



Granite State Geologist

The Newsletter of the Geological Society of New Hampshire,
Fall Edition – September 2023 – Issue No. 122

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MESSAGE FROM THE PRESIDENT

Hello Friends,

October is a big month for geology. Earth Science Week (ESW) was founded in 1998 by the American Geosciences Institute (AGI) as an annual international event held during the second week of October to encourage better public understanding of and appreciation for the Earth Sciences and Earth stewardship. This year's ESW will be held from October 8 - 14, 2023 and will celebrate the theme "Geoscience Innovating for Earth and People." According to AGI, the event will emphasize the many ways that innovations in the geosciences are helping communities create healthier and increasingly sustainable lives, while accelerating environmental problem-solving around the world.

For a menu of online resource see:

<https://www.earthsciweek.org>.

Here's a guide to some of the ESW information I found interesting on the internet:

- American Geological Institute prepares for each year an [Earth Science Week Toolkit](#). This year's toolkit includes 26 items produced by allied governmental and non-governmental organizations for use by educators and geology enthusiasts. The toolkit is free and available for just the cost of USPS shipping and handling, \$9.50 for the first toolkit and \$2.50 for each additional toolkit in the United States.
- The United States Geological Survey has not yet updated its website for 2023. However, their website for [2022 Earth Science Week](#) is still available and has some really interesting materials for your review.

- At the end of ESW, the Geological Society of America is holding their annual meeting: “[GSA Connects 2023](#)” this year in Pittsburg, PA between October 15 and 18. The technical program has many sessions that appear very interesting.
- The [Geological Society \(of London\)](#) is participating in 2023 Earth Science Week by hosting numerous field trips around the UK and also hosting family film nights screening films Jurassic Park (1993) and WALL.E (2008). Their choice of these films appears to be reflective of the Society’s goal for increasing stewardship for the earth and ecosystems.

Most importantly, the Geological Society of NH is holding our **in-person** fall meeting on October 12, 2023 at Makris Restaurant in Concord. More information regarding this event is presented later in this newsletter.

For those who are familiar with the history of geology as a science, October 23 is (in)famous as the supposed earth's birthday. Irish Archbishop James Ussher (1581-1656) deduced that the first day of creation was in the morning of October 23, 4004 BC. In 1650 Ussher published a book "*Annals of the Old Testament, Deduced from the Earliest Beginning of the World*" (translated from its original Latin title), where he reconstructed the history of the world based on the bible, Egyptian and Jewish chronologies, and research by other scholars, like John Lightfoot (1602-1675), who published his calculations in the year 1644. As John McPhee notes in his book "*Basin and Range*", October 23rd has become a day when students of geology celebrate B-Earth Day.

Please get outside and enjoy New Hampshire in the fall. I hope to see you at our meeting on October 12.

Tom

Just a Few GSNH T-Shirts Left!

After this summer’s field trip, we have just a few small and medium t-shirts 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

October 6-8, 2023 – **New England Intercollegiate Geological Conference (NEIGC)**, Field trips in northern Maine and western New Brunswick. <https://neigc.info/neigc-annual-conference/>

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

October 12, 2023 – **GSNH dinner meeting**. Makris Lobster & Steakhouse, 350 Sheep Davis Road, Concord, NH. Dykstra Eusden will give a presentation on “Bedrock Geology of the Shelburne, NH region: A Transition from Convergent to Collisional Tectonics of the Acadian Orogeny”. See details below and reservation information on page 23.

October 16-19, 2023 – **39th Annual International Conference on Soils, Sediments, Water and Energy**, UMass Amherst, Amherst, MA. <https://www.aehsfoundation.org/eastcoast>

October 9, 2023 – **10th Annual UNH Geotechnical Engineering Pedro De Alba Lecture**. J. Carlos Santamarina will deliver a lecture on Energy-Climate-Livability: Geotech in Changing Times. <https://ceps.unh.edu/civil-environmental-engineering/opportunities/pedro-de-alba-lectures>

December 14, 2023 – **GSNH Board meeting**. 6:00 PM over zoom.

January 18, 2024 – **GSNH dinner meeting**. Online.

March 17-19, 2024 – **Geological Society of America Northeast Section Meeting**. Manchester, NH; https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/ne/2024mtg/home.aspx

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>

October Meeting Presentation

Dykstra Eusden ...or Dyk for short, lives in South Paris, Maine and is an emeritus professor of Geology at Bates College. While teaching in the department his favorite courses were “Geology of the Maine Coast by Sea Kayak” and “Katahdin to Acadia: Exploring Maine Geology.” He went to Bates for his B.S., then University of New Hampshire for his M.S. and finally Dartmouth College for his Ph.D.. His research is on the bedrock geologic history and ancient tectonics of the Presidential Range and the broader region of the White Mountains. He has published many papers and bedrock geologic maps about the rocks in that area. He spent about two years studying active tectonics, faults and landscape geomorphology in New Zealand where the comparisons to the ancient Appalachians were nicely revealed! He has published with Durand Press two books for the lay-public: “*The Geology of New Hampshire’s White Mountains*” and “*The Presidential Range: Its Geologic and Tectonic History.*”

Both will be for sale at the talk: White Mountains book \$30 and Presidential Range book/map \$20 (cash or checks only please).

Photos below and on the next page:



Mahoosuc Range looking toward the Presidentials



Rangeley Formation with calc-silicate pods near Shelburne Dam

New Hampshire Geological Survey Update

By Shane Csiki, State Geologist and Director, September 2023

As you all know, Summer 2023 in New Hampshire was very wet, with rain and flooding being a frequent occurrence. Our Groundwater Level Monitoring Network showed no drought this year! On the contrary, flash flooding led to failed culverts, which necessitated our summer intern team to shift their culvert assessment focus away from southwest New Hampshire, and work in the Lakes Region. One of our collaborative peer review sessions, for Josh Keeley's Mount Osceola quadrangle, also had to be rescheduled because of a flood threat on the originally designated day. So, a lot of "on the fly" management this summer!

Despite the soggy weather, NHGS staff and summer interns remained productive and were able to complete much work. Two of our stream crossing assessment interns (Jaylin and Noah) were able to assess 190 stream crossings, mostly in the Lakes Region. Our geologic mappers were able to largely complete their field mapping projects. On June 19 and 20, a team of New Hampshire community

bedrock geologic mappers and NHGS staff joined Dyk Eusden and Dave Converse for a two-day North Country excursion. All field reviewed Dyk's Shelburne quadrangle on the 19th, followed by Dave's Cowen Hill quadrangle, in Pittsburg on the 20th. The weather turned out dry, temperatures were comfortable, and lots of great bedrock geologic discussion was had! Attendees included former bedrock geologic mappers, USGS staff, and guests from the University of Maine at Farmington. The collaborative reviews continued in August with John Brooks' Ossipee quadrangle (surficial) on August 10. Coming up in September, Dan Tinkham's Ossipee Lake quadrangle review, and the reschedule of Josh's Mount Osceola quadrangle (both also surficial) will both be held. Hopefully, it won't rain these times! Dyk and Josh both benefited from the assistance of Cal Schrupp, a Geology student from Bates College in their mapping work this summer, and Cal's efforts contributed to the value of both projects.



Collaborative peer review in Pittsburg

As reported in the last update, and with many thanks to summer intern Emilie Pray, and NHGS staff members Rebecca LeCain and Mike Howley, we successfully repackaged the Redstone Core into new

core boxes. We were able to successfully preserve about 950 feet of the original 3002' length core in the project. Sometime in September, we will be shipping the remains of the core to New Jersey.



Redstone Core ready for shipping

Josh Keeley, with the assistance of Jean Schwab, completed New Hampshire's portion of a USGS-funded New England Stratigraphic Correlation project this summer. The purpose of the project was for the six New England state geological surveys to work together across state boundaries to identify bedrock stratigraphic unit mismatches across state boundaries and within states and to develop a literature review regarding these problems. The project results set the stage for future potential opportunities to target research and additional data collection to address the correlation issues identified as part of the project.

As always, if you have any suggestions about how NHGS can better serve you, reach out to anyone in NHGS at anytime. We always look forward to hearing from you.

July 2023 Field Trip Report

Our Summer 2023 field trip was held in Franconia Notch. Trip leaders were Brian Fowler of the Old Man of the Mountain Legacy Fund (bfowler@quarry-asset-management.com), Thom Davis of Bentley University (Pdavis@bentley.edu) and Matt Maclay of Dartmouth College (matthew.t.maclay@dartmouth.edu)

We met at the main parking lot at the Old Man of the Mountain Historic Site and walked to the following stops (using the bike trail as the regular footpath was impassible from recent rain):

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

- Welcome and general introduction to the field trip



Initial introduction and field trip discussion by Brian Fowler

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



Stop 1: Profile Lake overlook



Stop 1: Thom Davis discusses the timeframe for glacial retreat across New England.



Stop 1: Matching the former Old Man profile at the Old Man of the Mountain Memorial Plaza

Climbers' Parking Lot and Cannon Cliff Outlook

- Description of the ongoing Cannon cliff 3D photographic and georeferenced imaging research project 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.



Stop 2: Cannon Cliff



Stop 2: Matt Maclay discusses the estimated volume of material lost from the Old Man and how the cliff face was reconstructed

Toe of the 1997 Cannon Cliff Rockfall and Colluvial Debris

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



Optional Stop 3: The group visits the boulders that stopped just short of the pike trail from the 1997 rockfall

Historic Site Parking Area and Picnic Site

- Lunch and Q&A session.

We were very lucky with the timing of the field trip – the fog had mostly burned off before we had started and while we did encounter a very short rain shower, the heavy rain held off until after the trip.

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, September 14th via Zoom. The primary topic was preparing for the October dinner meeting, which will be in-person at Makris Lobster & Steak House on October 12th.

- This coincides with Earth Science Week!
- Dyk Eusden will speak about his bedrock mapping work in northern NH, more details in this newsletter.

Other matters discussed:

- GSNH involvement at the GSA Northeastern Section Meeting, March 2024 in Manchester, NH.
 - Ideas for GSNH merchandise.
-

The Ocean Has a Fever

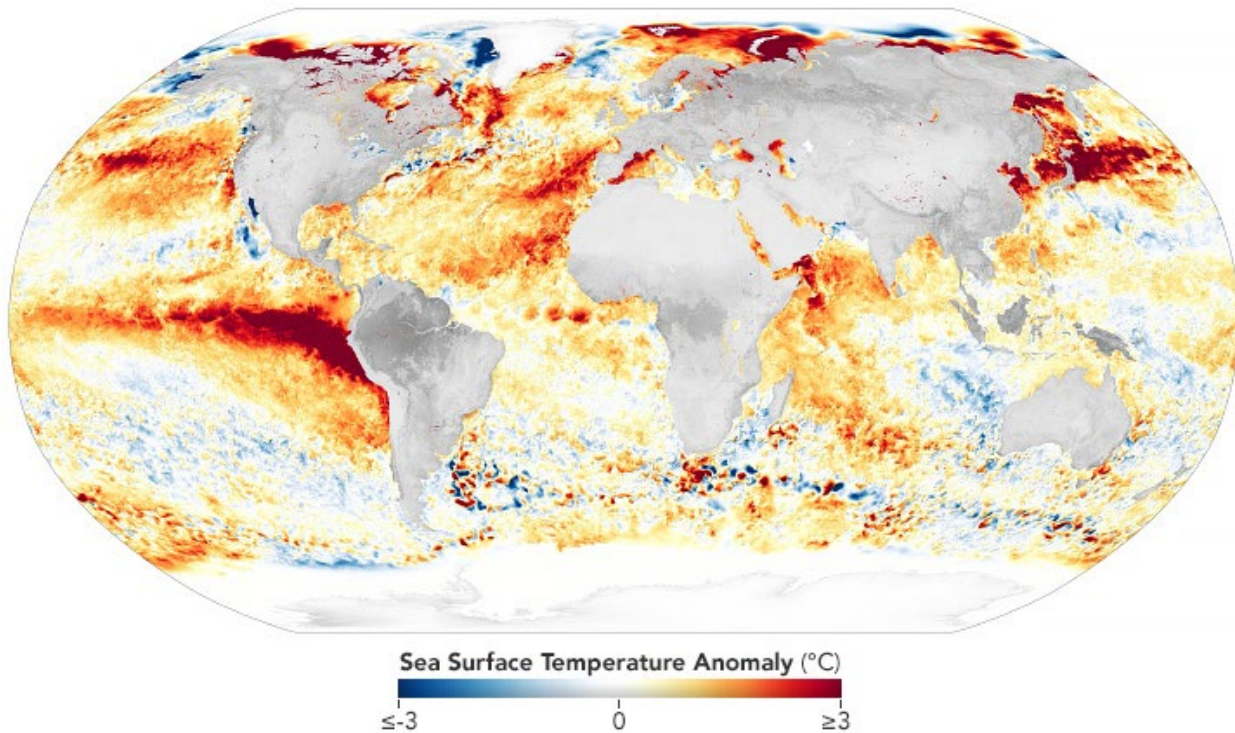
From NASA Earth Observatory, August 21, 2023:

<https://earthobservatory.nasa.gov/images/151743/the-ocean-has-a-fever>

In March and April 2023, some earth scientists [began to point out](#) that average sea surface temperatures had surpassed the highest levels seen in a [key data record](#) maintained by [NOAA](#). Months later, they remain at record levels, with global sea surface temperatures [0.99°C \(1.78°F\)](#) above average in July. That was the fourth consecutive month they were at record levels.

Scientists from NASA have taken a closer look at why. “There are a lot of things that affect the world’s sea surface temperatures, but two main factors have pushed them to record heights,” said Josh Willis, an oceanographer at NASA’s Jet Propulsion Laboratory (JPL). “We have an El Niño developing in the

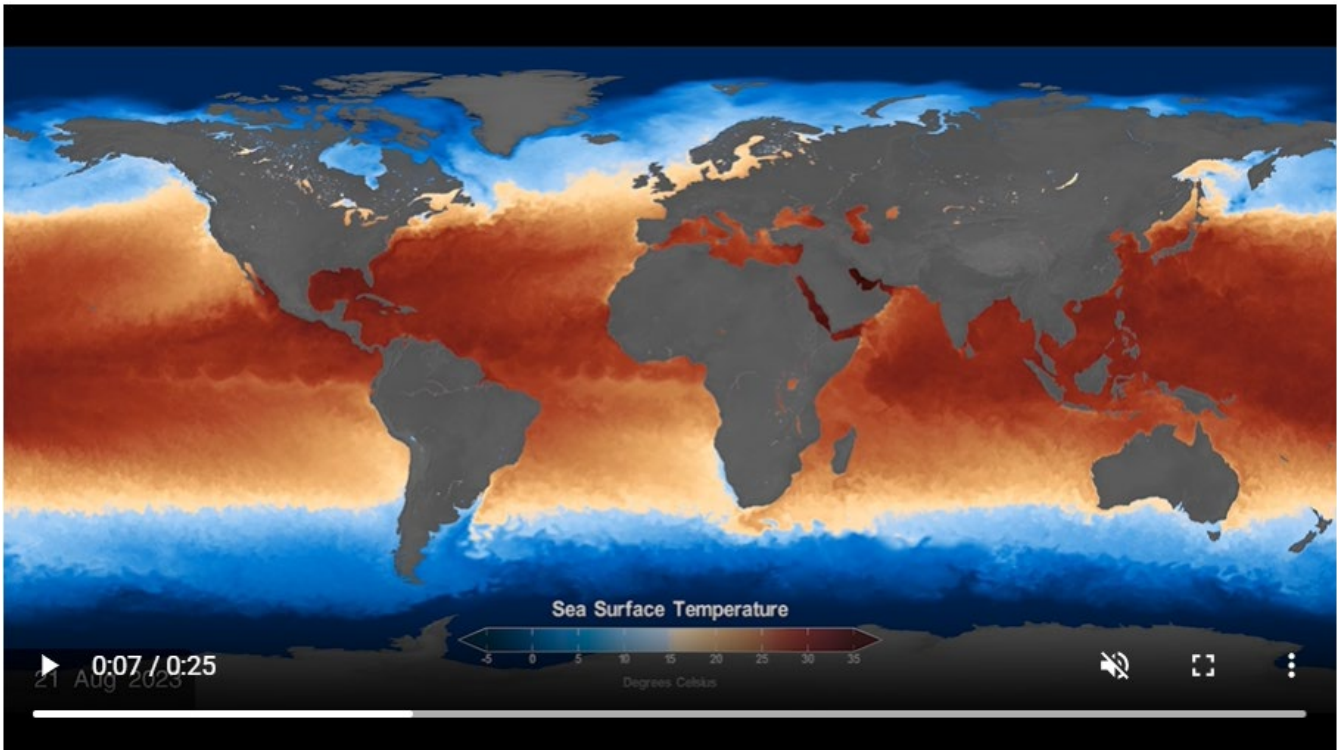
Pacific, and that's on top of long-term global warming that has been pushing ocean temperatures steadily upward almost everywhere for a century.”



Decades of gradual warming due to human-caused climate change and an El Niño in the Pacific Ocean nudged global sea surface temperatures to record levels in 2023

The map above shows sea surface temperature anomalies on August 21, 2023, when many areas were more than 3°C (5.4°F) warmer than normal. On that date, much of the central and eastern regions of the equatorial Pacific were unusually warm, the signature of a developing El Niño. As has been the case for weeks, large patches of warm water were also present in the Northwest Pacific near Japan and the [Northeast Pacific](#) near California and Oregon. Portions of the Indian, Southern, and Arctic Oceans also showed unusual warmth.

The map is based on data from the [Multiscale Ultrahigh Resolution Sea Surface Temperature](#) (MUR SST) project, a JPL effort that blends measurements of sea surface temperatures from multiple NASA, NOAA, and international satellites, as well as ship and buoy observations. Rather than showing absolute temperature, the anomaly reflects the difference between the sea surface temperature on August 21, 2023, and the 2003-2014 average for that day. The [screenshot from the] [video below](#), also based on MUR SST data, shows global sea surface temperatures since April 1, 2023, the period when they have been at record-breaking levels. The warmest waters appear dark red.



April 1 - August 21, 2023 ([MPEG](#))

“Over the long term, we’re seeing more heat and warmer sea surface temperatures pretty much everywhere,” said Gavin Schmidt, the director of NASA’s Goddard Institute for Space Studies. “That long-term trend is almost entirely attributable to human forcing—the fact that we’ve put such a huge amount of greenhouse gas in the atmosphere since the start of the industrial era.”

Schmidt noted that other factors—such as weather and wind patterns or the distribution of dust and [aerosols](#)—have short-term effects on sea surface temperatures in certain regions, but they generally have a minor effect on the longer-term global mean. [Previous research](#) shows that as much as [90 percent](#) of the excess heat that has occurred in recent decades due to increasing greenhouse gas emissions is absorbed by the ocean, with much of that heat stored near the surface.

The most important factor that helped push sea surface temperatures into record territory in 2023 was the [evolving El Niño](#) in the Pacific, according to Willis. He came to that conclusion by analyzing the timing and intensity of sea surface temperature anomalies in several regions and comparing them to the global trend.

“We had a big jump in global surface temperature at the beginning of April—exactly when the Pacific temperatures jumped up and also when sea levels in the eastern Pacific started to rise,” Willis said. “The heat waves in the Atlantic are important and will have serious effects on marine life and weather in Europe in the coming months. But it’s the Pacific that has taken the global mean on a wild ride this year.”

What happens in the Pacific tends to have a large influence on the global sea surface temperatures partly because of its size. The Pacific represents about half of the world's ocean area.

[Marine heat waves](#)—defined as periods of persistent anomalously warm ocean temperatures (warmer than 90 percent of the previous observations for a given time of year)—have occurred recently in several areas. One [NOAA analysis](#) showed that 48 percent of the global oceans were in the midst of a marine heat wave in August—a larger area than for any other month since the start of the record in 1991. Particularly intense events have warmed the [North Atlantic](#) and [parts of the Caribbean](#) in recent months.

Willis expects the heat in the equatorial Pacific to have more staying power than many of the other marine heat waves simmering around the world. “Many of the marine heat waves we’re seeing are ephemeral and ‘skin’ deep, generally lasting on the order of weeks and driven by atmospheric forces,” explained Willis.

The unusually warm water in the equatorial Pacific associated with the developing El Niño [after three consecutive years of La Niña](#) is expected to weaken trade winds in ways that reinforce and amplify the warming of surface waters, fueling the El Niño further. Forecasters from NOAA say that there is a greater than [95 percent chance](#) that El Niño conditions will persist throughout the Northern Hemisphere winter. “What’s happening in the Pacific with El Niño will influence global weather patterns and sea surface temperatures well into the winter and possibly even longer,” Willis said.

To monitor sea surface temperatures, scientists at NOAA and NASA analyze observations from sensors and buoys in the oceans, ships, and several different polar-orbiting and geostationary satellites. Groups of scientists with [NOAA’s Physical Sciences Laboratory](#), [NOAA’s Coral Reef Watch](#), and [NASA’s Jet Propulsion Laboratory](#) track marine heat waves and sea surface temperature anomalies closely. You can use NASA’s [State of the Ocean Tool](#) on [Worldview](#) to monitor daily sea surface temperature anomalies.

NASA Earth Observatory image by Lauren Dauphin, using data from the [Multiscale Ultrahigh Resolution](#) (MUR) project. [Video](#) by NASA’s Scientific Visualization studio, using data from the MUR project. Story by [Adam Voiland](#).

Legislative Committee Update – September 2023

By Tom Fargo

The June 2023 update described an effort, initiated by Governor Sununu, for the Legislature to make significant changes to the State statutes to eliminate professional certifications for many medical professions along with State licensure requirements for professional Foresters, Wetlands, Soil and Natural Scientists. Elimination of licensure requirements for NH Professional Geologists was not initially proposed.

In early 2023, the Legislature considered bills to codify this Governor’s initiative. House Bill 655 provided for funding and administrative staff changes in the Office of Professional and Certification that would continue to administer licensure of Professional Geologists as outlined in RSA 310-A: 120. HB-655 was passed by both the House and Senate on June 13th and was signed by the Governor.

Provisions for the elimination of up to 34 licenses was included in House Bill Two (HB-2, the so-called budget trailer bill). On March 28, 2023 the NH Bulletin reported that “Republican and Democratic budget writers in the House are moving to reject nearly all of the controversial and sweeping professional licensing changes Gov. Chris Sununu is seeking.” Rep. Dan McGuire, an Epsom Republican, told the House Finance Committee Monday. “Personally I think that the governor’s initiative here was a good one. And long overdue, ... It just turned out to be way too much for our (House Finance subcommittee) to process and deal with.”

Further action on this initiative is anticipated next year. Legislative Service Requests (LSRs or draft bills) are now being processed for the 2024 Legislative Session. Titles and text for these bills are not yet available.

Volcano Watch – Using remote acoustic monitoring to distinguish volcanic styles

By USGS, Hawaiian Volcano Observatory. September 1, 2023.

<https://www.usgs.gov/observatories/hvo/news/volcano-watch-using-remote-acoustic-monitoring-distinguish-volcanic-styles>

Volcano observatories often use continuous remote monitoring instruments like seismometers and acoustic microphones to detect earthquakes and explosions. These types of sensors are ideal because they can monitor constantly, and scientists can apply remote detection capabilities, not unlike home alarm systems in households and businesses, to monitor activity.

To build more accurate alarms, volcano scientists work to better understand key eruption characteristics of volcanic eruptions.

In a recent study, USGS volcano observatory researchers joined international volcano scientists to examine two types of eruptive activity at Stromboli volcano, which erupts frequently.

The scientists were interested in discovering differences between discrete explosive eruptions compared to sustained eruptions (called jet eruptions for their similarity to a jet engine on a plane). The two eruption types have different implications for hazardous conditions at Stromboli. The motivation of the study is a better understanding of these events, at Stromboli, that can be applied to similar types of volcanic activity occurring around the globe.

Explosive eruptions are characterized by their impulsive onset and tend to radiate energy equally in all directions. These types of eruptions may throw rocks in all directions. At Stromboli, sustained jets have longer durations and produce a directed plume of ash and rocks away from the vent. The events are analogous to jet engine dynamics and such volcanic jetting can push ash to heights beyond international airline traffic altitudes.

From a volcano monitoring perspective, it is useful to understand the types of signatures that these events produce and how they are recorded on standard volcano monitoring networks. However, networks are hindered because seismic and acoustic sensors are almost always placed on the ground surface and are not ideal for the capture of eruption energetics into the atmosphere.

The research team working in Italy attempted to improve our understanding of eruption dynamics by placing an acoustic sensor on a small stationary Uncrewed Aircraft System (UAS, or drone) helicopter above Stromboli to capture both explosions and jet eruptions. The work revealed key features of the two event types that allow them to be easily distinguished by a sensor briefly suspended above the volcano.

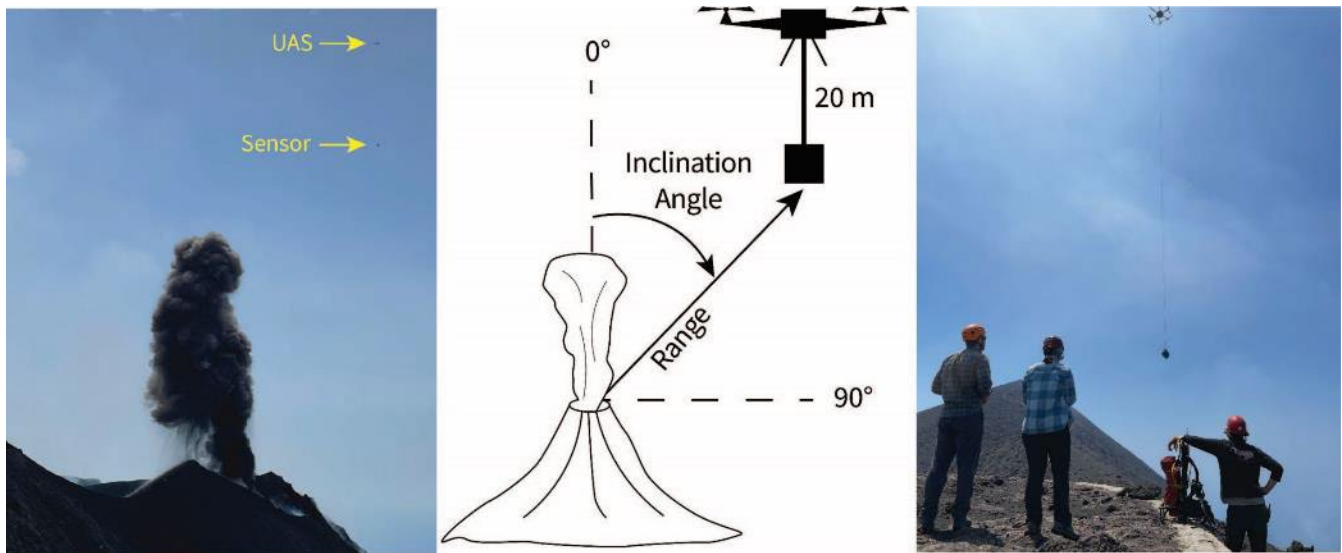


Image of jetting eruption at Stromboli volcano Italy (left), the orientation of the sensor compared to the eruption direction (center) and a close image of the hovering UAS with sensor on tether below (right-Image courtesy David Fee).

This particular experiment in Italy is impractical from the perspective of long-term eruption monitoring. However, it demonstrated the ability to capture these data and identified constraints on how to design better ground networks to monitor the wide variety of eruption types. This work introduces methods for improved monitoring and detection of volcanic eruptions at United States and international volcanoes, which in turn improves situational awareness and volcanic response.

The Hawaiian Volcano Observatory currently uses UAS techniques to measure volcanic gas and conduct aerial imagery surveys to generate three-dimensional models. Experiments by other volcano scientists show that applications of UAS technology are continuing to develop and expand. If you want to learn more about experiments of this type, please check out this recent publication in [Geophysical Research Letters \(2023\)](#).

Please visit HVO's website for past Volcano Watch articles, Kīlauea and Mauna Loa updates, volcano photos, maps, recent earthquake information, and more. Email questions to askHVO@usgs.gov.

Volcano Watch is a weekly article and activity update written by U.S. Geological Survey Hawaiian Volcano Observatory scientists and affiliates.

Other Geology News:

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

Two NH residents buy Ruggles Mine in Grafton

By David Brooks, Concord Monitor. From NHPR, July 24, 2023.

<https://www.nhpr.org/nh-news/2023-07-24/ruggles-mine-nh-residents-buy-landmark>

Two New Hampshire residents purchased Ruggles Mine in Grafton ahead of a scheduled foreclosure auction, with the hope of reopening the mine to the public.

The mine first produced commercial amounts of mica in 1803, making it the oldest mica mine in the country, and it operated commercially for 150 years. The Wahlstroms purchased the mine in 1961 and transformed it into a tourist attraction which allowed the public to collect their own samples. The family sold the mine in 2019 to a production company and it was largely shut since then.

Crawford Lake chosen as the primary marker to identify the start of the Anthropocene epoch

From the University of Southampton, July 12, 2023.

<https://www.southampton.ac.uk/news/2023/07/crawford-lake-anthropocene.page>

The Anthropocene Working Group has recommended Crawford Lake in Canada as a Global Boundary Stratotype Section and Point (GSSP) for the Anthropocene, which is a proposed new geological epoch in which human activity has become the dominant influence on the Earth. Sediment at the bottom of Crawford Lake provides a complete record of environmental change over the last millennia. Evidence from Crawford Lake and secondary supporting sites with similar high-resolution records of human impacts will be presented to the International Commission on Stratigraphy (ICS), which will decide next year whether to ratify the Anthropocene as a new geological epoch.

Earth's most ancient impact craters are disappearing

From the American Geophysical Union, August 1, 2023.

<https://news.agu.org/press-release/earths-most-ancient-impact-craters-are-disappearing/>

Earth's oldest craters may provide critical information about early Earth, the solar system, and crater impacts on other planets – if we can find them. Geologists have found evidence of impacts (ejecta, melted rocks, and high pressure minerals), but the craters themselves have been elusive thanks to weathering and erosion. Researchers studied one of the oldest known impact structures, the Vredefort crater in South Africa, to see if some of the deepest layers would have a signature that could be detected even if the rest was eroded. The results did not point to any key indicators that could be used to distinguish fully eroded craters, but the researchers will keep looking.

W. Jason Morgan, pioneer of plate tectonics, dies at 87

By Liz Fuller-Wright, Princeton University, August 14, 2023.

<https://www.princeton.edu/news/2023/08/14/w-jason-morgan-pioneer-plate-tectonics-dies-87>

W. Jason Morgan died on July 31. He was a pioneer of the theory of plate tectonics; he was the first to identify the plates that can separate, collide, or slide against each other, linking together numerous geologic phenomena such as the San Andreas Fault, the Pacific Ocean's volcanic "ring of fire", and mid-oceanic ridges into a cohesive model. He received many awards for his contributions to science, including the National Medal of Science (the highest scientific honor in the US), the Japan Prize, the Maurice Ewing Medal, the Leon Lutaud Prize of the French Academy of Science, and the Alfred Wegener Medal. He was elected to the National Academy of Sciences in 1982.

Fresh look at DNA from glacier mummy Oetzi the Iceman traces his roots to present day Turkey

From AP via CBS News, August 16, 2023.

<https://www.cbsnews.com/news/dna-glacier-mummy-oetzi-the-iceman-traces-roots-turkey/>

Decades after an ancient mummy, named Oetzi the Iceman, was discovered in the Italian Alps, scientists have reevaluated his DNA to reveal more about his origins. Oetzi, who lived more than 5,000 years ago, was frozen into the ice and his corpse was preserved as a "natural mummy" until hikers discovered him in 1991. Scientists used newer DNA extraction techniques to determine an updated genome, and found that he was mostly descended from farmers from present-day Turkey.

Call for Articles

Have a geological story you want to share with your fellow geologists? Did you go on a field trip or just see a cool geological feature in your travels? Feel free to submit to the GSNH newsletter, published quarterly. The submission deadlines are March 1, June 1, September 1, and December 1, but content can be submitted any time for inclusion in the next newsletter article. Send to jlambert@nobis-group.com. For more details, see the submission guidelines at the GSNH website:

<http://www.gsnh.org/submission-guidelines.html>.

GSNH T-Shirt Order Form

	Number of Shirts	Price per Shirt	Total
GSNH Small T-Shirt		\$18.00	
GSNH Medium T-Shirt		\$18.00	
GSNH Large T-Shirt		\$18.00	
GSNH Extra Large T-Shirt		\$18.00	
		Subtotal	
Shipping & Handling costs		Shipping & Handling	
One Shirt	\$4.00	Total	
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**



Geological Society of New Hampshire



Topic: “Bedrock Geology of the Shelburne, NH region: A Transition from Convergent to Collisional Tectonics of the Acadian Orogeny”

Speaker: Dykstra Eusden

Thursday, October 12, 2023

**Location: Makris Lobster & Steak House
Route 106, Concord, NH 03301**

5:30 pm Social Hour - 6:30 pm Dinner - 7:15 pm Speaker Presentation

RSVP by 4 pm Friday, **October 6, 2023 to get the reservation price**

- | | | |
|-----------------------|---|---------|
| Advance Reservations: | _____ Member (Dues Paid) | \$35.00 |
| | _____ Non-member | \$40.00 |
| • | Students \$20.00 with valid student ID card (Reservation Requested) | |
| • | Member at the Door | \$37.00 |
| • | Non-Member at the Door | \$42.00 |

Checks payable to: GSNH

Please indicate special food issues – leave blank for none.

GSNH will also accept dinner reservations by e-mail, which will then allow you to pay at the door.

Reply via e-mail to: Sharon.Lewandowski@des.nh.gov or

Mail to: **Sharon Lewandowski , GSNH Dinner Meeting,
PO Box 401,
Concord, NH 03302.**

Please note that e-mail reservations constitute an agreement with the Society for which you will be responsible to pay, whether you are able to attend or not, unless you cancel your reservation by noon the Tuesday before the dinner.

Name(s) _____

Address: _____

Your phone or e-mail: _____

The dinner and lecture program counts as 2.0 hours of CEU contact hour credit.



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: _____