



# Granite State Geologist

The Newsletter of the Geological Society of New Hampshire,  
Spring Edition – June 2023 – Issue No. 121

Newsletter Editor: [jlambert@nobis-group.com](mailto:jlambert@nobis-group.com)

Website: <http://www.gsnh.org/>

## 2020-2022 GSNH Officers:

**President** – Tom Fargo, NHDES

**Vice President - Council** – Doug Allen,  
Haley and Aldrich

**Vice President – Society** – Nelson Eby,  
UMass-Lowell

**Secretary** – Rebecca LeCain, NHGS

**Treasurer** – Abby Fopiano,  
Edgewater

**Past-President** – Wayne Ives  
NHDES

**Member-at-Large** – Sharon  
Lewandowski, NHDES

**Member-at-Large** – Mike Howley,  
NHGS

**Member-at-Large** – Melissa Lombard,  
USGS

**Membership** - Doug Allen, Haley and  
Aldrich

**Education and Outreach**  
Tom Fargo, NHDES

**Elections / Nominations**  
Abby Fopiano, Edgewater  
Julie Spencer, AECOM

**Website**  
Abby Fopiano, Edgewater

**GSNH General Information**  
[gsnhinfo@gmail.com](mailto:gsnhinfo@gmail.com)

**Newsletter Editor**  
Jennifer Lambert, Nobis Group  
To submit articles, send to  
[jlambert@nobis-group.com](mailto:jlambert@nobis-group.com)

## In this issue:

- **New Hampshire Geological Survey Update**
- **April 2023 Meeting Presentation Recap**
- **New Hampshire Geological Survey Update**
- **What's your Board been doing?**
- **GSNH 2023 Field Trip: Geologic Features of Franconia Notch**
- **Tongan volcano plume produced the most intense lightning rates ever recorded**
- **June Legislative Committee Report**
- **New NASA Map details 2023 and 2024 solar eclipses**
- **Other Geology News**
- **Upcoming Events...and more!**

## MESSAGE FROM THE PRESIDENT

Hello Friends,

Participants of the April 4, 2023, NH Geological Survey Mapping Workshop acknowledged the contributions of senior mappers Brian Fowler, Woodrow Thompson, and Peter Thompson on the occasion of their retirement (actually second retirement) from mapping activities for the NHGS. In addition to expressing gratitude for their many years spent mapping the geology of the Granite State, there was a realization that their unique knowledge and vital skill sets are being lost. Who will be New Hampshire's geologic field mappers in the future?

The mission of the Geological Society of NH is to promote geological education. It is clear that the focus of much contemporary geologic research is shifting away from "classic" field data collection (striking and dipping, walking out geologic unit contacts, etc.) in favor of addressing how to decipher, predict and respond to anthropogenic impacts to our environment, our planet. Much of this work utilizes new technologies and remote sensing techniques. However, geologic mapping and associated field data collection continues to be important to society as well. So how can GSNH promote the training of the next generation of field geologists?

I see opportunities for GSNH members to engage in geologic education at two junctures. The first would be to participate in career days at your local Middle School to inform science-oriented students about what excited you about geology, why you became a geologist, and what a geologist does. The second juncture is to provide opportunities for high school or early college-aged students to participate in field research, to perform data collection and analysis, and to potentially present

the results of that work to others. The GSNH Board is currently evaluating how we can promote such activities in collaboration with the NHGS. If you are interested in doing more to help train the next generation of field geologists, please feel free to contact me or other GSNH Board Members through the [gsnhinfo@gmail.com](mailto:gsnhinfo@gmail.com) email.

I hope to see many of you during the GSNH Summer Field trip on July 15th. Further information regarding this planned gathering in Franconia Notch follows in this newsletter. Otherwise, I hope you have a great summer.

Tom

---

### GSNH T-Shirts Available!

We have a few GSNH T-shirts still available – no XL, and we have just a couple in size L and a few more M and S sizes left. Send in your order before they're gone! T-shirts will be shipped to you. See order form on second to last page (right before the renewal form).



Front (left photo) and back (right photo) of GSNH t-shirt.

---

## DATES TO REMEMBER

July 15, 2023 (rain date July 16) – **GSNH Field Trip: Franconia Notch** – See page 7 for details.

July 22-23, 2023 – **41nd Annual Champlain Valley Gem, Mineral and Fossil Show**. Champlain Valley Exposition, Exp North Building, 105 Pearl Street, Essex Junction, Vermont.  
<http://www.burlingtongemandmineralclub.org/show.html>

August 11-13, 2023 – **2023 East Coast Gem, Mineral and Fossil Show**. Better Living Center, Eastern States Exposition, 1305 Memorial Ave, West Springfield, Massachusetts.  
<https://www.mineralshowslld.com/fall-east-coast-show/>

August 26-27, 2023 – **Capital Mineral Club 58<sup>th</sup> Annual Gem, Mineral & Jewelry Show**. Everett Arena, 15 Loudon Road, Concord, New Hampshire. <https://www.capitalmineralclub.org/minshows.php>

September 14, 2023 – **GSNH Board of Directors Fall Meeting**

September 16, 2023 – **New England Mineral Association Fall Mineral Tailgate Sale**. Havey Quarry, Levine Road, Poland, Maine. Rain date: September 17. [https://www.nemineral.org/me\\_events/](https://www.nemineral.org/me_events/)

October 8-14, 2023 – **Earth Science Week: Geoscience Innovating for Earth and People**.  
<https://www.earthsciweek.org/>

October 12, 2023 – **GSNH dinner meeting**. Details TBD.

Looking for some continuing ed credits? Some webinar series are below:

- clu-in.org compiles webinars of interest to EPA and the environmental community here:  
<https://clu-in.org/training/#upcoming>
- The geoscience online learning initiative (GOLI) has several webinars and short courses:  
<https://www.americangeosciences.org/workforce/goli>

---

## New Hampshire Geological Survey Update

By Shane Csiki, State Geologist and Director, June 2023

In writing this, we are now headed into another beautiful summer in New Hampshire. With that, for NHGS, comes summer field work and intern season! We are host to a total of 6 interns this summer, all of whom bring an environmental science background and youthful enthusiasm to the job and our programs. This year's interns are working across all of NHGS' programs, and not solely on stream crossings, as has been the historical norm for the past several years and we are thrilled to have them on board.

Two interns, as a team, are working with Brian Hauschild to continue our standard stream crossing assessments. However, instead of a focus on filling in large gaps of data across the state, their focus will be to complete gaps within areas that have already been assessed in preparation for working with stakeholders on prioritization and long-term data upkeep. Jaylin Calistro will be a senior majoring in Environmental Science: Geography, with minors in Geology and German at Kutztown University of Pennsylvania and is excited to work the summer in her home state. Noah Waldron will be a senior at the University of New Hampshire this year, and is pursuing a Bachelor of Science in Environmental Engineering. She expressed eagerness to train, explore and develop her skills and is excited to use the knowledge she has gained from her classes.

A second team of two interns, also working with Brian, will be performing quality control review of incoming stream crossing assessment data from interns hired by UNH as part of the second year of an NHDES-grant funded project. Jakob Duval recently completed his degree, with a focus in Environmental Science and Wildlife Conservation Biology from Southern New Hampshire University, and is pleased to be bringing his skills to his internship experience. Although most intern positions end in August, Jakob is currently slated to continue working with us for a period of time beyond August. Then, he will be continuing to work with Brian on field verification of stream locations in the White Mountain National Forest, which is part of a long-term partnership project NHGS has with the Forest Service. Madison Quill just completed her senior year at UNH with a Bachelor of Science in Environmental Science (Soil and Watershed Focus), and is interested in gaining more environmental experience. Madison will be with us through October, and will be taking the stream crossing data and running it through the hydraulic vulnerability model from August through October.

Emilie Pray is a Geology Master's student attending Michigan Technological University. A New Hampshire native, she is excited to be working with us this summer, and is interested in a future career in geology back in New Hampshire when she completes her Master's degree within the next year. Emilie will be working across the breadth of NHGS' programs. She will be working with Mike Howley on resurrecting and retooling the GeoLogs database of statewide borehole information and assisting with ongoing maintenance of the Water Well Inventory. Additionally, she will be supporting geologic mapping efforts by assisting with the collaborative field peer reviews in July, and will be working with Rebecca LeCain to repack the Redstone Core for shipment to a more permanent home at a core repository in New Jersey, work funded through a USGS Data Preservation grant. Emilie will also assist with processing of stream crossing data as needed.

Cal Schrupp is pursuing his Bachelor's degree in Geology at Bates College in Maine, and wanted to gain hands-on geologic field experience. He is providing field assistance to, while also being mentored

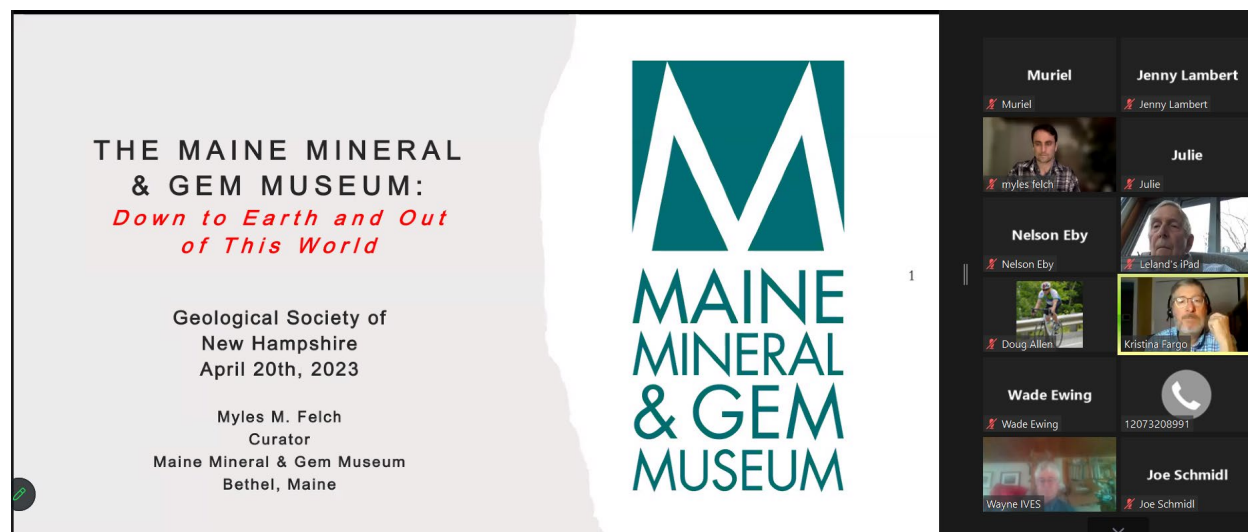
by, Dyk Eusden and Josh Keeley in geologic field mapping. For the first half of the summer, he has been in the field with Dyk, who is mapping the bedrock of the northern half of the Shelburne quadrangle. As part of his experience, Cal is working with Dyk in an independent study arrangement through Bates College. Then, during the second half of the summer, Cal will be in the field with Josh, who is mapping the surficial geology of the southern half of the Mount Osceola quadrangle. NHGS budgeted for a summer geology intern to provide this field assistance, reciprocal with mentorship, so that the mappers themselves have a partner in steep terrain, while also training the next generation of geoscientists.

We are grateful for the presence of this year's suite of summer interns, for the skills they are bringing to their roles, and for their enthusiasm. As you can see, across all of our programs, we have another busy summer of important work ahead!

---

### April 2023 Meeting Presentation Recap

Our spring GSNH meeting was held on April 20 via Zoom, with 47 reservations. Myles M. Felch, curator of the Maine Mineral & Gem Museum, gave a virtual tour of the museum, which includes information on the long history of mining in Maine, a recreated historical gem shop, and specimens including meteorites and samples from both Mars and the moon. You can even hold an extraterrestrial rock!



Example screenshot from the April presentation.



Example screenshot from the April presentation.

### Have You Renewed your Membership?

Have you renewed your membership yet for 2023? With your membership, you get a discount on dinner meetings (which will happen at some point!) and field trips, information of upcoming events of interest to the geological community, voting privileges at Society business meetings, and automatic subscription to this newsletter! Membership dues also help to support outreach for the greater community.

See the last page of this newsletter for a membership renewal application.

### What's Your Board Been Doing?

The GSNH Board of Directors met on Thursday, June 22 via Zoom. Topics of discussion included the following:

- Plans and logistics for the summer field trip on July 15 to Franconia Notch (see next page for details);
- Plans for the in-person October 2023 meeting, and potential speakers for the October meeting and future meetings;
- Potential options for online payment processing and cost tradeoffs;
- Newsletter changes, including streamlining and including more article summaries rather than full articles; and

- Education report – we had one educational grant application that was approved, and also discussed the potential for GSNH to host classes on the geology of New Hampshire.

---

## GSNH 2023 Field Trip – Geologic Features of Franconia Notch Area

To recognize the 20<sup>th</sup> anniversary of the collapse of the Old Man of the Mountain (May 3, 2003), this year's GSNH Summer Field Trip will review research since then in the central and northern portions of Franconia Notch. **There is no cost to participate.** GSNH will provide a continuing education certificate for 5.0 CEUs for Professional Geologists participating in the entire field trip.

Research discussed will include:

- Geomechanical studies of the residual rock mass stability of the Old Man's "stump" at the north end of the Cannon Cliff;
- Depositional stratigraphy in Profile Lake and surface morphology related to the frequency and volume of individual landslide events around the height of land in northern Franconia Notch;
- Cosmogenic exposure dating and resulting "glacial dipsticks" that provide evidence for the style and rate of Late Wisconsinan regional deglaciation in the White Mountain region; and
- 3D photographic and georeferenced imaging of Cannon cliff and the recent (September 9, 2022) rockfall on the Hound's Hump portion of Eagle cliff, both of which will help estimate historical rockfall frequencies and present-day susceptibilities.

**When:** Saturday, July 15 (Sunday, July 16 rain date). The group will assemble at 8:30 AM SHARP! Check the GSNH website ([www.GSNH.org](http://www.GSNH.org)) on Friday, July 14 to learn if the weather forecast has forced the field trip to be moved to the alternate date.

**Where:** Main parking lot at the Old Man of the Mountain Historic Site near the height of land in Franconia Notch. Take I-93, Exit 34B and follow signs to the Historic Site's parking lot. Overflow parking is available at the nearby Cannon Mountain Ski Area.

**Reservations:** We request that you pre-register by email so that we can estimate the number of attendees. Those pre-registered will receive an email *in the event that* the field trip is postponed to the July 16<sup>th</sup> rain date or cancelled for some reason. To register, please send an email to GSNH Board Member Lewandowski ([Sharon.A.Lewandowski@des.nh.gov](mailto:Sharon.A.Lewandowski@des.nh.gov)) no later than Thursday, July 13, 2023.

**Topic:** To recognize the 20<sup>th</sup> anniversary of the collapse of the Old Man of the Mountain (May 3, 2003), this year's GSNH Summer Field Trip will review research since then in the central and northern portions of Franconia Notch. Research discussed will include:

- Geomechanical studies of the residual rock mass stability of the Old Man's "stump" at the north end of the Cannon Cliff;
- Depositional stratigraphy in Profile Lake and surface morphology related to the frequency and volume of individual landslide events around the height of land in northern Franconia Notch;
- Cosmogenic exposure dating and resulting "glacial dipsticks" that provide evidence for the style and rate of Late Wisconsinan regional deglaciation in the White Mountain region; and
- 3D photographic and georeferenced imaging of Cannon cliff and the recent (September 9, 2022) rockfall on the Hound's Hump portion of Eagle cliff, both of which will help estimate historical rockfall frequencies and present-day susceptibilities.

**Accessibility:** All stops involve short walks on paved pathways or relatively flat-ground hiking trails on the floor of the Notch that provide spectacular views of research sites on Cannon and Eagle cliffs, the westerly flanks of Mt. Lafayette, Franconia Ridge, and at Profile Lake.

**Trip Leaders:**

- Brian Fowler Old Man of the Mountain Legacy Fund ([bfowler@quarry-asset-management.com](mailto:bfowler@quarry-asset-management.com))
- Thom Davis, Natural and Applied Sciences, Bentley University ([Pdavis@bentley.edu](mailto:Pdavis@bentley.edu))
- Matt Maclay, Earth Sciences, Dartmouth College ([matthew.t.maclay@dartmouth.edu](mailto:matthew.t.maclay@dartmouth.edu))

**Equipment:**

- Bring or have available field trip guidelines and publications included in the announcement on the GSNH website, [www.gsnh.org](http://www.gsnh.org). No printed copies will be available on the day of the field trip.
- Wear sturdy, moisture resistant light-hiking footwear (no canvas sneakers, sandals, or flip-flops)
- Wear field clothing and bring some water and extra clothing as may be appropriate for that day's weather at ~2,000 feet in Franconia Notch (often windy, damp and chilly)
- Bring your own cold picnic lunch and beverages (small coolers only!) and a personal trash bag to comply with the Park's "Bring In-Carry Out" policy.

**Field Trip Stops:**

Optional Stop 0: Boise Rock Historic Site



- Heavy summertime traffic prevents an official Stop in the narrow parking lot at this site on the northbound side of I-93, about 0.5 mile north of the Lafayette Place Trailhead parking in Franconia Notch. If interested, this site is easily self guided, so please spend a few minutes on your way to our rendezvous site to examine Boise Rock and its history.

#### Rendezvous: Old Man of the Mountain Historic Site, Headquarters Building and Parking Area

- Welcome and general introduction to the Field Trip and its schedule.

Walk ~1/3 mile south on paved pathway to the Old Man Memorial Plaza

#### Stop 1: Old Man of the Mountain Memorial Plaza and Profile Lake Outlooks

- Old Man Memorial, quick history and how to use the profilers.
- Landslide events and Profile Lake stratigraphy.
- Cosmogenic Exposure Dating – “Glacial Dipsticks” and Late Wisconsinan Regional Deglaciation.

Cross wood boardwalk and continue ~2/3 mile south on the mainly flat well-trodden Pemi Trail along the west shore of Profile Lake and cross a short wood bridge to Stop 2.

#### Stop 2: Climbers' Parking Lot and Cannon Cliff Outlook

- Description of the ongoing 3D photographic and georeferenced imaging research project of Cannon cliff that begins to estimate historical rockfall frequency and present-day susceptibilities, along with new questions arising about the cooling history of the Cannon Mountain pluton
- Implications of continuing geomechanical studies for the residual rock mass stability of the Old Man's “stump” at the northern end of the Cannon cliff using data recently obtained from the 3D imaging research project.

Walk ~ 1/4 mile south on the paved pathway to Stop 3.

#### Stop 3: Toe of the 1997 Cannon Cliff Rockfall and Colluvial Debris

- Description of the large volume 1997 rockfall and the extent of its colluvial deposits.

Walk back north ~2/3 mile on the paved pathway that passes through a tunnel under I-93 to a small parking area for Old Man Viewing and continue on a short trail section to Stop 4.

#### Stop 4: Toe of the 2022 Hound's Hump Rockslide and Colluvial Debris

- Description of the September 2022 rockfall and the extent of its colluvial deposits. This slide event is the most recent significant rockfall event in Franconia Notch.

Return to the paved pathway and continue north ~1/2 mile back to the Field Trip's assembly point and Stop 5.

#### Stop 5: Historic Site Parking Area and Picnic Site

- GSNH official business and remarks, picnic logistics, visits to the Old Man of the Mountain Museum, and general Q&A

---

### **A Tongan volcano plume produced the most intense lightning rates ever detected**

From Los Alamos National Laboratory, June 20, 2023:

<https://discover.lanl.gov/news/0620-tongan-volcano/>



**Powerful volcanic eruptions produce ash plumes that can create their own weather systems, providing the conditions for lightning at higher altitudes than normally seen.**

New research published in the journal *Geophysical Research Letters* showed that the plume emitted by the Hunga Volcano eruption in 2022 created the highest lightning flash rates ever recorded on Earth, more than any storm ever documented.

"The eruption of Hunga Volcano was the largest volcanic explosion since Krakatau in 1883," said Sonja Behnke, of Los Alamos National Laboratory's Electromagnetic Sciences and Cognitive Space Applications group and author on the paper.

Powerful volcanic eruptions produce ash plumes that can create their own weather systems, providing the conditions for lightning at higher altitudes than normally seen. When the undersea volcano in Tonga erupted, it created a plume that went more than 25 miles higher than typical thunderstorms. Lightning was observed at stratospheric altitudes (12 to 18 miles), where the air pressure is too low to support thunderstormlike lightning. This fast-rising volcanic plume may have created locally higher pressures to support the environment necessary for lightning.

After reaching its maximum height, the plume expanded outward as an umbrella cloud, creating fast-moving circular ripples known as gravity waves, similar to a rock dropped in a pond. Donut-shaped rings of lightning expanded with the umbrella cloud and were as large as 174 miles in diameter. Similar "lightning holes" have been observed in thunderstorms, but never on this large of a scale.

The lightning was detected by space-based optical sensors, and global networks of ground-based radio antennas thousands of miles away.

The research team, led by the US Geological Survey Cascades Volcano Observatory, found that the eruption produced 2,615 flashes per minute at its peak intensity, which lasted nearly five minutes. This peak lightning rate is significantly higher than the second most intense lightning event ever detected — 993 flashes per minute — in a thunderstorm over the southern United States in 1999.

Remote detection of lightning helped create a detailed timeline of this historic eruption, and demonstrated the value of using volcanic lightning for monitoring volcanic activity.

"Lightning observations such as these reveal detail about the evolution of an eruption over time, which is particularly valuable when cloud cover obscures satellite observations of a plume," said Behnke.

Paper: "Lightning Rings and Gravity Waves: Insights Into the Giant Eruption Plume From Tonga's Hunga Volcano on 15 January 2022," *Geophysical Research Letters*. DOI: <https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2022GL102341>

Funding: The work was supported by the U.S. Geological Survey Volcano Hazards Program, the Laboratory Directed Research and Development program at Los Alamos National Laboratory and a

NASA ROSES-2019 "Earth Science Research from Operational Geostationary Satellite Systems" program award.

Contact: Nick Njegomir, [nickn@lanl.gov](mailto:nickn@lanl.gov)

---

## June 2023 Legislative Update

By Tom Fargo

In his bi-annual budget proposal, Governor Sununu requested the Legislature to make significant changes to the State statutes regulating professional certifications stating: *“Licensure exists to protect the public, not to increase the barrier of entry to our workforce or create an anti-competitive industry climate. To that end, the budget [proposal] eliminates 692 unnecessary statutory provisions, 14 unnecessary regulatory boards, and 34 license types”*. Types of professional licensure proposed for elimination included many medical professions along with State licensure requirements for professional Foresters, Wetlands, Soil and Natural Scientists. Elimination of licensure requirements for Geologists was not initially proposed.

The Legislature is now considering two bills to codify this Governor’s initiative. House Bill Two (HB-2, the so-called budget trailer bill) would make changes to statutes necessary to eliminate funding for future administration of the licensure requirements proposed to be cut – thereby eliminating such programs. In addition, HB-655 provides for funding and administrative staff changes in the Office of Professional and Certification that would (as of this writing) continue to administer licensure of Professional Geologists as outlined in RSA 310-A: 120. HB-655 was passed, with amendments, by the full NH House of Representatives on March 16<sup>th</sup>.

---

## New NASA Map Details 2023 and 2024 Solar Eclipses

By NASA Scientific Visualization Studio. Released March 8, 2023 and updated June 14, 2023.

<https://svs.gsfc.nasa.gov/5073>

Summary article by [Vanessa Thomas](#), [NASA’s Goddard Space Flight Center](#), March 8, 2023.

<https://solarsystem.nasa.gov/news/2332/new-nasa-map-details-2023-and-2024-solar-eclipses-in-the-us/>

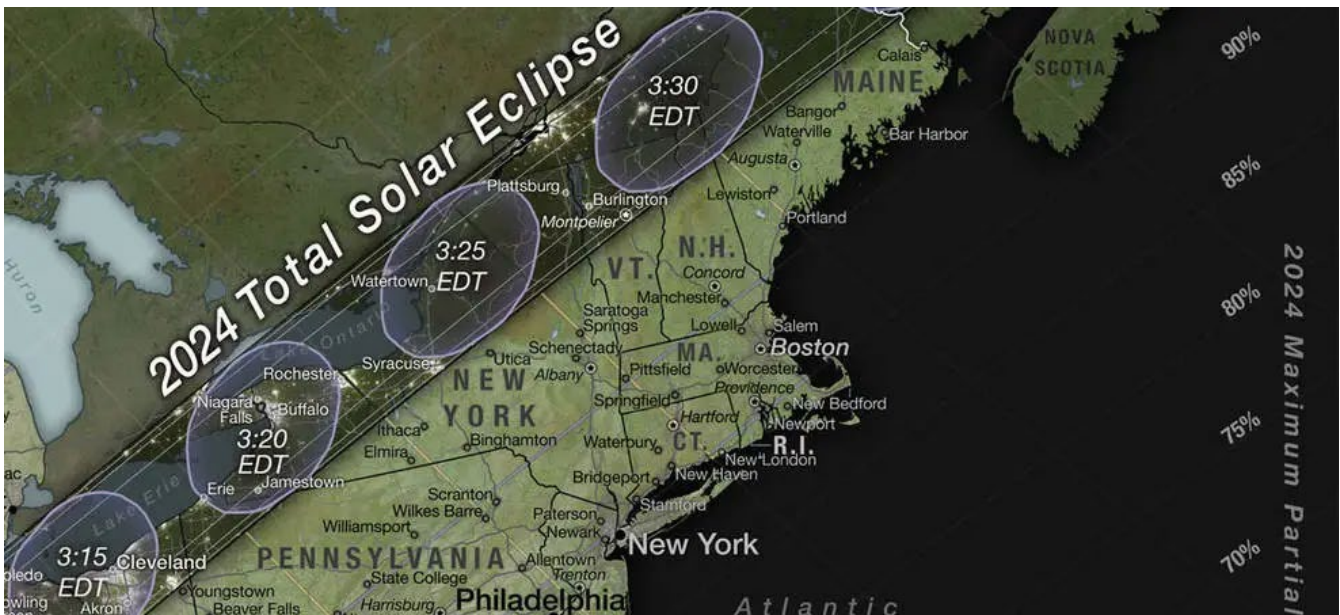
NASA has released new maps detailing the path of the Moon’s shadow as it crosses the contiguous US during the annual solar eclipse on October 14, 2023 and total solar eclipse on April 8, 2024. The

total solar eclipse will pass through northern New England on April 8, 2024. See links above for more information.



Using observations from different NASA missions, this map shows where the Moon's shadow will cross the U.S. during the 2023 annular solar eclipse and 2024 total solar eclipse. The map was developed by NASA's Scientific Visualization Studio (SVS) in collaboration with the NASA Heliophysics Activation Team (NASA HEAT), part of NASA's Science Activation portfolio.

Credits: NASA/Scientific Visualization Studio/Michala Garrison; eclipse calculations by Ernie Wright, NASA Goddard Space Flight Center | [Download the full map](#)



Outside of the eclipse paths, purple and yellow lines on the map show the percentage of the Sun that will become covered by the Moon at different locations for the total and annular eclipses, respectively. For example, the purple line that passes near New York City and Providence, Rhode Island, indicates that the Sun will become about 90 percent obscured in those cities during the peak of the eclipse on April 8, 2024. Credit: NASA/Scientific Visualization Studio/Michala Garrison; eclipse calculations by Ernie Wright, NASA Goddard Space Flight Center

---

## Other Geology News:

See below for a roundup of recent geology articles that caught the interest of GSNH members:

### **Great Basin: History of water supply in one of the driest regions in the USA**

From University of Innsbruck, May 11, 2023: <https://www.uibk.ac.at/en/newsroom/2023/great-basin-history-of-water-supply-in-one-of-the-driest-regions/>

An international team used calcite samples from the “Devils Hole” cave system to reconstruct the evolution of groundwater in the Great Basin, USA – one of the driest regions on Earth – up to 350,000 years into the past with unprecedented accuracy, as published in the journal *Communications Earth & Environment*. The results shed new light on the effects of climate change on water supply and provide important insights for the sustainable use of groundwater resources. The link above has some incredible photographs of the cave.

Publication:

A 350,000-year history of groundwater recharge in the southern Great Basin, USA: Tracie R. Jackson, Simon D. Steidle, Kathleen A. Wendt, Yuri Dublyansky, R. Lawrence Edwards & Christoph Spötl. *Communications Earth & Environment*, 4:98 (2023), <https://doi.org/10.1038/s43247-023-00762-0>

### **Ground beneath Thwaites Glacier mapped for first time**

From the British Antarctic Survey, May 31, 2023:

<https://www.bas.ac.uk/media-post/ground-beneath-thwaites-glacier-mapped-for-first-time/>

The ground beneath Thwaites Glacier, which is Antarctica’s most vulnerable glacier to climate change, has been mapped for the first time. Analysis of the geology below the Thwaites Glacier in West Antarctica shows there is less sedimentary rock than expected – a finding that could affect how the ice slides and melts in the coming decades.

Publication:

Geological sketch map and implications for ice flow of Thwaites Glacier, West Antarctica, from integrated aerogeophysical observations: Tom A. Jordan, Sarah Thompson, Bernd Kulesa, and Fausto Ferraccioli. *Science Advances*, 9:22 (2023),

<https://www.science.org/doi/10.1126/sciadv.adf2639>

[youtube video is here: <https://youtu.be/bITNZp3Tpz0>]

## **Iron-rich rocks unlock new insights into Earth's planetary history**

From Rice University. Published May 25, 2023.

<https://news.rice.edu/news/2023/iron-rich-rocks-unlock-new-insights-earths-planetary-history>

Banded iron formations, which contain distinctive layers of dark orange, yellow, silver, brown and black, contain iron oxides that may connect changes at the Earth's surface (such as the start of photosynthesis) to larger-scale process such as volcanism and plate tectonics. These heavy, iron-rich rocks may have been drawn deep into the lower mantle and then influenced heat flow to promote mantle plumes.

Publication:

Links between large igneous province volcanism and subducted iron formations: Duncan Keller, Santiago Tassara, Leslie Robbins, Cin-Ty Lee, Jay Ague and Rajdeep Dasgupta, *Nature Geoscience* 16: 527-533 (2023), <https://doi.org/10.1038/s41561-023-01188-1>

## **At long last, ocean drillers exhume a bounty of rocks from Earth's mantle**

By [Paul Voosen](#), Science. May 25, 2023. <https://www.science.org/content/article/long-last-ocean-drillers-exhume-bounty-rocks-earth-s-mantle>

For more than 60 years, scientists have been trying to retrieve rock samples from the upper mantle. Recently, researchers aboard the JOIDES Resolution, the flagship vessel of the International Ocean Discovery Program (IODP), announced that they had successfully retrieved a 1,000 km rock core from the Atlantic Massif, which is a relatively shallow feature close to the Mid-Atlantic Ridge.

doi: 10.1126/science.adi9181

## **How cities are trying to stop their land from sinking**

By Kasha Patel, The Washington Post. June 5, 2023.

<https://www.washingtonpost.com/climate-solutions/2023/06/05/land-sinking-cities-recharge>

In many areas, uncontrolled groundwater pumping has caused the land to subside, causing the ground to destabilize. In some areas, water managers pushed new water conservation approaches and added water back to the ground, slowing subsidence rates and even causing some rebound. Scientists note that this is not a “magic bullet” and that the most rebound from recharge is generally a few inches. The primary goal is to stabilize the subsidence rates over a longer period of time to mitigate the damage.

## GSNH T-Shirt Order Form

	Number of Shirts	Price per Shirt	Total
<b>GSNH Small T-Shirt</b>		\$18.00	
<b>GSNH Medium T-Shirt</b>		\$18.00	
<b>GSNH Large T-Shirt</b>		\$18.00	
<del><b>GSNH Extra Large T-Shirt</b></del>		<del>\$18.00</del>	
		Subtotal	
<b>Shipping &amp; Handling costs</b>		Shipping & Handling	
One Shirt	\$4.00	<b>Total</b>	
Two Shirts	\$7.00		

Ship to:

Name	
Street Address	
City, State, Zip Code	
Phone # <small>(in case of questions about your order)</small>	

Please make checks payable to "GSNH" and mail with this completed order form to:

**GSNH  
P.O. Box 401  
Concord, NH 03302**





MEMBERSHIP & RENEWAL APPLICATION

Geological Society of New Hampshire

PO Box 401, Concord, NH 03302

Name: \_\_\_\_\_

(Please print clearly)

E-mail: \_\_\_\_\_

Renewing Members: Only update this section if you have changes to your contact information (including email) or educational history.

New applicants: please complete this section.

Preferred address/email to receive GSNH Communication: \_\_\_ Home or \_\_\_ Business

Home Address:

Business Address:

Home address lines

Business address lines (Employer):

Home Telephone: \_\_\_\_\_

Office Telephone: \_\_\_\_\_

New Hampshire PG # (if applicable) \_\_\_\_\_

Education: Degrees received or in progress:

Table with 4 columns: Year, Degree, Major, College or University

I volunteer to help with one of the following committees or tasks:

- Membership Committee, Legislative Committee, Giving a talk at a meeting, Regulations Committee, Education Committee, Events Committee, Communications Committee, Other

- Regular Member (Annual Dues \$20.00)
Student Member (Annual Dues \$10.00)...Please complete Education section above.

Make checks payable to "Geological Society of New Hampshire." Note that GSNH dues are not deductible as a charitable contribution, but may be deductible as a business expense. Please return this completed application form with any necessary corrections and a check for the appropriate dues to the GSNH at the address above. The Society's membership year runs from January 1 to December 31.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_