



# Granite State Geologist

The Newsletter of the Geological Society of New Hampshire,  
Summer Edition – July 2017 – Issue No. 97

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## In this issue:

- **Summer field trip to Mt. Ascutney is full!**
- **August total eclipse and lots of other space stuff**
- **American Geophysical Union Fall Meeting**
- **Yankee features the Madison Boulder and Brian Fowler**
- **What is your Board doing?**
- **Legislative update**
- **Find out what that is they're doing in Hancock**
- **Upcoming Events and Much More!**

## MESSAGE FROM THE PRESIDENT

The summer field trip to Mt. Ascutney is booked up. The people registered will soon get the field guide as an electronic document so that this year the guidebook can be printed out or read using a handheld device. GSNH tee shirts will be available, so bring cash. Years ago on a fine winter day I hiked up the trail road with some friends and my dog and sledged back down. Seemed like a good idea at the time.

The efforts to enhance the Madison Boulder site have paid off with an article in Yankee. The article describes the visit the author made with Brian Fowler, who has been managing the work there for some years now. The Society continues to support the work being done there to protect and promote the Boulder.

A total eclipse of the sun will be visible across the USA. There's a website giving state by state details of how to get on the path of the eclipse. Spoiler alert - That mysterious place out in Hancock that you've seen driving by, but never bothered look up when you got home is explained in this episode. Also, the end of the Cassini mission is just days away. This time the mission will not be extended.

The AGU fall meeting and NEIGC field trips are coming up so plan accordingly. Bates College will be leading the NEIGC. AGU will be covering everything you ever wanted to know about fracking down in New Orleans.

Our next dinner meeting will be at Makris on October 12. This is our annual meeting where there may be some voting going on, but it won't be elections this year. More information to come as the summer ends. Steve Arcone will be describing his investigations in Antarctica. Also, our new website should be what you see when you go online looking for GSNH. We are still tweaking and developing more pages, so it will continue to grow and improve just like our Society.

I hope you're enjoying this summer. My father always said summer was over the Fourth of July. I know he didn't mean it literally, but it sure goes by quick after that.

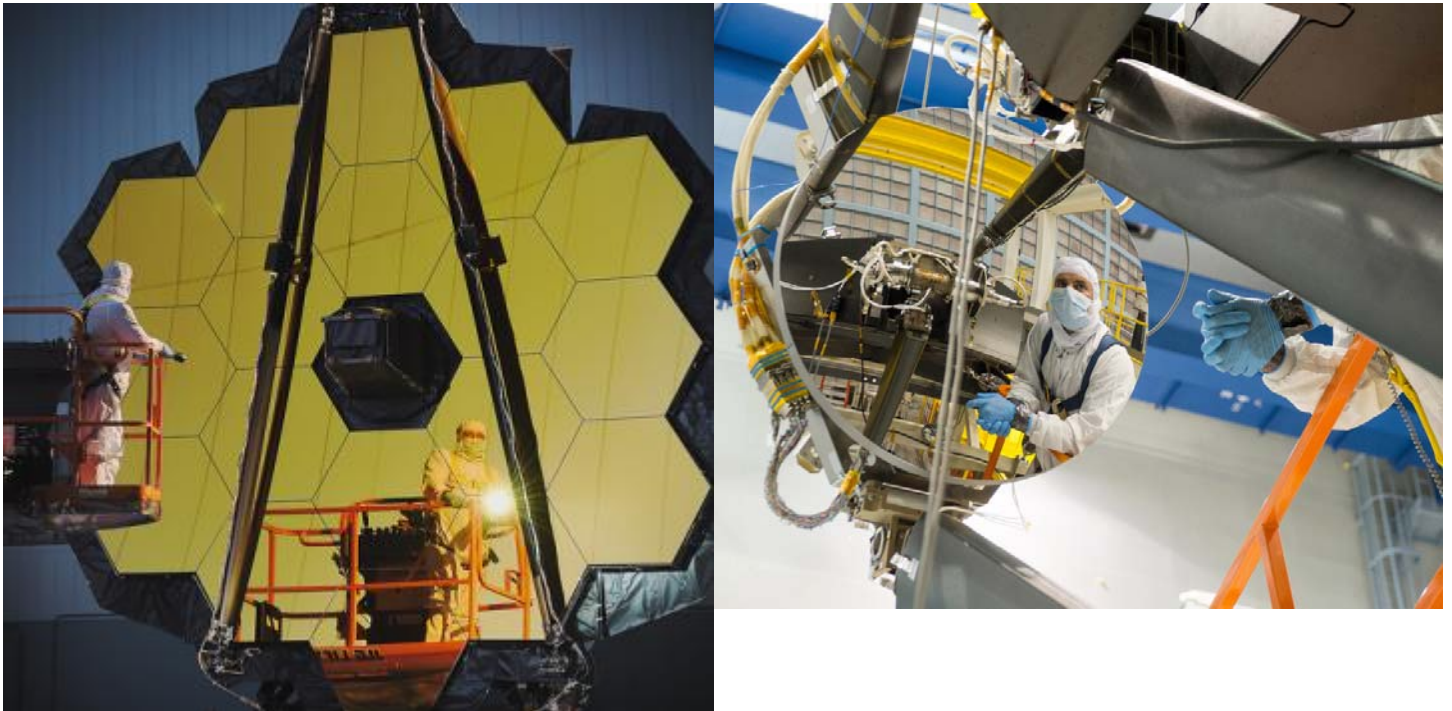
## ENTRY LEVEL GEOLOGY JOBS IN NH submitted by Wayne Ives

I found this site calling itself “2017 Geology Entry-level Jobs in New Hampshire” while looking for something else. I’m not a student, so I didn’t try to log in to access the site, but there were several geology jobs posted (however, with only the job and company name at the starting point), so let me know if you use it and it is helpful. <https://www.wayup.com/s/entry-level-jobs/geology/new-hampshire/>

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## WHAT DOES NH HAVE IN COMMON WITH THE NEW JAMES WEBB SPACE TELESCOPE? Submitted by Lee wilder, NHGS <https://www.jwst.nasa.gov/>

The 18 mirror segments are made from polished beryllium, a metal derived from New Hampshire's State mineral. Then the extremely smooth beryllium surface is covered with a thin layer of gold for high reflectivity.



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## HE'S SPREADING HIS UNCLE'S HAWAIIAN LAVA ROCKS

By Jason Schreiber Union Leader Correspondent May 25, 2017

<http://www.unionleader.com/apps/pbcs.dll/article?AID=/20170526/NEWHAMPSHIRE09/170529541/0/img&template=printart>

FREMONT — Ron Watson didn’t know what he was going to do when he inherited 200 Hawaiian lava rocks from his late uncle eight years ago. Chief Petty Officer Albert N. Turner had big plans to use the rocks for a pit to hold luaus for his family when he retired from the Navy in the late 1960s and settled in Maine. But the pit was never built. The rocks, of various sizes, which Turner gathered himself during his free time as a Navy diver stationed in Hawaii, remained packed up for decades in small wooden crates stored in the loft at his camp in Dead River Township, Maine. “Over the years of living up there he had amassed quite an amount of interesting things. In the process of starting to clean out we came across the rocks. We hadn’t seen them in years,” said Watson, who, along with his cousin, inherited his uncle’s estate.

Watson, 66, said he was told that they came from a volcanic eruption at Kilauea when lava flowed into the ocean. Over time the wave action smoothed over the rocks, making them easy to handle, he said. While the rocks held special memories from his uncle’s experiences in Hawaii, Watson didn’t feel he could hang onto them forever. He decided to sell some on eBay to help maintain the camp and keep



**Ron Watson holds one of the lava rocks he inherited from his late uncle. He has been trying to find homes for the lava rocks he inherited. (Jason Schreiber)**

it in the family. He gave others to people who were interested in learning about them, especially children. "I got to a point where I said, 'You know what? Why not give them to schools? They have geology classes and kids are interested in geology,'" he said. Watson recently gave 18 rocks to Ellis School in Fremont, where students were learning about volcanoes, and others to A Place to Grow child care center in Brentwood.

He had a positive response after posting a message about the rocks on a Fremont community Facebook page and gave several more away to interested takers. "I've been carrying them around in the back of my truck," he said. By Thursday he was down to just eight rocks. He might give the rest to Ellis School and keep one for himself. 'Cooking utensils' That's a far cry from the ton of rocks Turner originally had shipped to Maine around 1961 when he transferred to the U.S. Naval War College in Newport, R.I. The rocks were first shipped to San Francisco in a large crate labeled "cooking utensils" and then loaded onto a train for part of the trip across the country. They were then placed in a moving truck that hauled them to a farm Turner bought in New Portland, Maine, which is where he would retire from 26 years in the Navy and after serving during World War II and the Korean and Vietnam wars. Unloading the rocks was a challenge. Watson said Turner used a tractor to pull the crate, but it split open and the rocks came pouring out. The delivery drivers didn't know what to think because they had no idea that it was filled with lava rocks. "The faces on the movers were pretty priceless," Watson said. Turner, who never had children, eventually sold the farm and moved to the camp in Dead River Township. "He brought everything with him, including the lava rocks," Watson said. Turner gave some rocks away before his death, leaving behind the 200 or so for his nephew.



WHICH DO YOU THINK THIS GUY SAYS?



## THE LOST MINE: A LEGEND OF THE HEADWATERS OF THE ANDROSCOGGIN

BY Bailey K. Davis <http://berlinhistory.weebly.com/the-lost-mine.html>

During the long and sanguinary struggle between the English and the Indians that drifted back and forth between Maine and New Hampshire and the French rendezvous in Canada, the latter almost invariably used bullets which contained more than half silver. These remarkable missiles became the wonder of the whites, and the source from whence they were obtained was a mystery. To this day the secret has not been learned, but how near it once came to being known is told by an old resident of Berlin.--Editor of <http://berlinhistory.weebly.com/>

Before the white men settled any part of Maine or New Hampshire, there was a very powerful tribe of Indians called Penobscots. Their sachem or chief lived on what is now known as Old Town Island, which is about twelve miles above Bangor, on the Penobscot River. They were in possession of all the country watered by the Penobscot, Kennebec and Androscoggin rivers. There was also another tribe called the St. Francis, living in Canada, and, if tradition saith truly, these two tribes were very friendly, often intermarrying. Their great thoroughfare was the Androscoggin River, and their camping places all up and down the river were plain to be seen by the early settlers, and whenever possible these camping places were located on islands, and often the curiosity seeker would find many things to richly reward his search, perhaps not very valuable as far as dollars and cents are concerned, but valuable as relics, such as arrow-heads, spear-points, tomahawks and, quite frequently, bullets.

These arrow-heads and other things were made of jasper, a stone very hard, and wherever these camping places were one was almost sure to find many pieces of this jasper, evidently chipped from larger pieces. Now it was a source of wonder where the Indians obtained this jasper, but this was settled by William Sanborn who, sometime in the year 1859, found what has been locally known as Jasper Cave, situated on the east side of Dead River Pond, about half way up a high bluff that rises some three or four hundred feet above the level of the pond. This cave is about fourteen feet long, nine feet high and six feet wide. In all probability this entire cave was made by the Indians, to obtain this jasper for the purpose before mentioned. The vein varies in thickness from a few inches to several feet, and as there is no other place on either of the three rivers mentioned before where this jasper has been found it seems certain that this was the place where the red men, with incredible labor, obtained what was to them of far more value than silver or gold; so that when it is remembered that until they obtained firearms, knives, and other utensils of the white men, this hard stone was what they made knives and tomahawks of, besides arrow-heads and spear-points, it will be readily seen that to them this stone was very valuable.

Some years before this town was organized, Mr. Benjamin Russell came through from Newry, Me., on a hunting excursion, as far as what is now called Old Goose-Eye Mountain, but not meeting with the success anticipated he started from that mountain to go back through to Newry, and got lost. It was four or five days before he at last found where he was, but when he did he came out on Bear River, nearly famished with hunger. When wandering around, about to descend a very steep place on the side of the mountain, and finding his hatchet a hindrance, he threw it down the declivity. To his surprise the tool embedded its edge in what looked to him a solid rock. Upon reaching the place he found that it was stuck in a vein of lead, so soft that it could be easily chipped. He stopped to cut out three or four pounds of the ore and, putting it into his pack, resumed his journey, thinking it would be an easy matter to find the isolated spot again. He did succeed in finding his way out of the wilderness, and soon after he sent some of the ore to Boston to be assayed. It was found to contain more than sixty per cent of silver. It was now evident where the Indians had found their ore for their "silver bullets." Elated over his accidental discovery, Mr. Russell started to find the place again, but after days of anxious search he failed to find any sign which revealed the lost mine. This search he repeated from time to time, but he was never able to find the place, and to this day it remains undiscovered. Without a shadow of doubt, somewhere between Old Goose-Eye and Newry lies a mine which would be a fortune to him who should find it.

There is an ancient story of a white man and an Indian who were at one time hunting on this river, somewhere near what is now Berlin Falls, and, as they got out of bullets, the Indian said, "Me get um lead, but white man no follow Indian, white man stay here sure." After some twelve hours, the Indian returned with plenty of lead, but would not tell the white man where it was to be found. In all probability this Indian and others knew of this ore before they ever obtained firearms of the white men. Thus is

accounted for the numerous places where this ore had been chopped out, as seen by Mr. Russell. Ore in its natural state cannot be chopped out as this was, for it is too hard, but after it has been melted it can be easily cut. Now in all probability this ore had been melted either by volcanic action or by the lightning, so that this vein had run out, and according to Mr. Russell's report, there was quite an area covered with this melted ore, which proved to be, by actual test, more than half silver. So this old tradition is given for what it is worth, but it seems very improbable that Mr. Russell should spend years of his life searching to again find the place where he obtained this valuable ore, if there were none. There are many men, who have hunted more or less to find this mine, but as yet it has not been discovered, and if it ever is, it is more than probable that it will be by accident.

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### **DATES TO REMEMBER**

**July 29, 2017** – **GSNH Summer Field Trip** – “Highlights of Mt Ascutney-Area Geology” led by Greg Walsh. Registration is FULL!

**August 2, 2017** – Abstract deadline for American Geophysical Union Fall Meeting  
[http://fallmeeting.agu.org/2017/abstract\\_overview/abstract-submissions/](http://fallmeeting.agu.org/2017/abstract_overview/abstract-submissions/)

**August 26-27, 2017** – 54th Annual Capital Mineral Club Gem, Mineral, Fossil & Jewelry Show; Everett Arena, Concord, NH [http://www.capitalmineralclub.org/54th\\_annual.php](http://www.capitalmineralclub.org/54th_annual.php).

**September 29 to October 1, 2017** - Bates College will be hosting **NEIGC 2017** out of Bethel, Maine. Dyk Eusden is planning on having many field trips in nearby northern NH. Preliminary list of field trips at  
[http://w3.salemstate.edu/~lhanson/NEIGC/2017/June%2025\\_TripList.pdf](http://w3.salemstate.edu/~lhanson/NEIGC/2017/June%2025_TripList.pdf).

**October 8-14, 2017** - Earth Science Week. See the details of focus days beginning with International Earthcache Day and ending with International Archeology Day at  
<http://www.earthsciweek.org/focus-days>.

**December 11-15, 2017** - American Geophysical Union Fall Meeting in New Orleans, Louisiana. Biogeochemical and Microbial Dynamics of Shale Formations and Hydraulic Fracturing Fluids  
General information about the conference can be found at <http://fallmeeting.agu.org/2017/>.

**March 18–20, 2018** – **GSA Northeastern Section 53rd Annual Meeting** • Burlington, Vermont  
Sheraton Hotel and Conference Center  
[https://www.geosociety.org/GSA/Events/Section\\_Meetings/GSA/Sections/ne/2018mtg/home.aSPX](https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/ne/2018mtg/home.aSPX)

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### **OCTOBER DINNER MEETING WILL BE AT MAKRIS**

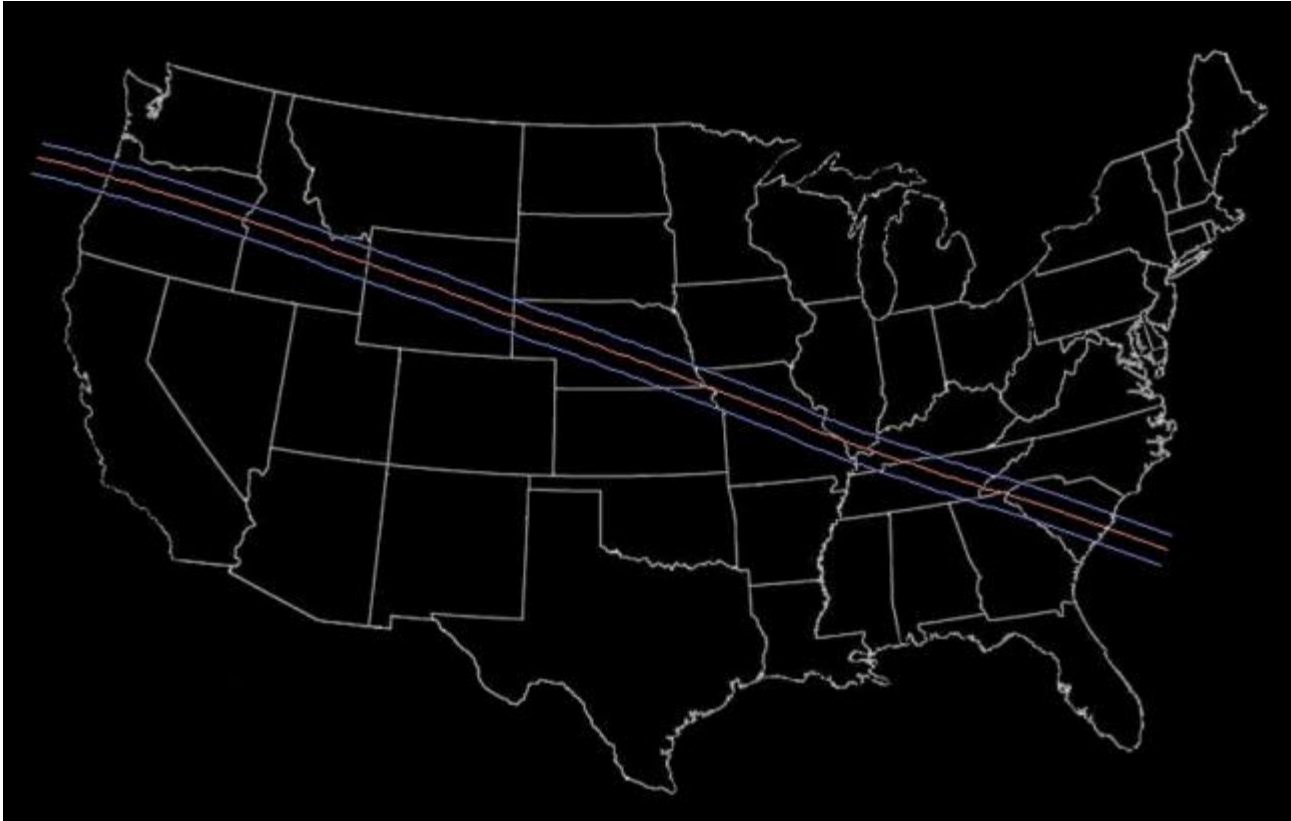
This year's fall meeting is a non-election year annual meeting that will be held at Makris in Concord. Steven Arcone will present on his studies in Antarctica using robotic Ground Penetrating Radar on the Ross Ice Shelf.

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## PATH OF THE AUGUST 2017 ECLIPSE

People from all over the world begin to converge on the United States in mid-August 2017. These will be people who make it a point to travel to wherever the Moon's shadow is going to touch the earth, and position themselves in a spot carefully chosen - sometimes years in advance - to ensure they see the sight.

These people will make contingency travel plans in case of last-minute clouds. These people will fill hotel rooms, sometimes inadvertently displacing locals from their homes as space gets harder to come by. These people will travel through miles of desert or forest or frozen wasteland, braving the harshest of conditions...for a short glimpse at the eclipsed Sun.



**Path of the August 21, 2017 eclipse across the USA.**

These people are coming to America, because for the first time in 26 years, a total solar eclipse will occur in our great country, and we will play host to the world's eclipse-chasers. For those of us who already live here, but have never seen an eclipse, this is the opportunity of a lifetime - to see the most beautiful thing on the planet, and maybe not even have to get on an airplane to get to it!

The date – August 21, 2017. The eclipse will start in the north Pacific Ocean at local sunrise at 16:48:33 Universal Time\*. (At that spot, the Sun will actually rise while totally eclipsed. The eclipse will make land fall one minute later. There will only be about 2 minutes of total eclipse at any one location. The swath of the shadow will touch the United States for only 1h 33m 16.8s. And that's it. From there, the Moon's shadow continues on, out over the Atlantic Ocean, not to touch any more land before deftly lifting off the earth's surface near Africa about 75 minutes after it left the US. And just for the record, "the next one" will be on Tuesday, July 2, 2019. You can see it on land at sunset, from small spots in either Chile or Argentina. Or, you can be on a cruise ship in the South Pacific Ocean!

See more at: [http://www.eclipse2017.org/2017/path\\_through\\_the\\_US.htm](http://www.eclipse2017.org/2017/path_through_the_US.htm). \*Universal Time or UT is the precise measure of time used as the basis for all civil time-keeping. Although their exact definitions differ, most readers can assume that Universal Time is equivalent to Greenwich Mean Time or GMT. Universal Time is actually based on the mean star time as measured in Greenwich, England. [Yes, trekkies, stardates have arrived! – ed.] Protective glasses made in the USA available at [http://www.eclipse2017.org/glasses\\_order.htm](http://www.eclipse2017.org/glasses_order.htm).



## **THE FLAMING END OF THE CASSINI MISSION TO SATURN submitted by Wayne Ives**

The Cassini space craft has been orbiting Saturn studying the planet and its moons for over 13 years. Its mission is scheduled to end in a few months on September 15, 2017. Before Cassini, we had only brief glimpses of Saturn from Pioneer 11 and Voyagers 1 and 2 flybys conducted decades ago, taking pictures, measurements and observations as they past. These missions shed new light on Saturn's complicated ring system, discovered new moons and made the first measurements of Saturn's magnetosphere. But these quick encounters didn't allow time for more extensive scientific research. Cassini began the first in-depth, up-close study of Saturn and its system of rings and moons. The Huygens probe landed on Saturn's largest moon, Titan, in January 2005.

The Cassini mission has seen two mission extensions, allowing for more flybys, investigations and measurements, over a longer span of time. As of this writing (July 6), Cassini has made 282 orbits of the planet. This final mission will conclude with a phase known as The Grand Finale -- 22 deep dives between Saturn's cloud tops and innermost ring. More than half have already been completed. On the final orbit, Cassini will plunge into Saturn's atmosphere, sending back new information on the planet's atmosphere right to the very end. After losing contact with Earth, the spacecraft will burn up like a meteor, becoming part of the planet itself.

Many interesting Cassini topics are explored in links originating at [https://www.nasa.gov/mission\\_pages/cassini/main/index.html](https://www.nasa.gov/mission_pages/cassini/main/index.html) as well as links for earlier NASA programs.

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## **APRIL DINNER MEETING**



Dr. Dwight Bradley, retired USGS research geologist, presented on the Ages and Plate Tectonic Settings of Lithium-Cesium-Tantalum Pegmatites in New England at our April meeting at the Puritan's Pappas Room in Manchester. He greatly enjoyed his speaker's gift and wanted to know if the bottom of the three thousand-foot core was still around!



## WHAT IS YOUR BOARD DOING? Submitted by Shane Csiki, Secretary

On Thursday, June 29, Thor Smith hosted a meeting of the Geological Society of New Hampshire Board of Directors at the USGS office in Pembroke. The Board discussed several items. One of the exciting items is that number of members, and interest, in GSNH is going up!

The annual summer field trip is coming up on Saturday, July 29. This year, the trip will explore the geology of the Mount Ascutney area. With 47 people signed up, the trip is nearly full! If you have registered for the trip, you should expect to receive a field trip guide about two weeks before the trip date from Lee Wilder. The trip will assemble at Blow me Down Farm in Plainfield, and from there will proceed up Mount Ascutney. Be sure to bring your own lunch. The Board thanks Greg Walsh in advance for volunteering to lead what is shaping up to be another exciting and educational field trip.

Our next dinner meeting, which is also the GSNH annual meeting, will be held once again at the Makris Steak House in Concord on October 12. Steve Arcone will be presenting about Antarctica. Beyond the annual meeting, the Board is seeking potential speakers for future dinner meetings. If any of you have ideas for a guest speaker, related to geology or earth science topics, or if you have a specific topic you feel would be of interest to GSNH, the Board would like to hear from you! Feel free to contact any one of the officers with your ideas and suggestions.

The Board is continuing to investigate options for establishing a website that provides a map and information of geological sites of interest here in New Hampshire. Vice President Tom Fargo has taken the lead on this effort, and is working on some potential organizational partnerships to help make such a website a reality. If you have any geological sites of interest in New Hampshire that you feel would be good candidates for inclusion on the website, contact Tom Fargo.

The Board is having ongoing discussions regarding the non-profit status of GSNH, and possible 501(c)(3) or 501(c)(6) organization status. The Board may be engaging you in this discussion in the near future, so stay tuned.

Our next Board of Directors meeting will be held on Thursday, September 7, 2017, at 6 PM at the offices of AECOM in Manchester. All members are welcome to attend our meetings. Please let a Board member know if you would like to attend or if there is an item of interest that you would like added to the agenda.

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**GSNH TEE SHIRTS EVEN LOOK GOOD UPSIDE DOWN** Ask Julie Spencer about buying one at the field trip or next dinner meeting!



## LEGISLATIVE COMMITTEE REPORT- July 2017 - submitted by Thomas Fargo

The 2017 session of NH General Court (State Legislature) has ended, but the fate of several bills of potential interest to NH geologists is still somewhat in doubt. The Legislative Committee tracked nineteen bills that were tabulated in the spring 2017 GSNH Newsletter. Here's the scorecard:

- Nine bills were voted by full House or full Senate as Inexpedient to Legislate or ITL. (That is the NH Legislature's semi-polite way of saying they killed the bill.)
- Two bills have been signed into law by Governor Sununu; these are:
  - SB-118 - An ACT defining pervious surfaces in the shoreland water quality protection act.
  - HB-431 - An ACT establishing a commission to study long term goals and requirements for drinking water in the seacoast area.
  - A third bill, SB-57 - An ACT making appropriations to the department of environmental services for the purposes of funding eligible drinking water and wastewater projects under the state aid grant program, has passed both chambers and currently awaits the Governor's signature, or veto.
- The remaining seven bills that GSNH was tracking were either retained by or re-referred to a committee, or tabled. This means that most of these bills are dead. Of particular note is HB-463 which was related to drinking-water impacted by perfluoro chemicals, PFOA and PFOS. The prime sponsor of HB-463 was Representative Mindi Messmer, NH Professional Geologist from Rye. This bill was approved by full House on March 23, 2017; and approved by full Senate with amendment on May 31, 2017. The House didn't concur with Senate amendment and a Committee of Conference was convened to resolve the differences. This Committee was unable to agree on compromise final bill on June 14, 2017, in essence killing the bill. It is unclear whether the issues of concern in HB-463 might be addressed during next year's Legislative session.

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## AMERICAN GEOPHYSICAL UNION FALL MEETING

### Biogeochemical and Microbial Dynamics of Shale Formations and Hydraulic Fracturing Fluids

New Orleans, Louisiana December 11-15, 2017

Abstract Deadline: **August 2, 2017**

Unconventional production using hydraulic fracturing has transformed the oil and gas industry, becoming a critical part of our energy portfolio. Although this revolution is advancing worldwide, little is understood about the biogeochemical interactions and alterations taking place among reservoir rocks and fracture networks, formation waters, frac fluids, and the microbial communities within each of these systems. Lack of such knowledge may potentiate inefficiencies in extraction, produced water treatment, and biocide application. We invite fundamental and applied research from field, experiment, and theory regarding biogeochemical, hydrologic, and geomechanical processes. Areas of interest include:

- Organic-inorganic-microbial interactions among reservoir rocks, formation waters, and frac fluids;
- Microbiology and biogeochemistry of shale formations and deep subsurface waters;
- Mineral transformations and microbial metabolism of geological material;
- Biogenic gas production;
- Geochemistry and microbiology of frac fluids and produced waters;
- Fracture generation and propagation;
- Coupling between engineered micro-fracture networks and induced geochemical processes;
- Leakage and environmental impacts.

Submit your abstracts to AGU online at <http://fallmeeting.agu.org/2017/abstract-submissions/>. General information about the conference can be found at <http://fallmeeting.agu.org/2017/>. Other inquiries should be directed to the symposium organizers

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# 2017 NEIGC - FRIDAY SEPTEMBER 29 THROUGH SUNDAY OCTOBER 1 IN MAINE

Hosted this year by Bates College Geology Department, Lewiston Maine. The conference location will be centered around Bethel Maine. The "footprint" of NEIGC 2017 field trips will be the foothills and mountains of western Maine and the adjacent White Mountains of New Hampshire. Think of an area including Bethel, Rumford, Fryeburg, Conway, Lancaster, and Berlin. Friday night reception will be held at the new Maine Mineral Museum and the Saturday night banquet at Gould Academy's Ordway Hall. Preliminary list of field trips at [http://w3.salemstate.edu/~lhanson/NEIGC/2017/June%2025\\_TripList.pdf](http://w3.salemstate.edu/~lhanson/NEIGC/2017/June%2025_TripList.pdf) (updated June 26). Find the trip description document below at

[HTTP://W3.SALEMSTATE.EDU/~LHANSON/NEIGC/2017/NEIGC%202017 TEASER.PNG](http://w3.salemstate.edu/~lhanson/NEIGC/2017/NEIGC%202017_TEASER.PNG)



Formal trip descriptions and NEIGC registration materials coming in late July  
Plan now for some great geology trips in Maine and New Hampshire  
Visit the [NEIGC web site](http://www.neigc.org) for updates. Questions? [deusden@bates.edu](mailto:deusden@bates.edu)

New England Intercollegiate Geological Conference

**Bates**

PRELIMINARY ANNOUNCEMENT

109th Annual Meeting

Fri Sept. 29 to Sun Oct. 1, 2017 Bethel, Maine

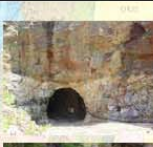
Host: Bates College Department of Geology



## FRIDAY TRIPS

**A1: Lithium-boron-beryllium gem pegmatites, Oxford Co. Maine: Hovey and Mount Mica pegmatites.**  
William B. Simmons, Alexander U. Falster, Myles Felch, Karen L. Webber and Dwight Bradley

This fieldtrip will visit two world renowned gem-producing pegmatites in the Oxford County pegmatite field of western Maine: Hovey and Mount Mica pegmatites. This is intended to be primarily an instructional fieldtrip, lead by pegmatite experts from the MMGM M2 research group. This is an opportunity to learn about the latest research and advances in the field of pegmatology in Maine. Enrollment will be limited to 25 participants.



**A2: Smalls Falls Revisited: a Journey through a Silurian sedimentary basin**  
Mark Van Baken, Doug Reusch, and John Slack

The enigmatic Smalls Falls Formation consists of quartzites and sulfidic schists laid down in a narrowing Silurian sedimentary basin during the assembly of North America. Originally deposited as black shales, the now-metamorphosed sulfidic schists record not only original sedimentary structures but the response of such rocks to varying degrees of metamorphism. This field trip will visit key outcrops that define the widely accepted stratigraphic paradigm and discuss Silurian tectonics and the geochemistry of black shales.



**A3: Hydrogeology of the former Chlor-Alkali Facility Superfund Site, in Berlin and bed sediment mercury contamination in the Androscoogin River, NH**  
James Desjain, Darryl Luce, and Andrew Hoffman

The field trip will focus on environmental concerns of a Superfund site along the Androscoogin River in New Hampshire. A description of the site background, geology and groundwater will be provided at the site. The site, outcrops with representative geology, and river reaches with varying hydrologic and hydrologic settings, will be visited and discussed in the context of the water and sediment chemistry.



**A4: Possible Post-Laurentide Alpine Glaciation in the Great Gulf Cirque, Presidential Range, Pinkham Notch, NH**  
Brian Fowler, Ian Dullin

The absence of moraines within or below Presidential Range cirque suggests only alpine glaciation pre-dating the Laurentide Ice Sheet, while the freshness of their morphology suggests activity that post-dates it. New mapping in the Great Gulf has identified possible moraines that may help this dilemma and that will be visited by this 3-mile roundtrip hike to the mouth of the cirque, just to the north of the Mt. Washington Auto Road Base in Pinkham Notch, NH.



**A5: Streams Under Pressure: Glaciers, Gorges, and Caves in Grafton Notch**  
Alice Dougherty

Grafton Notch State Park welcomes north-bound Appalachian Trail through hikers to Maine with the hardest mile of the AT (Mahosoc Notch) and rewards them with spectacular views. We will drive north of Bethel on the Grafton Notch Scenic Byway (Route 26), where impressive mountains (including Old Speck, the fifth tallest in Maine) and a U-shaped valley dominate the view. We will visit Screw Auger Falls (pictured), Moose Cave, Mother Walker Falls, and offer an optional hike up to Table Rock lookout for an elevated view of the valley.



**A6: Stratigraphic and Structural Traverse of Mount Moriah and the Wild River Wilderness Area**  
Tim Allen

This trip will be an extended hike from the Androscoogin River over Mount Moriah to the Wild River, crossing the center of a large area of migmatized metasedimentary rocks of the Central Maine Terrane. The geologic problems to be examined include the stratigraphic assignments of these highly metamorphosed rocks; the structural interpretation within the migmatite zone, which necessarily depends on the stratigraphy; and speculation as to the causes and mechanisms for producing large localized migmatite zones and metamorphic "hot spots".



## SATURDAY TRIPS

**B1: Bedrock geology of the Bald Mountain-Saddleback Range, Maine: An arduous hike with great outcrops**  
Douglas N. Reusch

Bald Mountain and adjacent Saddleback Mountain host the best exposures of bedrock in the contentious Rumford outlier of Sebago Brook Group in west-central Maine. This trip will consist of a long, all-day traverse from the Bald trail head to Saddleback. The outcrops are comparable to ones in the Presidential Range, Mt Katahdin, and Mt Monadnock along strike in NH. Several marker beds are repeated on early, cryptic thrusts, and sedimentary features are well-preserved at a high grade of metamorphism.



**B2: Glacial deposits and late-glacial to postglacial alluvial fans in the northwestern White Mountains, New Hampshire**  
Woody Thompson

This trip will examine the geology and LIDAR expression of glacial and postglacial deposits in the Twin Mountain - Jefferson Grandis area, surficial quadrangle mapping for the New Hampshire Geological Survey, and newly available LIDAR imagery, reveal many small moraine deposits that help define and fill gaps in the White Mountain Moraine System deposited during the Older Dryas cooling event. Examples of moraines, other glacial deposits and extensive alluvial fans will be seen.



**B3: Paleo-dunes and Other Post-Glacial Oddities in the woods and fields of New Sharon and Chesterville, ME**  
Patricia Millette and students, Mt Blue High School

Don't miss this opportunity to visit the beach! The paleo-beach that is. These sand dunes, mixed in with other glacial oddities, show evidence of post glacial marine incursion into the Sandy River Valley during the period of Laurentide glacial melting, eustatic sea-level rise, and subsequent fall. Easy access, geo-education, friendly landowners, and good aquifer potential make these features an excellent trip option.



**B4: Bedrock Geology of Mt. Washington, Presidential Range**  
Dyckstra Eusden

Great rocks await you in the alpine zone of Mt. Washington. We'll drive in cars to the top of Mt. Washington, then work our way down the mountain during the day taking short walks to mostly outcrops of the Devonian Littleton Formation and some of the Silurian Madrid, Smalls Falls and Rangeley Formations. You'll see graded bedding, multiple generations of deformation fabrics, and coarse pseudomorphs of andalusite, all a product of the Acadian and Neacadian orogenies.



**B5: Geology of the Lower Ellis River Valley and Rumford Whitecap Mountain, Andover and Rumford, Maine**  
Lindsay Spigal, Amber Whittaker, and Ryan Gordon

This trip will provide an overview of the geology in the East Andover USGS 7.5 minute quadrangle, with something for a variety of interests. Morning stops will focus on glacial geology and hydrogeology, with stops at the Ellis River esker, the Red Hill channels and alluvial fan, Split Brook valley, local sand/gravel pits, and more! The afternoon will feature a hike up beautiful Rumford Whitecap Mountain, with discussion of bedrock, mining, and glacial geology features.



**B6: Devonian granite melt transfer in western Maine: Relations between deformation, metamorphism, melting and pluton emplacement at the migmatite front.**  
Gary Solak, Paul Tomascak, Mike Brown

This trip is focused on structural geology and petrogenesis of the migmatites and granites in the area between Rangeley and Rumford, Maine, at the NE migmatite front of the northern Appalachian migmatite-granite belt. We will examine the mineral fabrics, shapes and sizes of granite bodies (from leucosomes to plutons), and the relation of these to the regional structure. We begin with sub-solidus metasedimentary migmatite protoliths found north of the migmatite front, and then traverse south across the migmatite front.



## SUNDAY TRIPS

**C1: Testing the cosmogenic nuclide dplstick model for deglaciation of Mount Washington**  
Thom Davis, Jeremy Shakun, Paul Bierman, Allie Jo Koester, Lee Corbett

This field trip will include a drive up Mt. Washington's Auto Road for examination of sites for cosmogenic nuclide exposure dating to construct glacial dipsticks for the deglaciation history of northeastern United States. Those interested are invited to hike down the mountain via the Nelson Cray Trail to visit additional sampling sites. There also will be an opportunity for a guided tour of Mount Washington Observatory on the summit.



**C2: Field relations, petrography and provenance of mafic dikes, western Maine**  
David Gibson, Donald Ostroff

This field trip will examine the mafic dike swarm that outcrops throughout western Maine. Hosted by the ~380myr Songa granodiorite, the zoned Sebago granite and its associated migmatite zone and the pegmatite intrusions of the area, these dikes vary in size, mineralogy and geochemistry. They most likely represent a variety of sources although many do have an affinity with other mafic intrusions that were temporally associated with the pre-opening of the North Atlantic.



**C3: Traverse from the Migmatized Central Maine Belt to the Bronson Hill Anticlinorium**  
Dyckstra Eusden, S. Baker, J. Carpi, E. Divan, I. Hillenbrand, A. Wheatcroft

This trip will visit outcrops along a transect starting in the migmatized Central Maine Belt and ending in the Bronson Hill. We start in West Bethel, ME, with the migmatized Silurian Rangeley Formation and intrusions, then proceed west to Randolph, NH, and the Ordovician Ammonoosuc Volcanics and Oliverian Jefferson Dome. The trip ends in Lancaster, NH with the Cambrian Albee Formation and Ordovician Lost Nation Pluton.



**C4: The New Hampshire Spherulitic Rhyolites: Rocks of Importance to Prehistoric Native Americans**  
Sarah Baker, Nathan Hamilton, Stephen Pollock, and Richard Boisvert

Rhyolites found in outcrop as dikes and secondarily as loose blocks have been used by prehistoric Native Americans from the Paleolithic through Archaic into Woodland times. The trip will visit dikes in Berlin and Randolph, NH and will proceed to the Archaic period Chamberlain site in Andover, ME. Participants will have the opportunity to explore the "Jasper cave" on Mount Jasper and examine the archaeological site excavation in Andover.



**C5: Return to the Sandy River: A decade of change and the impact of recent erosion management efforts**  
Julia Daly and Tom Eastler

This trip will visit dynamic gravel bars on the Sandy River between Phillips and Farmington Falls, Maine and examine recent efforts to mitigate long-term cutbank erosion. Since 2012, erosion concerns have been addressed by re-introduction of sand and gravel removal, and at one location the construction of a novel rockfall bank stabilization project. This trip will be a great opportunity to look at the impact of these strategies and to foster discussions about human interactions with a rapidly changing landscape.



**C6: Migmatites in Pinkham Notch, New Hampshire**  
Tim Allen

We will examine metasedimentary rocks of the Central Maine terrane across a "migmatite front" and on into an in-situ anatectic granite (can you say "granitization"), and discuss petrologic, geochemical, and isotopic evidence for the mode of migmatization, as well as looking at the structural and stratigraphic context. Are large localized migmatite zones (such as in Pinkham Notch and the Carter-Moriah/Wild River area) the conduits through which magma passed as it migrated from sources deeper in the crust to be emplaced as plutons at higher crustal levels?



**FRIDAY NIGHT RECEPTION AND TOUR OF THE MAINE MINERAL & GEM MUSEUM, BETHEL, MAINE.** Learn about the history of pegmatite mining in Maine, see world-class Maine minerals, and discover the otherworldly Stiller Collection of Meteorites. Led by the MMGM staff.

**BANQUET AT GOULD ACADEMY ORDWAY DINING HALL, BETHEL, MAINE**

## THE GSA REPORTS:

Because of climate change, Louisiana's coastline is shrinking at a higher rate than previously thought. It is now well within what the organization considers to be the "danger zone."

<http://www.geosociety.org/gsatoday/groundwork/G337GW/GSATG337GW.pdf> and

<https://www.sciencedaily.com/releases/2017/06/170615100624.htm>



## KENTUCKY COAL MUSEUM SWITCHING TO SOLAR POWER

By Alexandra Larkin, CNN, April 6, 2017

<http://www.cnn.com/2017/04/06/us/coal-museum-goes-solar-trnd/>

You wouldn't expect a museum dedicated to the coal industry to run on anything other than coal -- but a mining museum in Kentucky is soon to be solar powered. [The Kentucky Coal Mining Museum](#) in Benham, owned by Southeast Kentucky Community and Technical College, is switching to solar power to save money. The museum, which memorializes Kentucky's history in coal mining, is modernizing with a new form of cheaper energy.



Solar panels in Ungersheim, eastern France

Communications director Brandon Robinson said the project "will help save at least eight to ten thousand dollars off the energy costs on this building alone." Robinson also said that the project was funded through an outside foundation.

The project includes 20 solar panels installed by [Bluegrass Solar](#). The owner of Bluegrass, Tre Sexton, believes the system will pay for itself. "I think everybody knows when we're talking about attractions like this -- these high-volume, low-traffic municipal attractions -- something has got to give to keep their expenses down." Sexton told WYMT that an average house could be run by 20 panels that would cost around \$17,000 or \$20,000 -- but the system would pay itself off within five to seven years. "It is a little ironic," Robinson said to WYMT, "But you know, coal and solar and all the different energy sources work hand-in-hand. And, of course, coal is still king around here."

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## THE NH GEOLOGICAL SURVEY GROUND WATER LEVEL NETWORK SUMMARY

Submitted by Lee Wilder of the NHGS

The NHGS is now posting its monthly groundwater levels from its network of NH Observation Wells online at: <http://www.des.nh.gov/organization/commissioner/pip/publications/geologic/groundwater-levels.htm>. The data for all of the wells in the NH Groundwater Level Network are shared with and posted on the USGS website at: <http://groundwaterwatch.usgs.gov/statemap.asp?sc=33&sa=NH>. A map of both the New Hampshire and Vermont Groundwater Level Network is at <https://groundwaterwatch.usgs.gov/netmapT2L1.asp?ncd=NHV>.



First cut of hay at the Campton Observation Well. Photo submitted by Lee Wilder.

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## EARTH SCIENCE WEEK 2017 (OCTOBER 8-14)

Submitted by Lee Wilder, NHGS Public Outreach Coordinator

This year's Earth Science Week will be held from October 8-14, 2017 and will celebrate the theme "Earth and Human Activity." This year's event, the 20th annual Earth Science Week celebration, promotes awareness of what geoscience tells us about human interaction with the planet's natural systems and processes. For more information see: <http://www.earthsciweek.org/about-esw>

Earth Science Week 2017 learning resources and activities are engaging young people and others in exploring the relationship between human activity and the geosphere (earth), hydrosphere (water), atmosphere (air), and biosphere (life).

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## IF YOU'VE EVER WONDERED ABOUT THE POWER OF GLACIERS, PAY A VISIT TO THE MADISON BOULDER

Julia Shipley • April 17, 2017

May 2017 issue of Yankee - <https://newengland.com/yankee-magazine/today/a-very-impressive-rock/>

Nobody stumbles upon it. Or over it, for that matter, even though it's been hunkered in the New Hampshire woods for the past 15,000 years.

My husband and I first learned about the monster rock known as the Madison Boulder, "the largest glacial erratic boulder in North America," in a book about stone walls. Just from the description we already knew that no farmer had ever attempted to pry this specimen free and lug it to his boundary wall. The mention of the boulder was obviously for show, an extreme, something to elicit our sympathy and awe: *Look at what these yeomen had to contend with!*

But "largest glacial erratic boulder in North America" also elicited our imagination. *Oh c'mon, how big?* we wondered.

In early May, we left northern Vermont and drove east, across the Connecticut River into New Hampshire, surging up and over the White Mountains, cruising through North Conway's fairway of motels and outlet shops, then poking along increasingly modest roads to reach the town of Madison. We passed a gravel pit, some small bungalows, and a recycling center. Could there really be a colossal rock near here? Finally, we rounded a corner and saw the sign: *Geological Park*.



Friends of the Madison Boulder president Brian Fowler at the ancient slab, which not only towers over him but also extends another 10 to 12 feet\* underground. Photo by Michael Seamans.

After traveling two and a half hours, a distance of 120 miles in our Chevy, we had arrived in the vicinity of a boulder that had also made a voyage—one that took about 5,000 years, over the distance of a few miles, while trapped in a glacier.

Its chilly vehicle gave the boulder status as an "erratic," which is the term used to describe any rock that thanks to glacial transport is constitutionally different from the rocks surrounding it. In designating the boulder a National Natural Landmark in 1970, the Department of the Interior heralded its transit as

\*Many readers of the article have picked up on a technical "glitch." Did you? In the photo above, the author got the depth of the Boulder below the surface wrong after Brian Fowler told the author 1-3 feet, but it got in the article as 10 to 12 feet. Obviously, there was confusion on the day of the field visit, which Brian didn't get to rectify not being afforded a review of the article before its publication. —ed.

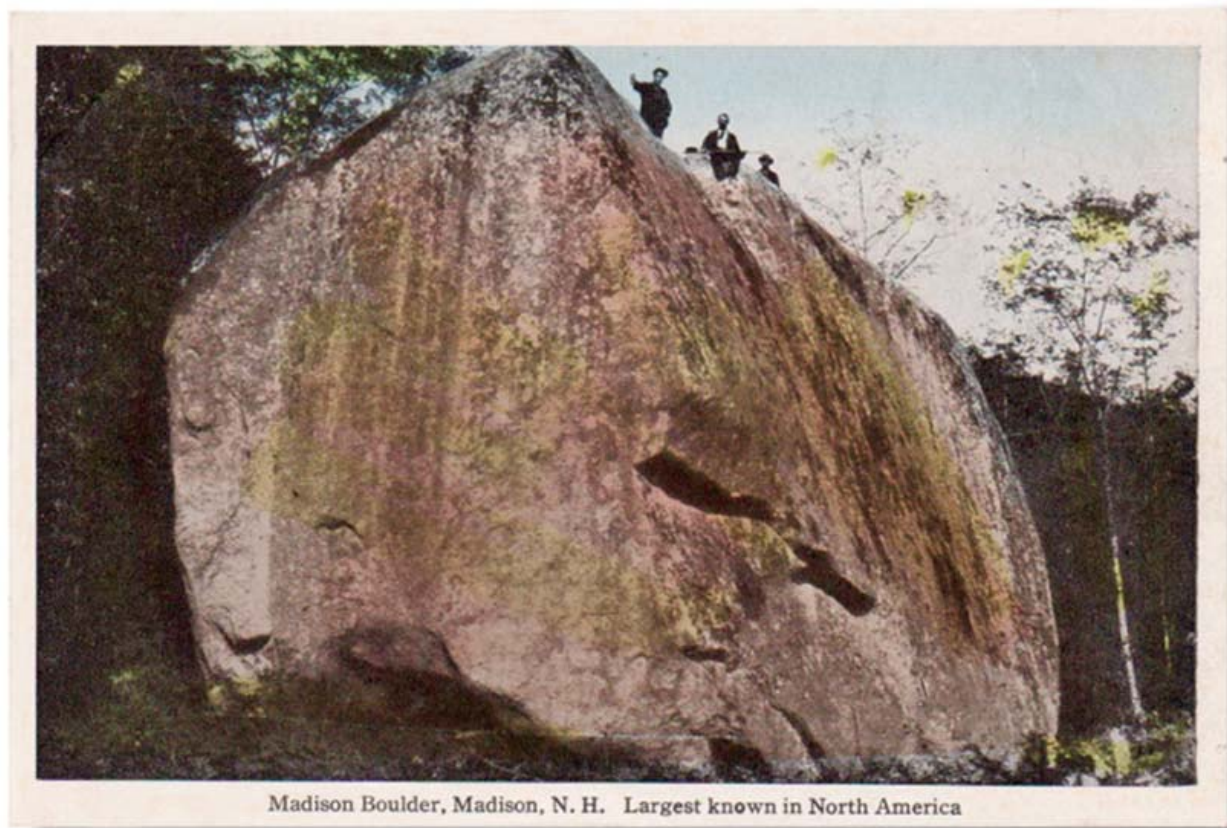


illustrating “the power of an ice sheet to pluck out very large rocks of fractured bedrock and move them substantial distances.”

A sign in the empty lot promised an easy 15-minute walk to the boulder. At scarcely the five-minute mark, I saw what looked like a slate barn roof in the distance and wondered aloud if it was maybe a three-story rangers’ quarters. “No, that’s it,” my husband said, just as we reached a clearing. The pamphlet we’d picked up in the parking lot described a “very impressive rock.” Oh yes.

The boulder’s dimensions—83 feet long, 23 feet high, and 37 feet wide—convey its enormity, but how to account for its ... sentience? The loafing rock emanates a presence, a heavy serenity. It seems like a petrified leviathan, with lichens freckling its flank like barnacles. At an estimated 5,900 tons, this behemoth of Conway granite in fact equals 35 blue whales.

I studied the boulder’s base, finding vole holes and violets and white-petaled stars-of-Bethlehem. In the distance, an ovenbird trilled; close by, a mosquito grazed my neck. All this delicate life, living with and beside the hulking rock.



**Support and funding from the National Park Foundation has helped turn the boulder from a onetime thrill-seeker’s attraction into a protected landmark.**

Meanwhile, my husband prowled the circumference. When I found him on the far side, he was peering at some spray-paint iconography scrawled onto the boulder’s surface. Then his eyes traveled upward, and he fixed his gaze on the boulder’s crown. “Wouldn’t it be cool to see what’s up there?”

A picture in *A Brief History of Madison*, published in 1925, features two gentlemen who did exactly that. They are standing on the boulder’s pate, grinning. According to Brian Fowler, president of the Friends of the Madison Boulder, some of last century’s visitors brought chisels and mallets to inscribe their initials on the top of the rock, which they reached via a staircase erected along the back side. However, by the 1950s the staircase had largely deteriorated, and nowadays ambitious visitors lean tree limbs and trunks against the boulder to try to shimmy up. The advent of spray paint, it seems, has made leaving a signature far easier, something Fowler laments.

“There’s a segment of our society that needs to express itself,” he said. It’s a primal segment, I think, one that harks back to our prehistoric ancestors’ making unmistakable marks on rock for us to discover. Nevertheless, it’s also directly at odds with the Friends of the Madison Boulder, which has

raised thousands of dollars to sandblast said expressions off the rock's front side, restoring its appearance to perhaps that of 20,000 years ago, when the Wisconsin glaciation was in full swing.

We circled around to the boulder's front. My husband stepped back, squinting at the rock, there in a clearing surrounded by the infant leaves of maple and beech, as if trying to imagine how it had foundered here. And so I reprised the history lesson that Fowler, who is also a trained geologist, had offered.

In 1878, Charles Hitchcock led the team that created the first geological map of New Hampshire, which included the Madison Boulder. A geology professor at Dartmouth College, Hitchcock also was the first to propose that the boulder had been delivered by glacier to the valley floor. (The common thinking was that epic floods had rearranged big rocks across the state's terrain.)

Since Hitchcock's time, surficial geologists have further described how the boulder arrived: During the last ice age, an advancing glacier knocked a chip off the old block (of exposed granite) and sleighed it "downstream." This chip likely came from the Whitten Ledge, a formation standing a mile and a half to the northwest; in his years of exploring the area, Fowler has noticed that the mineral structure of the boulder "matches up perfectly" with that of part of the ledge.

For a few thousand years, this dislocated granite chunk was suspended in ice. But about 15,000 years ago, the glacier began to melt and gradually release its debris, and—as Fowler put it—"down she went."

And down she remained—while across the globe, our Stone Age forebears were on the verge of domesticating sheep, soon to be followed by cows, and grain farming, which was about to grow by leaps and bounds due to a new tool called the plow. Yet innovations like chicken farming, horseback riding, and writing were still a few millennia down the road.

And there she sat—while humanity inched toward omelets, cavalries, and magazine publishing.

And here she still sits—this humongous heirloom from prehistory, persisting.

*The Madison Boulder Natural Area is located at the end of Boulder Road, off Rte. 113, in Madison, NH, and is open to visitors year-round.*

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### **SOME ORE DEPOSITS IN MAINE AND THE MILAN MINE, NEW HAMPSHIRE BY WILLIAM H. EMMONS 1910**

Although this 65 page booklet is chiefly about Maine ore deposits, there is a section on the workings in Milan, NH, which were included because of the mine's proximity and resemblance to the deposits in Maine. When this report says the Milan deposit was discovered in the seventies, one must remember that the booklet was published in 1910.

The geology and processing of the Milan ore is described at a level of detail that is common in old geology texts that makes them a joy to read because of the clear, straightforward language.

There are descriptions of over two dozen Maine mines as well as hand-drawn cross sections and maps, and a color version of the 1909 printing of the geologic map for Bluehill, Brooksville, Deer Island and Castine Maine at 1/125,000. I expect the formation age estimates have been revised in the intervening century, but it's likely that their rock descriptions are accurate.

You can read the whole bulletin at <https://pubs.usgs.gov/bul/0432/report.pdf>.

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SOME ORE DEPOSITS IN MAINE  
AND  
THE MILAN MINE, NEW HAMPSHIRE

BY  
WILLIAM H. EMMONS



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1910



## **HIDDEN HANCOCK ANTENNA HELPING ASTRONOMERS EXPLORE UNIVERSE**

By ABBY KESSLER Monadnock Ledger-Transcript Wednesday, May 17, 2017

Tucked along a remote section of Windy Row in Hancock, a 260-ton, 82-foot diameter antenna looms behind a patch of trees just out of sight from the public road. A dirt road leads to the unit's base, and the massive, white orb becomes visible soon after traveling down the path. At its base, the antenna hums, and occasionally moves its disk.

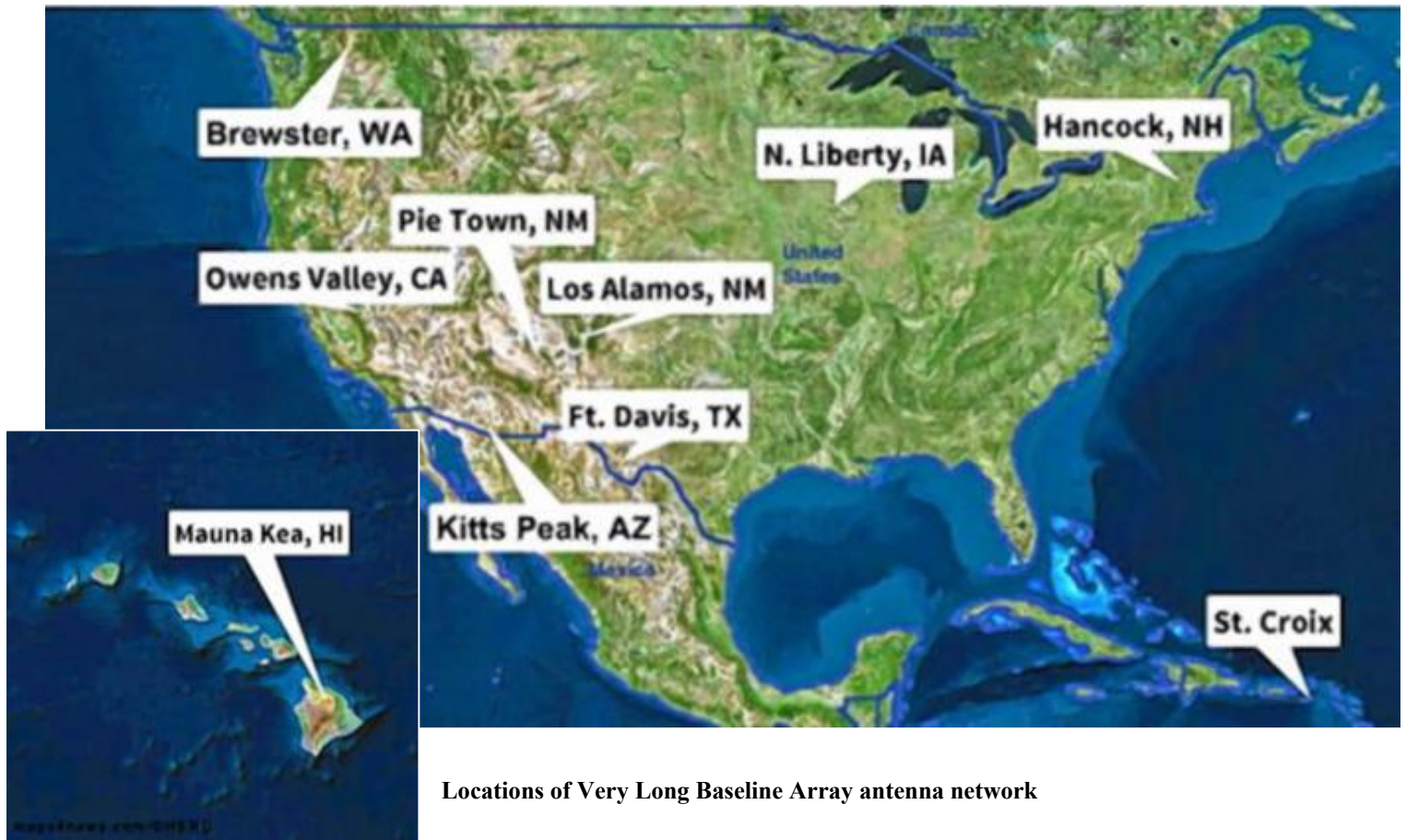
A technician in a control building, which is located adjacent to the antenna, opens a pair of barred double doors in the building on Tuesday afternoon. He says he works there full time operating and maintaining the complex array of equipment, but doesn't elaborate much further about his day-to-day duties. He says there used to be tours open to the public, but that those don't happen very often anymore. The technician directs any further questions to a person stationed at the array's control center in New Mexico, and with that, closes the door and slips back into the dark room.



**One of 10 antennae that makes up the Very Long Baseline Array, or VLBA, is located in Hancock. Together the technology has been used to find galaxies 450 million light years away. Staff photo by Ben Conant**

Meade Cadot, who was a Hancock planning board member when the antenna was built, said he vaguely recalls when the unit came in front of the board in 1986. He said it was a little difficult to come up with appropriate zoning for the antenna, but otherwise, no residents complained and the project continued without a hitch.

And since its establishment in 1993, the unit has been there, and gone largely unnoticed. "No one says anything about it. I don't think anyone even notices it anymore," said Linda Coughlan, the town's administrative assistant.



Locations of Very Long Baseline Array antenna network

The antenna in Hancock is on land between Peterborough and Hancock near hiking trails close to Nature's Classroom at the Sargent Center Environmental Education, which is owned by Boston University. The parties recently signed on to another 10-year lease for use of the land.

**Peering into far away galaxies** - Although it doesn't receive much attention in the area, the antenna is one of 10 radio telescopes in the Very Long Baseline Array, or VLBA, that spans more than 5,000 miles from Hawaii to the Virgin Islands.

The synchronized array functions as a single radio telescope system nearly the size of the Earth. The project is overseen by the federally funded National Radio Astronomy Observatory, and is the largest dedicated, full-time astronomical unit in the world. In 2011, researchers used the VLBA to find a galaxy 450 million light years from Earth called NGC 6264.

Objects studied with the VLBA include stars, both young and old; giant clouds of gas and dust where new stars are being born; galaxies and the powerful phenomena associated with supermassive black holes at their cores; supernova explosions; and many more," said Dave Finley, a public information officer with the NRAO who is based at the array's headquarters in Socorro, New Mexico.

The array's sharp radio "vision" (the array has a resolution 400 times better than the Hubble telescope, according to the National Aeronautics and Space Administration) has allowed scientists to make the most precise astronomical distance measurements ever, which have improved the map of our galaxy, the Milky Way.

Finley said the same precision also allows it to serve as a valuable tool for measuring tectonic plates on the Earth that have helped scientists better understand earthquakes and volcanoes.

**How it works** - The telescope points to an object in the universe that is emitting radio waves and because of the way the dish is shaped, those waves bounce off of a subreflector, and then back down.

In a circle around the center of the dish there are several feedhorns, each which carry the waves into a receiver. Each receiver pair covers a different range of radio frequencies.

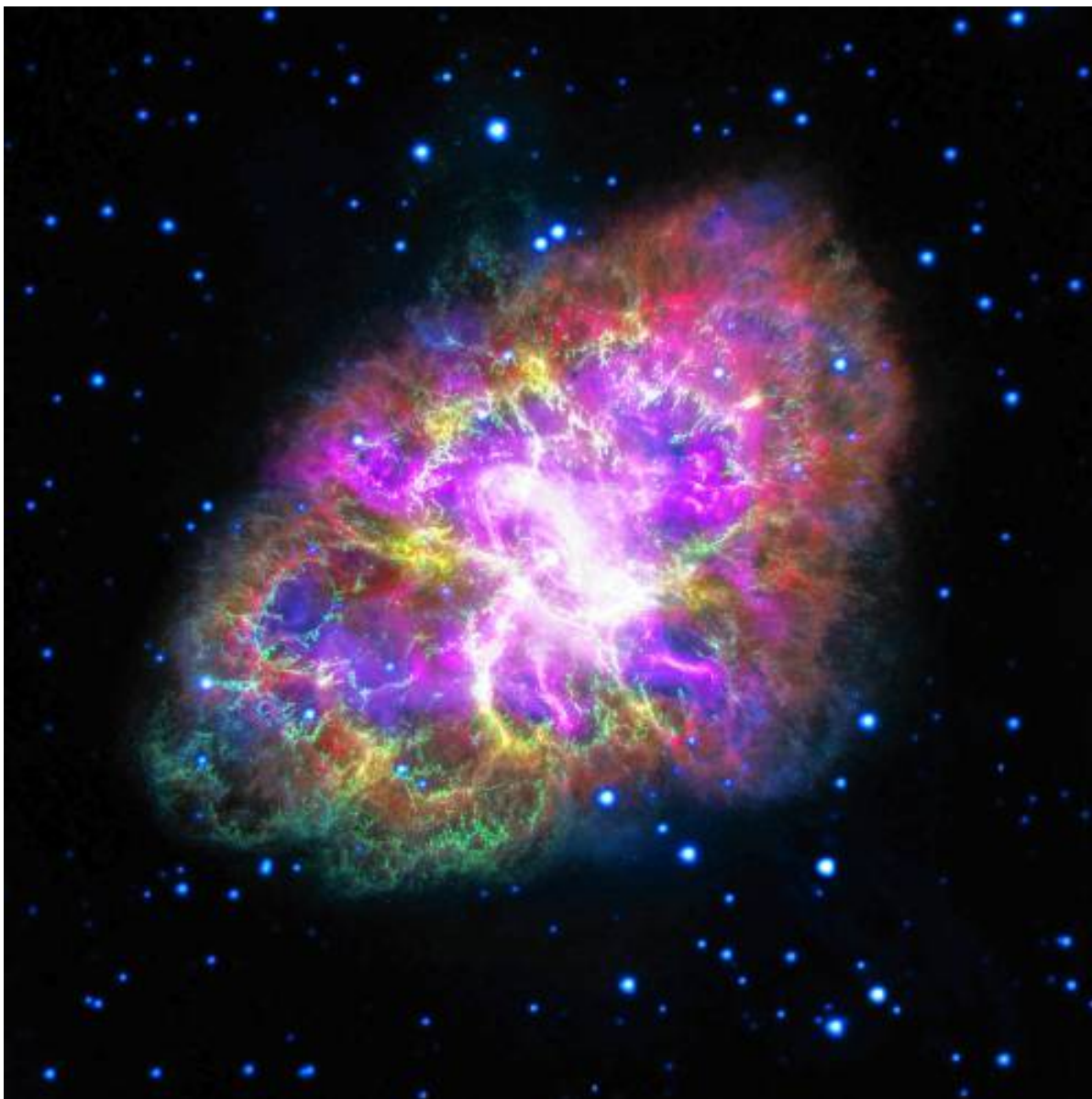


Finley said the information is stored on high-density packs of disk drives, which are shipped to Socorro, New Mexico, and simultaneously read on a special purpose computing facility that produces raw material that astronomers can use to make high-resolution images.

On the NRAO website, colorful images of supermassive black holes, the death and birth of stars, and galaxies are on display.

“We have scientists from all over the world who are using this data,” Finley said.

Finley said astronomers have discovered thousands of planets orbiting other stars, some of which are in what is referred to as the “habitable zone” where their surface temperatures should be favorable for liquid water. Finley said in giant clouds of gas and dust from which new stars and planets are formed, astronomers have discovered numerous complex molecules, including sugars and alcohols that are precursors to life. “Based on all this evidence, it seems that the likelihood of extraterrestrial life is very good,” Finley said. “We’re still awaiting evidence to prove it.”



**On May 10, the National Radio Astronomy Observatory released this photo of the Crab Nebula, a supernova explosion. The image is a combination of data from five different telescopes. The red in the image is from the Very Long Baseline Array. CREDIT: G. Dubner et al.; NRAO/AUI/NSF; A. Loll et al.; T. Temim et al.; F. Seward et al.; Chandra/CXC; Spitzer/JPL-Caltech; XMM-Newton/ESA; and Hubble/STScI**

<http://www.ledgertranscript.com/Antenna-used-to-find-new-galaxies-450-million-light-years-away-10088404>



MEMBERSHIP & RENEWAL APPLICATION

Geological Society of New Hampshire

PO Box 401, Concord, NH 03302

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

Education: Degrees received or in progress:

Table with 4 columns: Year, Degree, Major, College or University. Includes three rows for data entry.

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

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Membership Category:

- Regular Member (Annual Dues \$20.00)
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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 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: \_\_\_\_\_