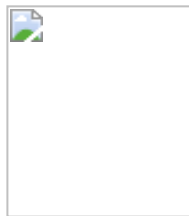


The Granite State Geologist



Newsletter of the New Hampshire Geological Society

Suite 133 * 26 South Main Street * Concord, NH 03301
Number 4 * April 1993

President's Message

Bob Luhrs

Since my first involvement with the NHGS, I have been impressed with the diversity of the backgrounds and interests of the membership. Our regular meetings have been well attended by about 50 to 80 members and non-members, and our paid membership has steadily grown to more than 140. To maintain or expand this membership, it is increasingly important that the Board of Directors know your wishes.

As with most groups, all that has been accomplished so far is because a few dedicated individuals have worked hard to make it happen. The NHGS is now in need of a few new faces to carry on this work. My experience in working with the Society has been very rewarding. I've had opportunity to meet many of the membership, develop several professional friendships, and become informed of what's going on in the field. If you are interested in becoming more involved, or in running for office during our October election of officers, please contact any member of the board.

It should be noted that during the April 7 board meeting one major change has been initiated. The topics presented at our meetings have been chosen to appeal to as many members and non-members as possible; however, our options for future talks are becoming limited. To encourage presentations, any person who gives the featured presentation at any future meeting will receive a free meal for that night, and a complimentary one-year membership (worth \$20.00). If you have a possible topic, or know someone who does, please let us know.

Spring Meeting Delayed

The Spring Meeting was postponed from the originally scheduled date of April 8 to the new date of April 29 to avoid a conflict with the Geological Society of Maine and in attempt to encourage College and University students to present papers. We apologize for any inconvenience, and hope you can come on the 29th.

Student Abstract

The abstract below was submitted in response to a call for student papers to be presented at the NHGS Spring Meeting. The Society would like to encourage college and university students to give presentations at any of our regular quarterly dinner meetings. Contact Bob Luhrs at (603) 880-6962 or Tim Allen at (603) 358-2571.

Strontium Isotopes in Streamwater: a potential tracer of climatic effects on rock weathering and the seawater Sr curve

Kevin Brown, Dartmouth College

Precise measurements of strontium isotope ratios in streamwater from the Sierra Nevadas provide new information on the effects of glaciation on granite weathering. By comparing Sr87/Sr86 values from streamwater in drainages glaciated during the Tioga glaciation (~10,000 years ago) to values from drainages free of glaciation since the Tahoe glaciation (>100,000 years ago), in 3 rock units, an average increase of 900 parts per million (ppm) with an uncertainty of 20 ppm was measured in the recently glaciated drainages versus drainages free of glaciation since the Tahoe. This shift is attributed to a relative increase in the amount of biotite versus plagioclase weathering on freshly exposed surfaces. This change in the relative proportions of minerals weathering with time has not been previously quantified.

Fluctuations in the seawater Sr87/Sr86 value of 20 ppm on the 100,000 year timescale have been attributed to glaciation. The fluctuations were attributed to an increase in the Sr flux to the oceans due to an increase in erosion due to glaciation. However, using the change in isotopic composition of streamwater due to glaciation measured in this study, calculations estimating the change in the global riverine Sr87/Sr86 due to glacial advance can be made. This change correlates to an oceanic shift of 17 to 46 ppm. Thus, the cause of short term fluctuations in the Sr seawater curve needs further evaluation.

Earthquakes in New Hampshire?

Greg Champlin

This article is presented as a follow-up to John Ebel's presentation on Regional Seismicity at the Winter Meeting.

In New Hampshire, when we think of natural disasters our first thoughts are drawn to hurricanes, severe winter storms, ice jams, wild fires, nor'easters, and even the stray tornado. Our thoughts are then drawn to the effects of such occurrences: flooding, power outages, damaged or blocked roads, and perhaps several buildings damaged or destroyed. Seldom do we think of earthquakes, not to mention how even a moderate event could effect our lives.

The recorded history of earthquakes in New England begins in the 1500's with the Native Americans recalling events to the first European settlers. Then in 1638 the Pilgrims, just eighteen years after their arrival, experienced their first earthquake.

New Hampshire's first documented damaging earthquake occurred the night of October 29, 1727. This earthquake, with its epicenter located off the NH/Mass coast, caused damage from Boston to Portland, ME. Brick buildings were "shattered" in Haverhill, Mass; chimneys were toppled and large quantities of sand were ejected from the ground in Hampton, NH. The Rev. Nathaniel Gooking of Hampton recorded no fewer than twenty-four aftershocks from this event.

Twenty-eight years later there occurred what has come to be known as the Cape Ann Earthquake of 1755. This earthquake, with an estimated magnitude of 6.25, caused wide-spread damage along coastal New England on the night of November 18, 1755. In Boston, twelve to fifteen hundred chimneys were toppled, gable ends of brick buildings were thrown down and the streets were blocked by fallen bricks, "especially on low, loose ground made by encroachments on the harbor." Much the same types of damage were reported in New Hampshire coastal communities. In Portsmouth, crews aboard vessels anchored in the harbor were brought scurrying from belowdecks like rats, thinking that they had run aground. The crew of a vessel sailing 200 km offshore thinking they had hit a rock, hove-to and cast the lead to find there was plenty of water under the keel. In Greenland, the Week's House, a brick home built in 1710, suffered a crack in its southern wall. This house, with its crack, may still be seen today.

The nineteenth century was relatively quiet compared to the eighteenth, but that's not saying the area didn't suffer some significant tremors. In the 1800's New Hampshire citizens experienced no fewer than eighty-three felt earthquakes, the first occurring on December 20, 1800, near Newport. On November 9, 1810, the town of Exeter suffered a quake that sounded like an explosion and broke many windows in Portsmouth. In the late 1800's the area around Concord experienced two moderate earthquakes, one on November 18, 1872, and the second on December 19, 1882. On November 23, 1884, the second, stronger, of two quakes in Henniker displaced a boiler foundation and was felt over an area of 14,000 square miles.

To date there have been more than 180 earthquakes within the borders of New Hampshire during the twentieth century. A couple of reasons for the apparent increase in seismicity are the larger density of population (increasing the odds of someone feeling a small event) and the installation, around the middle of the century, of seismographs that can record minor tremors not normally felt.

The strongest earthquakes to strike New Hampshire in the twentieth century, to date, occurred December 20 and 24, 1940. Both quakes had a magnitude of 5.8, with epicenters located near the town of Tamworth at the edge of the Ossipee Mountains. These quakes were felt over an area of 500,000 square miles--Christmas trees were toppled in Albany, New York, for example. Just about all the chimneys in the epicentral region (Tamworth) suffered some damage, ranging from cosmetic cracks to total collapse, as a result of these earthquakes. Sections of several foundations fell in and at least one house rotated on its foundation. Chimneys were toppled in other areas as well, most notably in Conway, 15 miles from the epicenter, where one house was lost to fire when sparks escaped from a cracked chimney. In Concord, 50 miles from the epicenter, the State Library had damage done to several offices, and in Keene, 80 miles from the epicenter, cracks appeared in the walls of the police station.

Before leaving these earthquakes behind it's important to note an excerpt from an article in the Bulletin of the Seismological Society of America, vol. 32, no. 2, April 1942: "What the damage would have been to brick structures is a matter of conjecture, for most of the buildings in this section of New Hampshire (Tamworth) are wooden frame structures, and they seem to have survived the shakings in a truly remarkable way."

Since 1940 there have been sixteen earthquakes within the boundaries of New Hampshire that have measured 3.0 or above on the magnitude scale. Two of the most notable were a magnitude 4.7 quake on January 19, 1982, known as the "Gaza Quake," which caused minor damage, and a 4.0 quake near the town of Berlin. At this writing the last earthquake to strike New Hampshire was a 3.4 occurrence, followed by a 2.5 aftershock, located 5 miles south of Franklin on October 6, 1992.

Greg Champlin is the new New Hampshire Earthquake Program Manager, associated with the New England States Earthquake Consortium (NESEC) funded by the Federal Emergency Management Agency (FEMA). NESEC's mission is to reduce fatalities, injuries and property damage resulting from earthquakes in New England. Greg can be reached at:

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NH Office of Emergency Management
State Office Park South
107 Pleasant Street
Concord, NH 03301
(603) 271-2231

Goldthwait Symposium

The Mount Washington Observatory and its new Education Resource Center will present the second in its series of educational symposia for the public this coming summer. The day-long program, "The Ice Age in the White Mountains: A Geologic and Human History," will be presented on Friday, June 18th at the Red Jacket Mountain View Motor Inn in North Conway, New Hampshire.

This symposium is being presented in honor and memory of the late Dr. Richard P. Goldthwait, former professor emeritus at Ohio State University and Founding Director of the Institute for Polar Studies, who with his father and family, carried out much of the earliest scientific research on the late-stages of the Ice Age on the Presidential Range and the White Mountains. He was also a longtime member of the Observatory, and in 1991 donated a large portion of his personal papers and research materials to the Observatory's Education Resource Center for use in future research and for the presentation of educational programs such as this symposium.

During the Ice Age, and as recently as 20,000 years ago, the White Mountains and all of New England were buried beneath a sheet of ice as much as a mile thick. The landscape was profoundly changed by the action of this ice as it first invaded and then retreated from the area. The altered landscape now provides important clues as to the activity of the ice.

As the ice sheet withdrew, a cold and desolate tundra environment developed across the region. As the climate gradually became more temperate, hardy plants, animals, and paleo-Indians began to live the new geography created by the ice and to establish the ecological and cultural patterns that have influenced human activity in the White Mountains ever since. This Symposium will explore this period of great change in our geologic and human history in a way that will be meaningful for the lay person and professional alike.

This Symposium brings together some of the leading geological and archeological researchers in the White Mountains to present an up-to-date picture of what happened here as the ice was leaving the area and as earliest man arrived.

- 8:00-9:00 Registration, Coffee & Donuts
- 9:00-9:05 Welcome & Symposium Introduction (William Lowell Putnam, MWO)
- 9:05-9:20 Tribute to Richard Parker Goldthwait, PhD. (Guy Gosselin, MWO)
- 9:20-9:50 Status of Ice Age Knowledge in New England (Carl Kotteff, USGS)
- 9:50-10:20 Late-Wisconsinian Deglaciation, Northeastern White Mountains (Robert Gerath, Thurber Engineering, Ltd.)
- 10:20-10:30 Coffee Break
- 10:30-11:00 Recession of the Laurentide Ice Sheet in Western Maine and the Northern White Mountains (Woodrow Thompson, Maine Geological Survey)
- 11:00-11:30 Lakes at the Glacier Margin (Thomas Weddle, Maine Geological Survey)
- 11:30-12:00 Alpine Glaciation in Northern New England (P. Thompson Davis, Bentley College)
- 12:00-1:00 Lunch Break
- 1:00-1:45 The History of the Ice Age in the White Mountains of NH (Brian Fowler, MWO)
- 1:45-2:15 The Ice Age in the White Mountains: Scientists & Controversy (Woodrow Thompson)
- 2:15-2:30 Coffee Break
- 2:30-3:00 Deglaciation of Northern New England & the Arrival of Paleo-Indian Hunters (Thomas Hemmings, Keene State College) continues
- 3:00-3:30 Question and Answer Session (All Topics)
- 3:30-4:00 Symposium Summary and Concluding Remarks (William Lowell Putnam, MWO)
- 4:30 Complimentary Wine and Cheese Reception with the Scientists (Cash Bar available)

This program will be of interest to both laymen and professionals alike, and ample opportunity will be provided for questions and answers during the program. There will be an informal reception afterward so participants can meet and talk with the scientists. The Observatory is able to present this symposium to the public because of the generous initial support of North American Reserve, Inc., Thurber Engineering, Ltd., the Maine Geological Survey, the USGS, the New Hampshire Geological Survey, and the Red Jacket Mountain View Motor Inn.

Admission to the program will be a \$5.00/person minimum, tax-deductible donation to the Mount Washington Observatory. Reservations are strongly advised, as seating will be limited.

For more information contact: Mount Washington Observatory, PO Box 2310, North Conway, NH 03860 or call (603) 386-8345.

Other Upcoming Events

Maine Mineral Symposium, May 7-9, 1993, Sheraton Inn and Conference Center, Western Avenue, Augusta, Maine. Saturday's program includes: Beryl in Maine and its Relationship to the Rest of the World (Vandall King); Mineral Localities of Southeastern Quebec (Jerry Van Velthuzien); Reopening of the Songo Pond Aquamarine Locality, Albany, Maine (Jim Mann); Minerals of the Fletcher Mine, North Groton, New Hampshire (Robert Whitmore); History of Maine Granite Quarries (Bradford Crafts); Minerals in Mirolitic Cavities of the Conway Granite, White Mountains, New Hampshire (Gene Bearss). For more information, contact Robert Hinkely, Yarmouth Road, Route 115, Gray, ME 04039, (207) 657-3732.

Geophysical Methods in Ground Water Resource Evaluation--A Short Course, May 12, 1993, Sonesta Hotel, Portland, Maine. A Geological Society of Maine Short Course taught by Peter Haeni (USGS), John Williams (USGS), Craig Neil (MGS), John Lane (USGS), Scott Calkin (ABB), Rudy Rawcliffe (Northeast Geophysical Surveys) and Stephen Kelley (Haley & Aldrich). For information, contact Steve Pinette (207) 287-3901, Jim Hillier (207) 865-6138 or Fred Beck (207) 846-6751. Pre-registration is advised: Professionals- GSM member \$50; non-member \$60; Students- GSM member \$25; non-member \$35. Make checks payable to Geological Society of Maine, and send to Geophysical Short Course, c/o Maine Geological Survey, State House Station 22, Augusta, ME 04333.

Landfills--Past, Present, and Future, May 14, 1993, Schaeffer Theatre, College Street, Bates College, Lewiston, Maine. Second seminar on New England groundwater and surface water topics, of the Yankee section of the American Institute of Hydrology. Speakers include Andrews Tolman (RG Gerber), Richard Burnham (Woodward & Curran), Robert Folvolden (University of Waterloo), Denis LeBlanc (USGS), Thomas Ballistero (UNH). Registration is \$30 before April 23, 1993; \$40 thereafter (includes field trip, lunch and refreshments). Make checks payable to AIH-Yankee Section and send to Lois K. Ongley, Department of Geology, Bates College, Lewiston, ME 04240.

Regional Response to Global Climate Change: New England and Eastern Canada, May 18-21, 1993, Sonesta Hotel, Portland, Maine. The purpose of this symposium is to share the most recent information on climate change, projected impacts, and policy responses appropriate for the New England States and eastern Canadian Provinces. The symposium is directed at planners, scientists, natural resource managers and policy-makers. Sponsored by Conference of New England Governors and Eastern Canadian Premiers, University of Maine, Environment Canada, Agriculture Canada, and National Oceanic and Atmospheric Administration. The registration fee is \$50. Contact Nick Houtman, 5715 Coburn Hall, Water Resources Program, University of Maine, Orono, Maine 04469-5715, (207) 581-1491

Lessons Learned in the Remediation of Petroleum-Contaminated Sites in Maine, June 16, 1993, Augusta, Maine. Cosponsored by the Consulting Engineers of Maine and the Maine Department of Environmental Protection. For information, contact Cheryl Fontaine, Lessons Learned in Remediation Conference, Bureau of Hazardous Materials and Solid Waste Control, Maine DEP--Station 17, Augusta, ME 04333, (207) 287-2651.

Treasurer's Report

For the period January 1, 1993 - March 31, 1993

Starting Balance		1613.72
Income		
	Dues	390.00
	January Dinner Meeting	955.00
	Interest	2.65
Total		1347.65
Expenses		
	January Dinner Meeting	917.06

	Postage	11.31	
	Office Supplies	13.74	
	Bank Fees	9.94	
Total			952.05
Ending Balance			2009.32
Bank Account Balances			
	Savings Account	1758.37	
	Checking Account	250.95	
Total Balance Forward			2009.32

Note: This report contains transactions from January 1, 1993 to March 31, 1993 for the First NH Bank accounts. Records for the older accounts are incomplete at this time. I hope to have a complete accounting available for the next newsletter.

Respectfully submitted,
Dorothy Richter, Treasurer

Summer Field Trip to Mount Washington

The NHGS, in cooperation with the Mount Washington Observatory, is making plans for a Summer Picnic and Field Trip to the summit of Mount Washington, Saturday, August 7, 1993. The plans tentatively include assembling at the base of the Mount Washington Auto Road (and Cog Railway for those so inclined) in the late morning, carpooling to the summit, and sharing a picnic lunch at the top. Field trips emanating from the summit will include both bedrock and surficial geology, and summit history & scenery with a tour of the Observatory. Bring the whole family, and your binoculars! Stay tuned for complete details coming this summer. If you would like to contribute to the organizing of this trip please contact Gary Smith at (508) 664-3299 or Tim Allen at (603) 358-2571.

Membership Report

Tim Allen

At this time the New Hampshire Geological Society has 151 members, including 2 Honorary Fellows. 131 members have provided at least some information about their educational background. According to these records, these members have earned 2 Associate's degrees, 128 Bachelor's degrees, 73 Master's degrees (2 in progress), 20 PhD's (2 in progress), 11 college degrees (unspecified, and 2 in progress). Fifty three of these degrees were earned at the University of New Hampshire, 9 at Dartmouth College, 4 at Keene State College, and 1 each at Antioch NE, Nashua Vocational-Technical College, New England College and New Hampshire College. Among institutions outside New Hampshire, Harvard University leads the pack accounting for 11 degrees (+1 from Radcliffe) held by NHGS members. The earliest degree earned by a member (according to our records) was in 1931 from Dartmouth College, and the most recent (1992) was also from Dartmouth College. The most popular major among our members was, of course, Geology, but we also have among us a couple MBA's, and majors in Accounting, Biology, Botany, Chemistry, Education, Engineering, English, Geography, German, Mathematics, and Physics.

123 Members listed their title or position. With some amount of interpretation or simplification, we have among us 23 Hydrogeologists, 22 Geologists (including engineering, environmental, and structural geologists), 13 Managers, 9 Principals, 8 Hydrologists, 7 Presidents, 7 Administrators (or similar), 7 Professors (including 4 Professors Emeritus), 4 Vice Presidents, 4 Retirees, 3 Owners, 2 Teachers, 2 Technicians, 2 Technical Writers, 2 Environmentalists, 2 Students, a Geophysicist, a Research Physical Scientist, a Water-Use Specialist, and a Specialty Welder.

A New Hampshire Geological Society 1993 Membership Directory has been published and will be available to members at the Spring Meeting. The Directory will be mailed to members who do not come to the meeting.

Unfortunately, the information in the Society's membership records is rarely if ever better than that provided to us by the members themselves--thus we make no claims that the addresses, phone numbers and employers listed are current or correct. If you move or change jobs, please be sure to let us know so that you can continue to receive The Granite State Geologist, future membership directories, and notices of meetings.

NHGS News and Events

The Spring Meeting of the New Hampshire Geological Society will be held on Thursday, April 29, 1993 (Cash Bar @ 6, Dinner @ 7), at the Cat and Fiddle Restaurant, 118 Manchester Street in Concord (US 3 south off I-93, Exit 13). The featured speaker will be Brian Fowler, who will give a presentation on the Surficial Geology of the Mt. Washington Area and about the Mount Washington Observatory (this is in anticipation of the NHGS Summer Picnic and Field Trip to the summit of Mt. Washington, August 7, 1993). Also featured will be the first of what we hope to be an on-going tradition of Student Presentations (see the abstract on page 1). Dinner is \$13 for members, \$14 for non-members. For information, contact Joanne McLaughlin at (603) 224-7979.

The next meeting of the Society, following the Summer Picnic and Field Trip to Mount Washington (Saturday, August 7, 1993--Bring the whole family!), will be the 1993 Annual Meeting, October 14. This meeting will again feature the election of officers. Please consider serving your society on the Board of Directors or volunteering in some other capacity.

Other Future Meetings of the Society are scheduled for January 13, April 14, June 9 (?), and October 13, 1994. Do you have a talk that you would like to present to the Society? Please volunteer! The 1994 summer picnic and field trip is scheduled for August 6. Do you have a location in mind that would be the perfect spot? Please make a suggestion!

The Geological Society of America's 1993 Annual Meeting will be held October 25-28 in Boston. Contact GSA at 1-800-472-1988 or (303) 447-2020 for more information.

The Twenty-Ninth Annual Gilsum Rock Swap will be held June 26 & 27, 1993, in Gilsum, New Hampshire. The swap is sponsored by the Gilsum Recreation Committee. Parking and admission are free. For more information, call (603) 352-7435.

If you have an article, news item or calendar event that you would like to have included in a future issue of The Granite State Geologist, please contact Tim Allen at (603) 358-2571, Science Division-Geology, Keene State College, 229 Main Street, Keene, NH 03431-4183, FAX (603) 358-2257.

Last Modified August 23, 1995

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