations with people whom this challenge impacts. Additionally, this allows space for the development of ideas from multiple perspectives. While working on a bill focused on plant and animal agricultural research, it was critical to speak with academic researchers, farmers and ranchers, large and small seed manufacturers, intellectual property experts, and others to understand current challenges and opportunities.

TIMESCALES OF CHANGE

As geologists, we often view the world through a lens of deep time. For some earth scientists, millions of years seem to be mere minutes. Typical cycles of projects for academic researchers may be a multi-year grant cycle or a multi-season field experiment. In the world of federal legislation, a project may need to be completed within a single day, or it may stretch for years. Yet in both geoscience and policy, multiple timescales must be considered. During my fellowship, there were often days when projects needed to be completed within the span of hours, while others required months of investment. In considering the effectiveness of a new policy, it is helpful to consider both short-term impacts—how will this address current challenges and what changes will be made on day one?—and long-term impacts—what will be the financial impact of this policy over time, and how will the policy change and adapt under new administrations or leadership?

COMMUNICATION IS KEY

Finally, good ideas in science and in policy cannot be successful without clear communication to diverse audiences. Both science and federal legislation use industry-specific jargon that can be daunting to approach and learn. Transparent and intelligible scientific writing allows the reader to understand the process a scientist used to conduct an experiment and even provides a template for replication of the experiment. Further, effective science communication translates scientific jargon into plain language and summarizes key findings. Similarly, deciphering the contents of bill text can be a daunting task; therefore, clear communication on how a piece of legislation can impact individuals is critical. In my fellowship year, I had the opportunity to develop one-pagers on new legislation and attend and host listening sessions regarding new policies to ensure that what may have appeared to be hundreds of pages of legal jargon can be understood as a tangible tax incentive for a homeowner investing in solar or a relief program for farmers facing climate disasters.

In the face of simultaneous climate, energy, and biodiversity crises, the role of geoscientists in policy and decision-making is more important than ever. Yet many scientists are still hesitant to engage in policymaking or may struggle to identify pathways to connect their research with policymaking. As the 2022–2023 GSA-USGS Congressional Science Fellow, I gained a deep understanding of how science can be effectively communicated and utilized in federal policymaking and identified the many ways in which the processes of science and policy mirror one another. I encourage all geoscientists to think critically about how their work can inform public decision-making.

Hannah M. Palmer, Ph.D.
2022–2023 GSA-USGS Congressional Science Fellow
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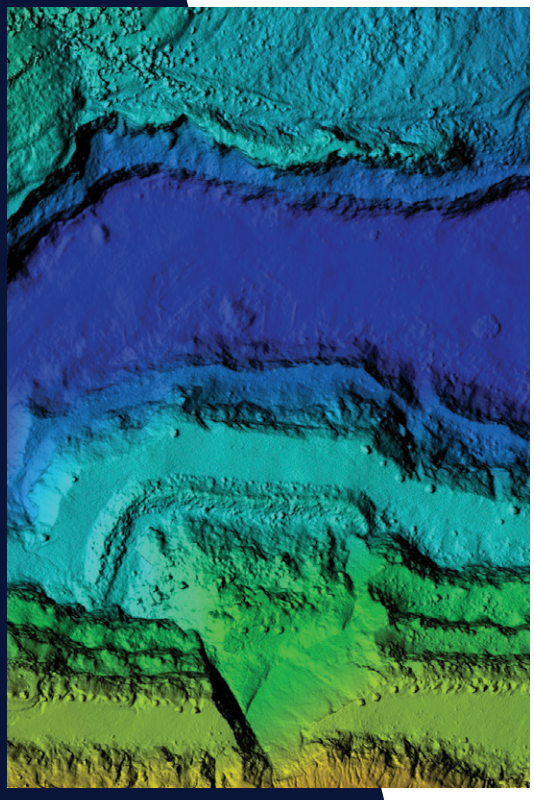

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As the holiday season approaches, it's time to start thinking about the perfect gifts for the geologists on your list. To make your holiday shopping even easier this year, we've curated a selection of unique and thoughtful gifts tailored to each recipient's personality, profession, and interests. Explore our suggestions and find something extraordinary for everyone.

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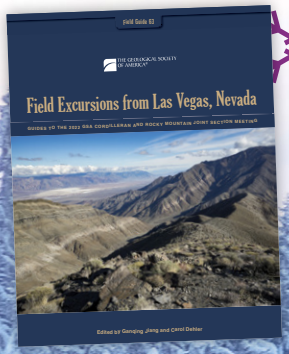
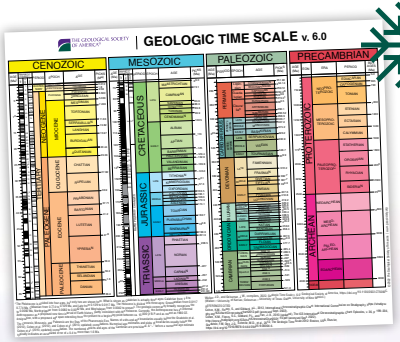
- Personalized canvas rucksack





Educators

- Earth science lapel pin
- Gemstone or geology-themed lanyard
- Geologic Time Scale Poster

Hard to shop for

* Rock calendar
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Field researchers

* Estwing rock hammer
* Rite in the Rain® notebook and pen
* Field clothes and sun protection

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* Core sample drinking glass

Into experiences

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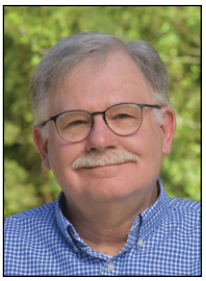
* National Parks Pass
* Road atlas with parks and geographical features

Richard H. Jahns Distinguished Lecturer Finishes His Tour



Vince Cronin

I have completed my one-year term as the Richard H. Jahns Distinguished Lecturer in Applied Geology for 2022–2023 and welcome the new Jahns Lecturer for 2023–2024, Cynthia Palomares. This lecture series is supported by the GSA Environmental and Engineering Geology Division and the Association of Environmental and Engineering Geologists (AEG). The lectureship promotes student awareness of applied geology through a series of talks at academic and professional meetings. This is an excellent investment by GSA-EEGD and AEG.

I am very thankful for the opportunity to serve as the Jahns Lecturer this year. It has been a wonderful experience.

The final tallies are not in as I write this in early October. However, I anticipate finishing the year having made ~50 face-to-face presentations at many locations, including 26 colleges or universities, 17 AEG chapter meetings, one multi-institutional field conference, and one consulting firm. Several face-to-face events were live streamed to remote audiences. I also presented three webinars on three different Jahns Lecture topics. I will have driven ~8,000 miles and caught about 35 airline flights, traveling from coast to coast and north to south, to attend Jahns events in 16 states.

Very little of this would have happened without the assistance of the fine people who volunteer as leaders and worker bees in local or regional AEG or GSA groups, as well as the many faculty and staff members who welcomed me into their university classrooms and lecture halls across the country. I am very grateful for their help, which enabled me to reach many students who might not have considered a career in geoscience applied in the public interest without having had the chance to hear a Jahns Lecture.

I offered six different Jahns Lecture topics, and information about each is accessible on a website I maintain [https://CroninProjects.org/Jahns]. The most frequently requested topic was, "How can engineering geology help society meet the challenge of a changing climate?" That lecture asserted that engineering geoscientists will play many essential roles in helping society in the coming decades. But first, we must do the hard work of mastering the knowledge and skills needed to create sustainable solutions to the many problems created or intensified by a warming climate. Engineering geoscience must be a trusted source of reliable information and solutions to these problems.

Vince Cronin
Professor Emeritus, Baylor University

2024 Birdsall-Dreiss Distinguished Lecture Series

The GSA Hydrogeology Division has selected Dr. Ben Rostron as its 2024 Birdsall-Dreiss Distinguished Lecturer. Ben is Professor Emeritus of Earth & Atmospheric Sciences at the University of Alberta and the president of Isobrine Solutions Inc. He has a B.Sc. in geological engineering (1986) from the University of Waterloo and an M.Sc. (1990) and Ph.D. (1995) in geology from the University of Alberta. Ben received his graduate training under the supervision of Dr. József Tóth. Ben's Ph.D. thesis on the regional hydrogeology and hydrochemistry of the Phanerozoic strata in west-central Alberta demonstrated how regional groundwater flow impacted oil migration/entrapment in economically significant units in the basin.

Ben started his academic career teaching geological engineering at the University of Saskatchewan in 1994. While there, he started mapping the hydrogeology and hydrochemistry of the Williston Basin, work that continues to this day. He collected his first wellhead formation-water sample in 1996, and since then, there are very few deep formation areas in Saskatchewan that he hasn't sampled. Ben was lured back to the University of Alberta to join the newly created Department of Earth & Atmospheric Sciences in 1997, where he taught regional and petroleum hydrogeology until he retired at the end of 2021. His academic career leaned toward applied research—applying hydrogeology and hydrochemistry to tackle numerous significant real-world problems.

"Students should continue to pursue careers in hydrogeology. We will need them." —Ben Rostron

Early field-sampling programs led to the creation of a University of Alberta spin-off company (Isobrine Solutions Inc.) in 2004. In 1999, Ben helped found the IEA-GHG Weyburn-Midale CO_2 Monitoring and Storage Project, one of the first large-scale CO_2 sequestration projects in the world. Ben served as the hydrogeology coordinator and his research group was one of 80+ research providers throughout Phase 1 of the project (2001–2004). Ben continued as the geology/hydrogeology theme leader for the Final Phase (2005–2011). Following the Weyburn project, Ben helped create the Aquistore CO_2 Monitoring and Storage Project, part of SaskPower's Boundary Dam Project, the world's first zero-emission coal-fired power plant. He drilled the two 3400-m-deep CO_2 injection and monitoring wells and designed and implemented the shallow groundwater monitoring program. In parallel, his 2002 publication, "Economic Potential of Formation Brines," and follow-up publications have provided most of the lithium concentration data for brines in Saskatchewan. That work led to an understanding of the unique distribution of lithium in the subsurface, a rush for mineral brine permits in Saskatchewan, and ultimately, in part, to the creation of several new lithium exploration and production companies attempting to exploit a new type of lithium-brine resource in the province.

Ben Rostron with employee Lucas Bartz (R), sampling water at the Boundary Dam site.

Ben is a Fellow of GSA, Engineers Canada, and Geoscientists Canada, and he has won several awards for oral/poster presentations and volunteer service. Ben is married to Catherine (34+ years) and has two children, Alex and Sarah.

Ben is pleased to offer three talks:

1. Lithium in brines (Duperow Aquifer) in southeast Saskatchewan: A modern-day gold rush.
2. Geology and hydrogeology at Aquistore: Canada's first CO_2 storage project associated with a commercial-scale coal-fired power plant.
3. Groundwater and native orchids: Is there a link (and why might anyone care)?

Each of these talks fits within an overall theme of manifestations of regional groundwater flow. A secondary message in all three talks is that hydrogeology plays a fundamental role in each of these diverse disciplines (economic geology, carbon capture and storage, and ecohydrology). To request a talk, visit **community.geosociety.org/hydrodivision/birdsall/about2024b-d** or contact Ben Rostron at Ben.Rostron@Ualberta.ca.

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We Thank You for Another Year of Progress, Growth, and Collective Impact

As we bid farewell to another remarkable year at the GSA Foundation, we stand in deep appreciation of the collective support we've received from many of you. Your unwavering commitment has been the driving force behind our mission to support the Society in its advancement of the geosciences.

The GSA Foundation owes its achievements to the generosity of donors like you. Your contributions have been instrumental in funding programs that have opened doors of opportunity for aspiring geoscientists. Among our most dynamic funds are the J. David Lowell Field Camp Scholarships, Graduate Student Research Grants, and On To the Future programming, all made possible through your support.

J. David Lowell Field Camp Scholarships: These scholarships have enabled students to embark on transformative journeys. Thanks to your contributions, budding geoscientists have gained hands-on experiences that transcend the classroom, deepening their connection to our planet.

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Our work is far from over. Your continued support is essential because it helps forge the geoscience workforce of tomorrow. Geoscientists play pivotal roles in addressing pressing global challenges. With your partnership, we can continue to inspire, educate, and empower the individuals who will lead these efforts.

Our achievements to date are a source of pride, yet the road ahead is filled with new challenges. As we enter a new year, we invite you to be an integral part of our mission to support the advancement of the geosciences.

Thank you for investing in the GSA Foundation, the Society, and the next generation of geoscientists. Here's to another year of progress, growth, and collective impact.

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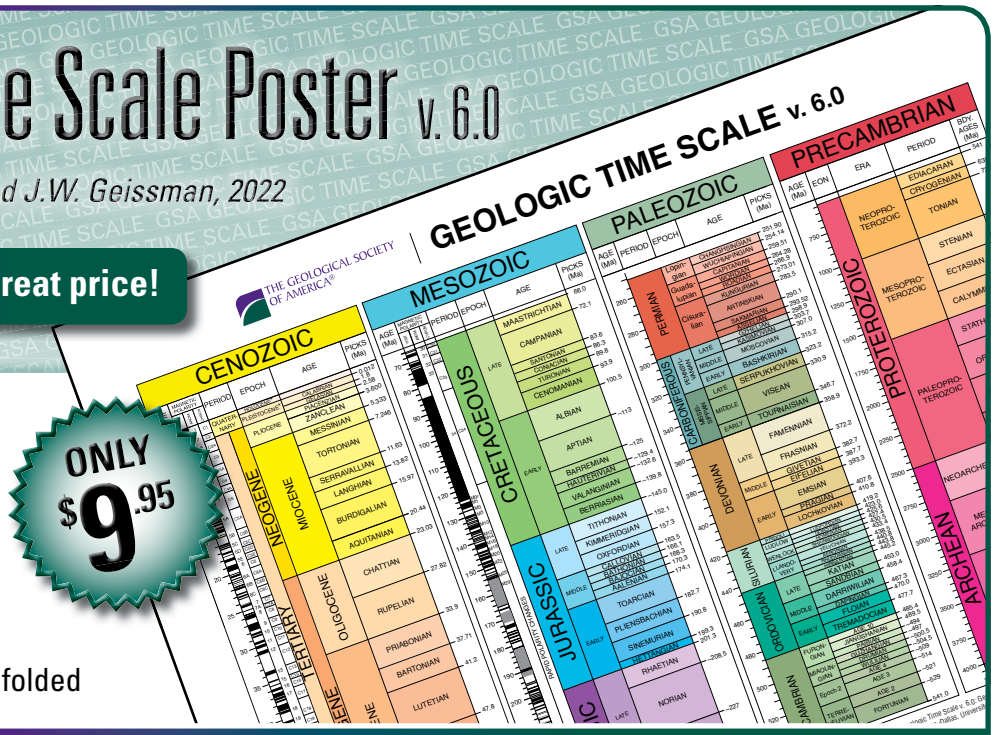

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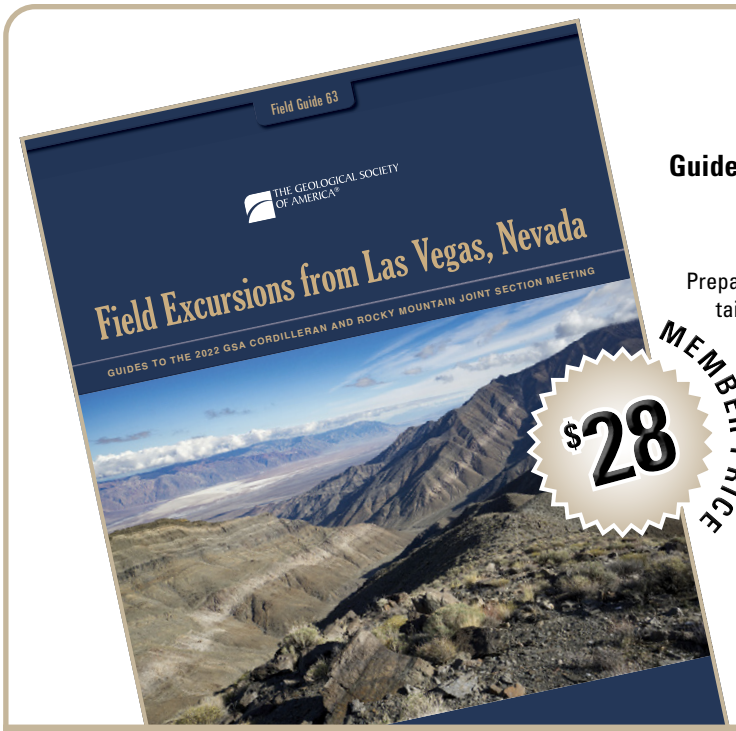
FIELD GUIDE 63



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Edited by Ganqing Jiang and Carol Dehler

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