Granite State Geologist

The Newsletter of the Geological Society of New Hampshire,
Fall Edition – September 2018 – Issue No. 102
Newsletter Editor: Wayne.Ives@des.nh.gov **Website:** http://www.gsnh.org/

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MESSAGE FROM THE PRESIDENT

Now that the summer heat has faded, it is both more comfortable and more urgent to get tasks done before winter. Those seemingly interminable days of summer are now replaced with chilly nights as a reminder that blocks of snow and ice are coming next.

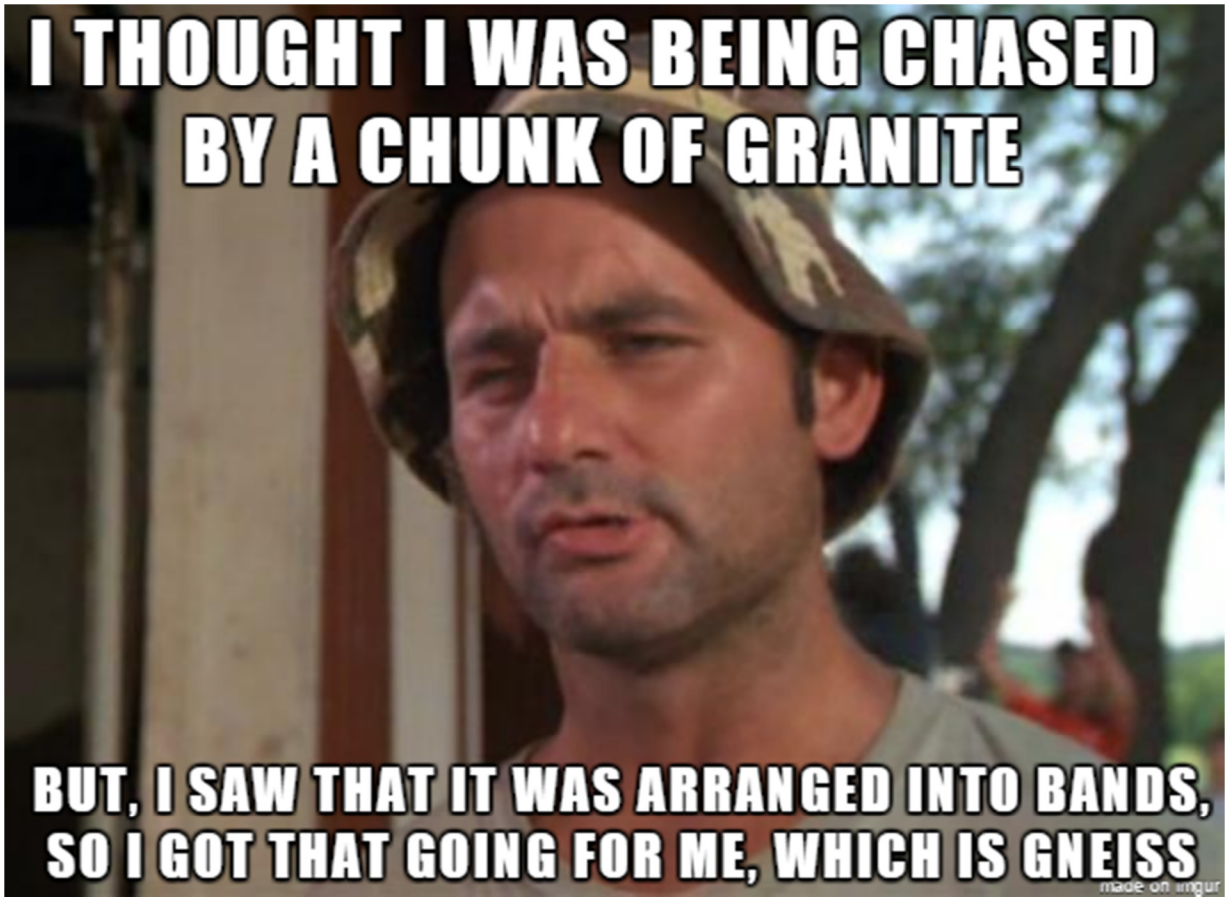
One thing you can do right away is make your reservations early for the fall dinner meeting at Makris October 18. Professor Meredith Kelly from Dartmouth College will be speaking on her work mapping and dating past glacial extents to decipher climate conditions in the mountains of Uganda. You won't want to miss any of it so get your reservations in quick!

NEIGC is the week before that October 12-14 in eastern NY by Lake George. I used to travel for business through the Adirondacks in the fall and attest that it is worth the trip just for the scenery. But there are a lot of good trips scheduled oriented on structural deformation and glaciation topics, with a few other topics sprinkled in, too. The final schedule for the weekend is now posted – links later in this newsletter.

The summer field trip was wet, but successful. Thirty five people made the trip in the luxury of a motor coach skillfully piloted through the trick roadways and poorly parked cars to the field stops. A few pictures are posted from the trip below.

The Society also partnered with American Geoscience Institute to promote their webinars on groundwater aquifers (sometimes pronounced ak-wif-fires) and wells. A couple of the webinars in the four part series have been presented already, but you still can watch the recordings and sign up for the upcoming topics.

Finally, the biennial elections to select board members will be held at this our annual meeting. The slate of candidates for you to pick from is in the back of this newsletter. If you need more reasons to attend, there will be four minerals for the raffle and Sharon has picked out a new menu that will be sure to please, too - so bring your apatite . . . or maybe get some at the meeting.



FALL LEGISLATIVE COMMITTEE REPORT by Thomas Fargo – September 2018

During 2018, the Legislative Committee tracked 25 bills of potential interest to the membership of the Geological Society of NH. Since the last Legislative Committee update (June 15, 2018), Governor Sununu has signed four additional GSNH-tracked bills. These Include:

- Senate Bill SB-309 and companion House Bill HB-1101 that amended RSA 125-C:4 and C:10; RSA-485:3 and 485:16; and RSA 485-C:6 to regulate groundwater pollution caused by polluting emissions in the air, and to establish standards for perfluorochemicals in drinking water, ambient groundwater, and surface water.
- Senate Bill SB-450-FN that amended RSA 149-P to establish an advisory commission for the department of environmental services relative to the delegation of authority of the National Pollutant Discharge Elimination System Program.
- Senate Bill SB-531-FN that amended RSA 6, RSA 310-A; RSA 319-C, RSA 313-A and RSA 328 to authorize the office of professional licensure and certification to establish by rule and collect the fees for boards and commissions administered by the office, and to deposit the fees collected in the office of professional licensure and certification fund for payment of the costs and salaries of the office. This bill was a request of the office of professional licensure and certification. This may result in an increase in the bi-annual registration fee for NH Professional Geologists.

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

During this past summer, behind the scenes, the GSNH Board has been busy carrying out the business of the Society. Board members arranged and successfully executed the annual summer field trip, which this year involved travel to Boston. The trip (though rainy!) was well-received.

GSNH has been in possession of 1 set of the Hitchcock geology volumes. The Board felt that in keeping with the mission of the society to make geology information widely distributed, that it was appropriate to donate the volumes to an entity in New Hampshire where they would be used. Lee

Wilder made the arrangements for this donation. This summer, the New Hampshire Historical Society graciously accepted the donation of these two volumes, which will preserve and make them accessible for generations of Granite Staters to come. More information will be forthcoming in an article in the next edition of the *Granite State Geologist.*

Discussion of dinner meetings, including arranging for speakers at future meetings and meeting venues always occurs at Board meetings, and as always, Board effort goes into making these events as successful as possible for you. Considerable effort goes on behind the scenes to make these a reality. Sharon Lewandowski has shown leadership in arranging menus and working with the restaurants. Lee Wilder has worked to arrange speakers, while Abby Fopiano keeps our website updated with the latest meeting information.

As always, Board meetings are open to all members to attend. Our next meeting will be held on Thursday, December 13, 2018, at 6 PM at the Department of Environmental Services office in Concord. Feel free to contact any officer with questions or concerns.

BAUXITE http://www.aluminum.org/industries/production/bauxite

Bauxite ore is the world's primary source of aluminum. Because it is a mixture of minerals, bauxite itself is a rock, not a mineral. Bauxite was named after the village of Les Baux by Pierre Berthe. This French geologist found the ore in nearby deposits. He was the first to discover that bauxite contained aluminum.

The ore must first be chemically processed to produce alumina (aluminum oxide). Alumina is then smelted using an electrolysis process to produce pure aluminum metal. Bauxite is typically found in topsoil located in various tropical and subtropical regions. The ore is acquired through environmentally responsible strip-mining operations. Bauxite reserves are most plentiful in Africa, Oceania and South America. Reserves are projected to last for centuries.

Although aluminum is the most common metal found on Earth (totaling 8 percent of the planet's crust), the metal is too reactive with other elements to occur naturally. Bauxite ore, refined through two processes, is the primary source of aluminum.

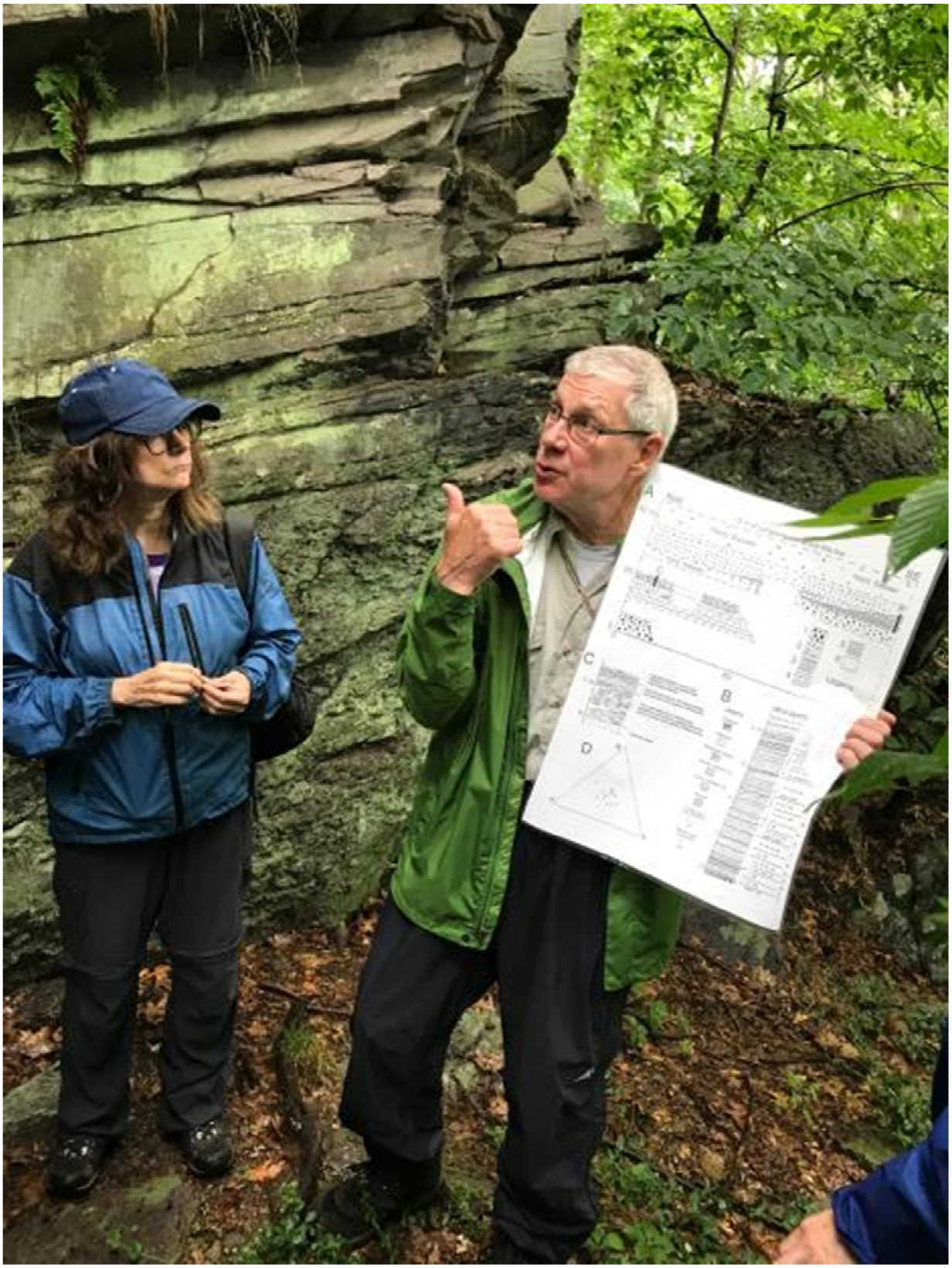
Demand for aluminum is increasing rapidly. However, bauxite reserves, currently estimated at 40 to 75 billion metric tons, are projected to last for centuries. Guinea and Australia have the two largest proven reserves. Vietnam may hold a wealth of bauxite. In November 2010, the prime minister of Vietnam announced the country's bauxite reserves may total up to 11 billion tons.

Bauxite is the name for a mixture of similar minerals that contain hydrated aluminum oxides. These minerals are gibbsite [$Al(OH)_3$], diaspore [α-AlO(OH)], and boehmite [γ-AlO(OH)]. Bauxite forms when silica in aluminum-bearing rocks (that is, rocks with a high content of the mineral feldspar) is washed away (leached). This weathering process occurs in tropical and subtropical weathering climates. This means that many countries with current tropical climates, or that were once tropical, have the largest reserves of bauxite ore, such as Brazil, Jamaica, Guinea, and Australia.
https://mineralseducationcoalition.org/minerals-database/aluminum/

GSNH SUMMER FIELD TRIP PICTURES (More captions on next page)

Proof you were on the 2018 GSNH field trip!

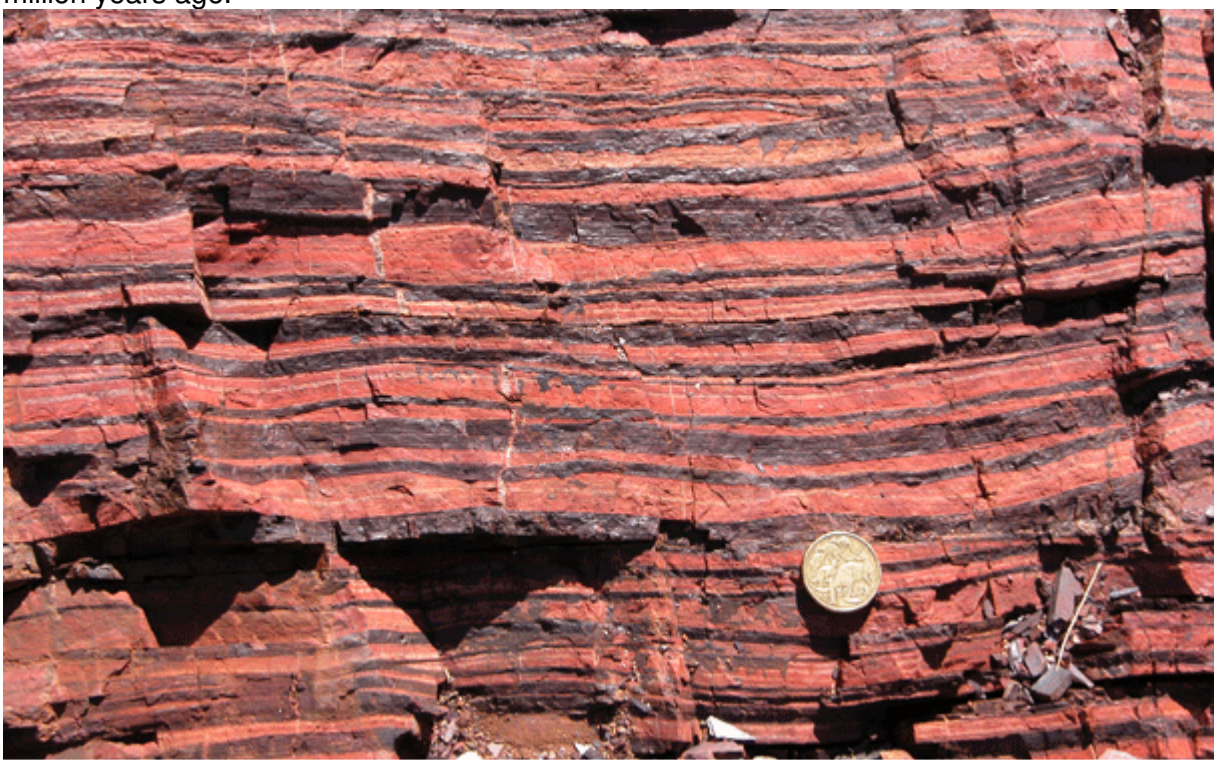
The GSNH field trip group at Stop 1 looking at the outcrops of the Boston Bay Group: Squantum Head locality with trip co-leader Prof. Dick Bailey (Northeastern University) back to the camera in the green raingear. View is to the north with downtown Boston in left distance and likely Thompson Island in the back right.



Prof. Dick Bailey and one of our field trippers at stop 3: Webster Conservation Area, Newton, MA, at a ledge of the Brookline Member, Roxbury Formation, This is the location of Dick's detailed stratigraphic section B on the laminated chart he is holding. Dick's thumb is (incredibly!) near the contact between the underlying conglomerate and the overlying thinly bedded and laminated sandstones illustrated in the chart. Above Dick's head you can make out the sequence of ripples and ripple cross-lamination (most-oscillation type).

SCIENTISTS DISCOVER EARTH'S YOUNGEST BANDED IRON FORMATION IN WESTERN CHINA http://www.geologypage.com/2018/07/scientists-discover-earths-youngest-banded-iron-formation-in-western-china.html and https://www.sciencedirect.com/science/article/pii/S0169136813002011 and https://www.folio.ca/scientists-discover-earths-youngest-banded-iron-formation-in-western-china/

Banded iron formations are Precambrian chemical marine sedimentary formations that record major transitions of chemical composition, and oxidation–reduction state of oceans at the time of their deposition. The discovery provides evidence of iron-rich seawater much later than previously thought. The banded iron formation, located in western China, has been conclusively dated as Cambrian in age. Approximately 527 million years old, this formation is young by comparison to the majority of discoveries to date. The deposition of banded iron formations, which began approximately 3.8 billion years ago, had long been thought to terminate before the beginning of the Cambrian Period at 540 million years ago.



A Banded Iron Formation (BIF) from Australia's Hamersley in the Pilbara. Image: Mark Barley
https://scienceillustrated.com.au/blog/science/first-oxygen-produced-on-earth-2-48-billion-years-ago/

"This is critical, as it is the first observation of a Precambrian-like banded iron formation that is Early Cambrian in age. This offers the most conclusive evidence for the presence of widespread iron-rich conditions at a time, confirming what has recently been suggested from geochemical proxies," said Kurt Konhauser, professor in the Department of Earth and Atmospheric Sciences and co-author. Konhauser supervised the research that was led by Zhiquan Li, a PhD candidate from Beijing while on exchange at UAlberta.

The Early Cambrian is known for the rise of animals, so the level of oxygen in seawater should have been closer to near modern levels. "This is important as the availability of oxygen has long been thought to be a handbrake on the evolution of complex life, and one that should have been alleviated by the Early Cambrian," says Leslie Robbins, a PhD candidate in Konhauser's lab and a co-author on the paper.

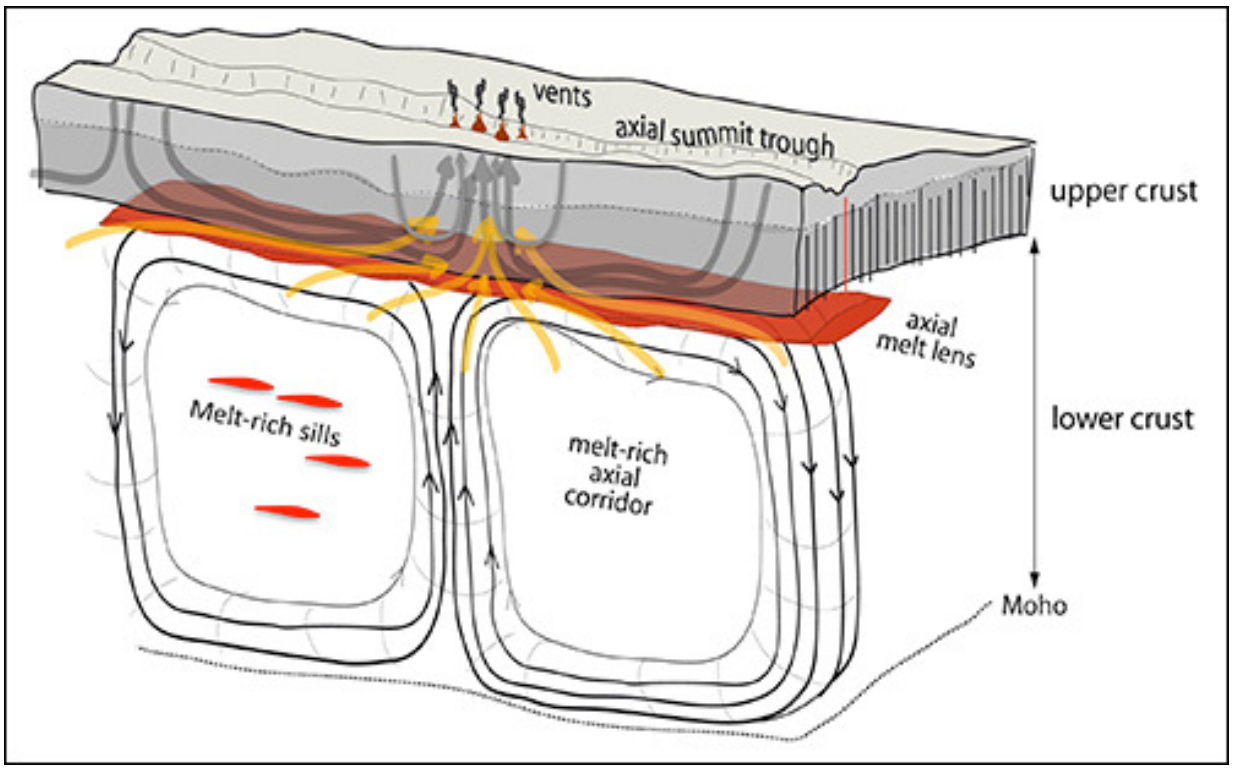
The researchers compared the geological characteristics and geochemistry to ancient and modern samples to find an analogue for their deposition. The team relied on the use of rare earth element patterns to demonstrate that the deposit formed in, or near, a chemocline in a stratified iron-rich basin.

"Future studies will aim to quantify the full extent of these Cambrian banded iron formations in China and whether similar deposits can be found elsewhere," says Kurt Konhauser
See https://www.nature.com/articles/s41598-018-28187-2

IS THE LOWER CRUST CONVECTING BENEATH MID-OCEAN RIDGES? By Terri Cook - 2 October 2017 https://eos.org/research-spotlights/is-the-lower-crust-convecting-beneath-mid-ocean-ridges

The first attempt to couple models of hydrothermal circulation and magmatic convection along fast-spreading ridges may explain the spacing of hydrothermal vent fields along the East Pacific Rise.

Along fast-spreading mid-ocean ridges, elongated lenses of partially molten material are the major source of magma for forging oceanic crust. These axial melt lenses are located between a slice of brittle, upper crust dominated by hydrothermal circulation and pliable, lower crust underlain by a zone of partially molten material. Although the transfer of heat and material between these hydrothermal and magmatic layers controls crust formation, geochemical cycling, and other important processes, most thermal models of these systems do not take their interconnectivity into account.



A conceptual model of magmatic and hydrothermal convective couplings at fast-spreading ridges. The lower crust convects along the axis as a viscous fluid, forming 4- to 5-kilometer-long "wheel rims" in a narrow axial domain along the axial melt lens (AML). Along-axis hydrothermal cells (in gray) are strongly coupled to magmatic ones. Hydrothermal upflows, located above magmatic upflows, transport latent heat due to melt crystallization in the AML. Additional heat can come from the cooling of the dyke and pillow sections above the AML and/or from the cooling of the whole gabbro section across the axis (orange arrows). The Moho is the Mohorovičić discontinuity, the boundary between Earth's crust and its mantle. Credit: Fabrice Fontaine and Mathilde Cannat

To explore these potential couplings, *Fontaine et al.* developed conceptual and numerical models that simulate the interactions between these two layers along a narrow (<1 kilometer) corridor that runs parallel to the ridge. Within this strip, the team assumed that the average melt content of the lower crust is relatively high and that the melt is heterogeneously distributed. By allowing for a large reduction in viscosity in the zones with the most melt, these assumptions facilitate the formation of "wheel rim" circulation cells within the lower crust that can then interact with hydrothermal circulation in the brittle upper crust.

The team's models indicate that convection is possible in a gabbro—an intrusive igneous rock—with an average melt content of 10%. Further, in such a scenario, the resulting interactions between the hydrothermal and magmatic layers within the corridor can form circulation cells that are 4 to 5 kilometers wide. In the simulations, the couplings between the two layers created zones of hydrothermal upflow directly above upflowing magma plumes, the spacing of which was comparable to

the distances between high-temperature hydrothermal vent fields observed along the East Pacific and south East Pacific rises.

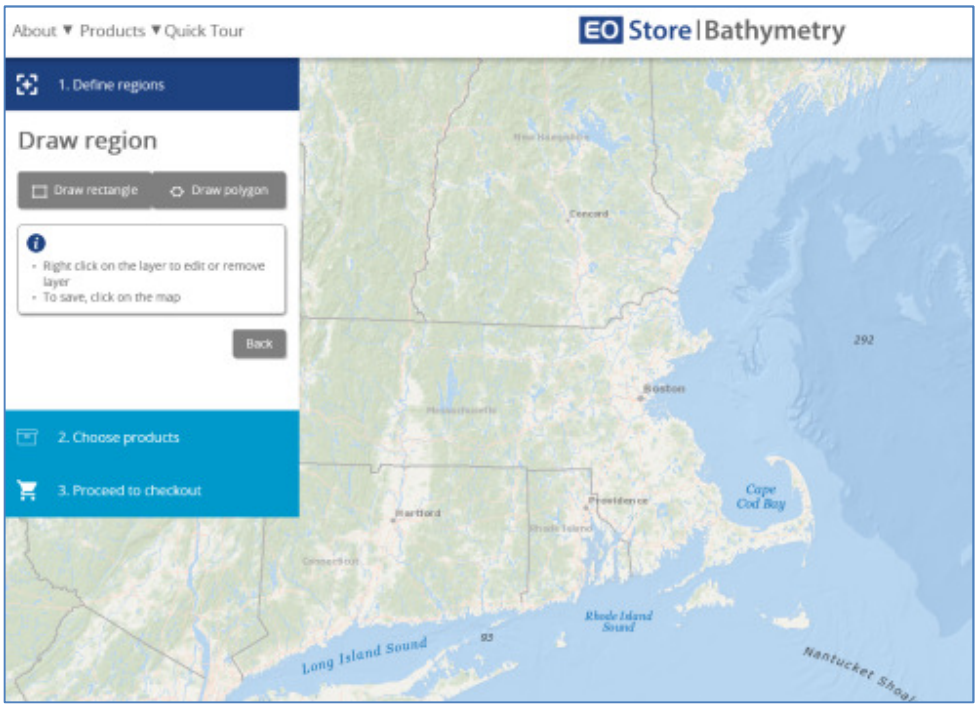
Although compatible with the "gabbro-glacier" model, in which the lower crust crystallizes entirely within the axial melt lens, the authors' hypothesis that the lower crust is convecting beneath mid-ocean ridges also raises the possibility that the accretion of the lower crust may occur in two stages, first actively in the convecting axial corridor and then passively in the diverging plates. As the first attempt to couple models of hydrothermal circulation with magma chamber convection, this study represents an important step in the development of a comprehensive model that can simulate the detailed field observations made along Earth's mid-ocean ridges. (*Geochemistry, Geophysics*, *Geosystems*, https://doi.org/10.1002/2016GC006737, 2017) **Citation:** Cook, T. (2017), Is the lower crust convecting beneath mid-ocean ridges?, *Eos, 98,* https://doi.org/10.1029/2017EO082623. Published on 02 October 2017.

EOMAP LAUNCHES ONLINE BATHYMETRIC DATA STORE - 21/08/2018 https://www.hydro-international.com/content/news/eomap-launches-online-bathymetric-data-store

EOMAP has established a commercial online store for global shallow-water bathymetry derived from satellite data. The EOStore Bathymetry provides rapid access, allowing industry professionals to search for and request high-quality data. Satellite-derived bathymetry (SDB) is now established as a valuable tool for the surveying, planning and management of coastal and offshore sites.

Unlike other survey methods, SDB can provide shallow-water bathymetric data worldwide without the need for a physical presence in the area of interest. Thus, SDB offers a rapid and cost-attractive solution for the coastal, offshore and survey industries.

"The EOStore Bathymetry allows every coastal engineer, modeler or surveyor to rapidly access up-to-date shallow water bathymetric data. It enables you to get the bathymetry data you need – even data you could otherwise not get – so you can plan and execute projects accurately, effectively lowering the project risk level," said Knut Hartmann, COO of EOMAP.



Global feasibility of SDB methods. EOMAP has developed the bathymetry store in response to feedback from industry. "The demand for bathymetry data in shallow waters is increasing significantly," he said. "What industry told us at our first conference on Satellite Derived Bathymetry, in June 2018, was that they needed to understand the global feasibility of SDB methods and ways to search for and request the data. Thus, we've created the EOStore Bathymetry which allows users to get worldwide shallow-water bathymetry data quickly and easily at a fraction of the price of traditional surveys."

EOStore Bathymetry offers different horizontal spatial resolutions of the bathymetric grid of 2m to 15m. This makes it flexible and fit for purpose for surveying, as well as for but also for planning and modeling purposes. For more information, please visit www.bathymetry.store.

GOLD IN GRANITE & PLUTONIC ROCKS

A recent paper by Prof. George P. Merrill, Curator of the Department of Geology of the U. S. National Museum, Washington, upon " An Occurrence of Free Gold in Granite," describes an interesting instance of the dissemination of this noble metal in the substance of granite of normal composition believed to be from Sonora, Mexico. He found the gold in small scales, rarely exceeding a millimeter in diameter, distributed through the scales of mica and apparently enclosed in both the feldspar and quartz granules. A number of thin sections of the rock submitted to examination with the aid of the microscope gave confirmatory evidence. Sulphides were not detected, nor any indication of a secondary impregnation, though the granite had undergone some alteration, apparently by weathering. Mr. Merrill concludes that " there is apparently no way of accounting for the gold other than by considering it an original constituent of the rock, a product of cooling and crystallization from the original magma."

We thus have another link in the chain of evidence showing that gold is a constituent of granite and of plutonic rocks, and that such crystalline rocks may be the primal source of the gold, which is concentrated in veins.

We do not, however, overlook the fact that the oceans may have contributed a portion of their dissolved gold to the sedimentary rocks, such as the slates, magnesian or otherwise, of different geological epochs; such slates being generally known to us as the country, or wall-rocks, of most of the auriferous quartz-veins, especially of the central gold-region of California.

As investigation progresses, and our knowledge is increased, it becomes more and more evident that such pyritous sediments derived their metallic contents from the waters of the ocean at the time of their sedimentation, through the reducing agency of organic matters, or the exhalation of sulphuretted or carburetted gases, as, for example, from the petroleum shales.

We encounter here the difficulty that gold is not uniformly present in pyritous deposits, as we might expect considering the universality of the oceanic source, and the general distribution of gold in this menstruum. But before we can generalize satisfactorily we require much more evidence regarding the dissemination of gold in the mass of the various kinds of rocks, independently of veins. Examples of the nature cited by Prof. Merrill are thus of great importance, not only in themselves, as hearing upon the question of the origin and distribution of gold, but as tending to stimulate observation, inquiry and discussion. Prof. Merrill refers to the description by J. B. Jaquet of an occurrence of free-gold in microcline in a rock consisting essentially of microcline and quartz impregnated with hematite, and, also, to the occurrence of free gold in glass-like and crystalline varieties of a quartz-trachyte, in Chili, S. A., as described by Moricke.

It is only within a few years that the instances of the occurrence of gold in the crystalline rocks have multiplied until we cannot longer regard them as exceptional, or hold that gold, as a rule, is confined to the magnesian and argillaceous slates.

One of the earliest cited and best examples of the occurrence of coarse free gold in the midst of granite, seemingly without any extraneous origin by impregnation accompanied by quartz, was at the Amargosa gold-mines at the sink of the Mojave river, San Bernardino county, California.

The native gold in visible masses was there disseminated in the midst of the aggregation of soda-feldspar (albite) and the quartz, as if an original constituent of the mass and indigenous to the rock, which it may have been. Pyrites were not present in the specimens obtained; but some fragments of white arsenic in granite from the same locality may be regarded as an indication of the former presence of an arsenide in association, and as possibly an impregnation subsequent to the formation of the rock. The specimens, unfortunately, have been packed for years and are not now accessible. In all cases of this kind it is important to study the rock in situ and in mass, and to note carefully all the surrounding conditions. It is not safe to make deductions from the phenomena exhibited by isolated specimens.

The influence of dikes of plutonic rock upon the mineralization of veins with the precious metals, has long been known and recognized by miners.

If we accept the theory of lateral secretion for the formation of mineral veins, such veins bearing the precious metals are perhaps as good evidence as we need of the diffusion of gold and silver in the mass of the adjoining country-rock, or, at least, that solutions bearing these metals may traverse the rocks by osmosis or otherwise. If such evidence may be admitted, the range of the phenomena and of the evidence is widely extended.

Some of the most notable districts in California where gold-bearing veins traverse crystalline rocks of the granite family are at Grass Valley and Nevada, Nevada county; also at Forbestown, Butte county; Ophir, Placer county; and West Point, Calaveras county. In these localities the veins are numerous, and appear to have been formed from the substance of the country-rock. In Mariposa county, at the southern end of the Mariposas estate, where the slates of the Jura-Trias age, with their accompanying large “Mother-Vein,” give place to granite, we find a vein of auriferous quartz which may not have any relation in origin to the vein in the slates, with which the vein in the granite contrasts strongly in its formation and in the distribution of the gold. It is known as a ” pocket-vein,” yielding the gold in isolated but rich bunches, and of a higher grade of fineness and less crystalline than the gold of the Princeton vein, which traverses the secondary slates. It would be instructive to determine the relative ages of these adjacent veins and the influence of the two different kinds of country-rock upon the deposition of the gold. It would be extremely instructive if we could find an instance of a gold-bearing vein passing from one formation into another, as, for example, from slates into compact granite, so as to exhibit the effects of change of country-rock, or of the walls, upon the mineralization of the vein—effects so strikingly shown in the lodes of Cornwall, which are copper-bearing in the ” killas ” and tin-bearing in the granite. It should be mentioned that the tin-lodes are not without some gold, being thus indicative of its presence in the granite.

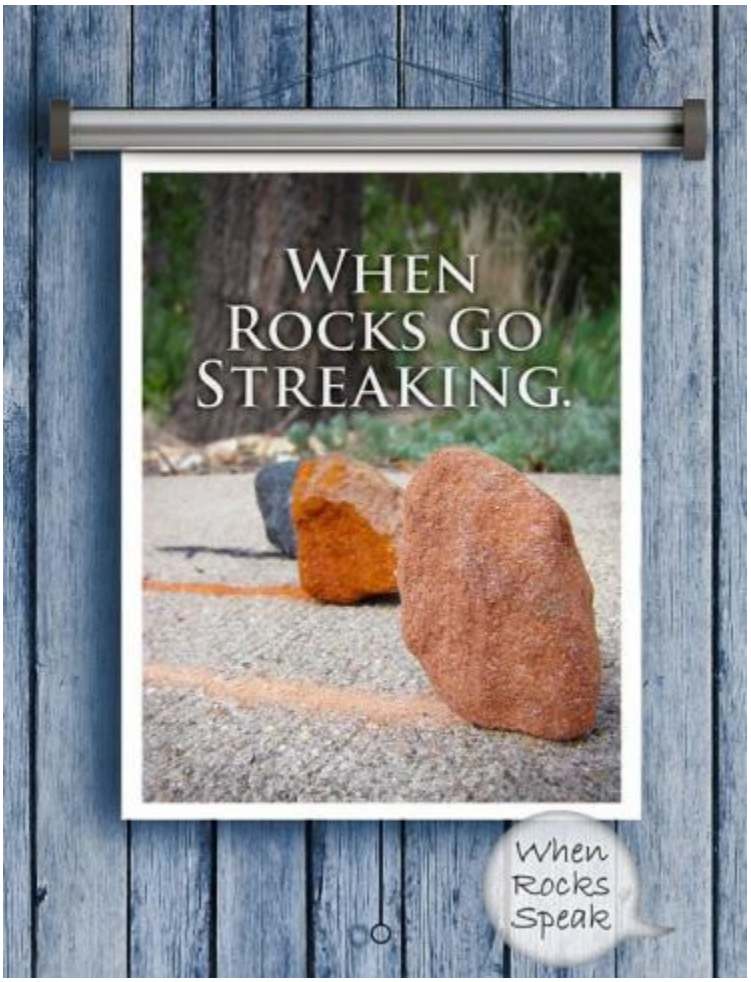
The well-defined granite rock of Butte and Walkerville, Mont., affords conspicuous examples of gold-bearing and silver-bearing veins, originating apparently by lateral secretion from the body of the granite on each side. The Rainbow and Blue Bird lodes especially appear to have derived their mineral and metallic contents from the granite in much the same way as the tin-bearing lodes are formed in Cornwall, according to the investigations of Le Neve Foster.

The occurrence of gold in thin flakes upon the surfaces and in crevices of the porphyry at the famous Contention mine at Tombstone, Arizona, has been shown; but it is not yet known with certainty whether this gold, either in its free state or combined with disseminated pyrite, was an original constituent of the dike, or whether it was derived from the diffused pyrites of the stratified beds traversed by the dike. So far as regards the plainly visible gold, it appears to be confined to the partly decomposed portions of the porphyry dike, at or near the contact with the other rocks, and to be a secondary or late deposition and not indigenous.

The mines of the Homestake group in the Black Hills of Dakota afford a good example of the occurrence of gold in ancient crystalline gneiss or granitic schists of preCambrian age. These schists are much plicated and are traversed by felsitic dikes, distinctly intrusive. Whether these are auriferous or not remains to be ascertained, and without a careful examination it is not possible to state the source of the gold, whether indigenous to the schists or introduced from the dikes or with quartz-veins

from remote sources. The rock for the stamp-mills is quarried, rather than mined in the manner usual with veins, and the rock is milled, together with any veins traversing it.

The ore of the Treadwell mine, Alaska, is described by Adams and Dawson as a hornblende-granite," much crushed, altered, and impregnated with secondary quartz, calcite, and pyrite." The pyrite contains the gold.



In the gold-bearing region of Northern Sonora, Mexico, the gold-veins are chiefly in or closely associated with granitic and plutonic rocks. The veins of El Grupo concession, about 100 miles southeast of Tucson, Arizona, traverse a fine-grained granite, and hear both gold and silver. A dioritic rock at El Plomo, in the same State, appears to be especially favorable to the occurrence of gold. At the San Francisco mines, 100 miles southwest of Gila Bend, Arizona, gold-bearing quartz-veins traverse Huronian or pre-Cambrian gneiss near or at the contact with a great dike of diorite on one side and of porphyritic granite on the other. El Campana, a large quartz-vein, also in Sonora, is at the contact between an obscurely defined felsitic rock, like granite, on one side, and a heavily-bedded quartzite (probably Cambrian) on the other.

In Central and Northern Arizona gold-bearing veins are found in granite. The famous Congress vein now worked to a depth of some hundreds of feet, traverses granitic rock in close association with a dike of plutonic rock. North of Indio, on the Colorado desert, California, in the second range of mountains, a ridge of granite contains irregularly spread patches or bunches of pyrite which, by decomposition, liberate a small amount of gold. This pyrite does not appear to be connected with any vein, but seems to be one of the original constituents of the rock. Somewhat similar pyritic impregnations in granite were worked a few years since in Arizona, near Peeples Valley and Rich Hill, north of Stanton, and yielded free gold.

The close association of gold and granite at Cripple Creek must not be overlooked. Some specimens of porphyritic granite with cavernous spaces partially filled with purple or amethystine fluorite are very rich in gold.

Penrose, in summarizing Chapter IV. of his monograph of the mining geology of the Cripple Creek district, says: "The gold and associated vein-minerals were probably derived from the volcanic rocks and, to a less extent, from the adjacent granite, at greater or less but not extremely profound depths." Again (p. 150)," The most profitable mines yet discovered in the Cripple Creek district are in the eruptive rocks or in the granite immediately adjacent to the main volcanic vent or vents." On Battle mountain, Cripple Creek, the veins are described as in some cases well-defined bodies of quartz, " in other cases they are impregnations and partial replacements of the country-rock with mineral matter along fissures. The prominent veins are both in the breccia and in the granite immediately adjoining the breccia area." This breccia, as found at the Independence No. 4 mine, is described as containing, besides volcanic rocks, large quantities of granite fragments, some of them several feet in diameter.

The ore of the Independence mine consists of "granite from which the mica and quartz have been partly or wholly removed, leaving a honey-combed, vesicular mass of partially kaolinized feldspar " (p. 201).

The phenomena of the occurrence of the precious metals in the celebrated Mercur mining district, Utah, furnish evidence which may be used in support of either view of the primal source of these metals. Both sedimentary and plutonic rocks are there found in conformable layers, and gold has been found in both, but the commercially available deposits are along and near the plane of contact of porphyry and limestone, but below the porphyry, the deposits thus being what is ordinarily described by miners as a contact deposit. According to the researches of Mr. J. Edward Spurr, there is a slight mineralization which is pretty generally distributed throughout the rocks of the basin. " Four assays were made of comparatively fresh Eagle Hill porphyry. Two assays showed 0.01 ounce of gold to the ton; one showed a trace of gold, and the fourth was entirely barren. Of two assays of the birdseye porphyry, one showed 0.01 ounce of gold to the ton, the other showed a trace of gold."

Nine assays were made of the altered limestone, seven of which showed very small quantities of gold, and two did not yield a trace. Of twelve assays of rock at the contact where there was no evidence of mineralization, nine yielded small quantities of gold, and the other three did not show the presence of the metal.

The phenomena indicate to me that the porphyries and possibly the shales above them are the sources of the gold, but Mr. Spurr concludes that the thickness of the porphyry-sheet is so slight that it is not possible that the ores could have been derived from it by leaching, and so carried downward into the limestone, and his explanation, or theory, is that " the mineralizing agents rose from below till they met the sheet of altered porphyry, when they spread out along the under contact and so produced the mineralization."

He also found a series of nearly vertical fissures or fractured zones through which he believes communication was established with a body of uncooled igneous rock at an uncertain depth below, permitting the ascent of moist volcanic vapors (p. 453).

The researches of Emmons upon the dissemination of gold in the rocks at Leadville have added largely to our knowledge of this subject.

In the representative series of gold specimens and ores sent by the Minister of Mines and Agriculture from New South Wales to the Columbian Exposition in Chicago in 1893, there were numerous specimens from granitic and feldspathic lode-stuff. Nos. 10, 11 and 12 of the collection were from" binary granite." No. 10 contained gold associated with copper pyrites and iron pyrites from the Challenger mine, Adelong. No. 11 was from the 978-foot level of the Great Victoria mine, and No. 12 from the 770-foot level of the same mine.

A pyritous granite was shown from Dargue's Reef, Major's Creek, Braidwood. This auriferous stuff is described as 25 feet in width at the 225-foot level. Nos. 23, 24, 25 and 27 of the same collection consisted of auriferous feldspathic lode-stuff from different mines at Yalwal, some specimens showing free gold. Feldspathic lode-stuff with mispickel and oxidized pyrite is found also at the Junction Reef, Mandurama. Auriferous quartz and feldspathic vein-stone rich in gold occur in the Hill End district and at Delaney's Dike, near Molong.

In the collection from Sydney there were gold-bearing specimens with feldspathic gangue from Saw Pit Gulley, Fairfield. Three mines at Timbarra were represented by masses of auriferous granite. The feldspathic gangue occurs in some places in a brecciated condition. At Wann's lode, Drake, New England (No. 140) the gold is obtained from a siliceous feldspathic breccia. At the Mount Graham gold-mine, Pambula, the occurrence of the gold is described as " unlike anything hitherto discovered in any of the Colonies. The lodes are in the main conglomerates and felsitic breccias, in many instances only to be distinguished from the country-rock by irregular walls. The gold is extremely fine and difficult to follow; frequently there is nothing to distinguish the gold-bearing from the barren portions; the drillings and the mortar are the only guides."

Specimens of vesicular and amygdaloidal basalt, claimed to be auriferous, were shown from Black Rock, Bullina.

A careful chemical investigation for gold of the basalt of Ovifak, Greenland, which contains the large and small masses of metallic iron, and which is believed to come from great depths in the earth's crust, would be exceedingly interesting.

Examples of the presence of gold in granitic and plutonic rocks might be multiplied, but those given are sufficient to show that we must recognize such rocks as truly gold-bearing.

https://www.911metallurgist.com/gold-granite-plutonic-rocks/

BEAUTY FROM THE ASHES by Debra Wilson

Debra Wilson is the Collection Manager for the Section of Minerals at Carnegie Museum of Natural History. https://carnegiemnh.org/beauty-from-the-ashes/

When Mount St. Helens erupted in the State of Washington on May 18, 1980, it became the deadliest and most economically destructive volcanic eruption in the history of the contiguous United States. The devastating results were not only measured by the fatalities and massive destruction but it also left behind about 540,000,000 tons of ash over an area of more than 22,000 square miles. The enormous task of cleanup was daunting. This is where serendipity stepped in to create great beauty from the ashes.

During the salvage effort, workers from a regional timber company were using acetylene torches to cut through twisted metal debris and they accidentally discovered that the torch melted the volcanic ash into a green glassy substance. This led to laboratory experiments that determined green glass could be produced by heating the ash to 2700° Fahrenheit and then rapidly cooling it. The glass quickly began being commercially produced and faceted into gemstones. It is marketed under the names Obsidianite, Helenite, Emerald Obsidianite or Mount St. Helens Obsidian. Its stunning green color has made it an attractive alternative to the more expensive emerald gemstone, though not as durable (a hardness of 5 to 5 ½ as compared to 7 ½ to 8 for emerald). Blue and red varieties are also produced by adding coloring agents to the melt.

The Section of Minerals obtained a faceted stone of Obsidianite as part of a donation of gemstones in 2009. It is a green oval cut stone, as you can see from the photo, and weighs 42.1 carats. Future plans are to incorporate this stone in the Treated and Synthetic Gemstones exhibit case in Wertz Gallery.

FIRST PALAEONTOLOGICAL VIRTUAL CONGRESS http://palaeovc.uv.es/

The emergence of new applications and technologies opens a wide range of possibilities regarding new forms of communication in the scientific world. Aware of this, we are glad to present the 1st Palaeontological Virtual Congress, which main goal is to spread the most recent scientific advances in palaeontology worldwide in a fast, easy and economical way.

This online congress is pioneer in palaeontology, offering an exclusively virtual-developed environment to researchers all around the globe. Oral communications and posters about any palaeontological field will be presented through an online platform created *ad hoc*. The simplicity of this new format allows for low-cost registration fees and saving travel and maintenance expenses. Consequently, this initiative aims to give international projection to the palaeontological research carried out by groups with limited economic resources and, therefore, promoting the participation of palaeontologists from developing countries.

More detailed information regarding important dates and deadlines, registration, fees, workshops proposals and technical/logistics issues can be found in the attached “First circular document”, as well as at the congress web page (http://palaeovc.uv.es/) and social media accounts (Facebook: https://www.facebook.com/1stPalaeoVC/; and Twitter: @palaeovc).

Registration will be available soon via our website:

http://palaeovc.uv.es/index.php/registration/

2018 NEIGC CONFERENCE IN LAKE GEORGE, NY

Friday October 12th - Sunday October 14 Hosted by the Natural Sciences Department at Castleton University and The Geology Department at Colgate University - https://www.castleton.edu/academics/undergraduate-programs/geology/neigc-nysga/

Preliminary NEIGC-NYSGA list of trips (doc, pdf**)** / Registration and Events

The conference will honor Bruce Selleck and William Kidd and their numerous contributions to our understanding of the geology and geological evolution of the Adirondacks, the Taconics, and the Champlain Valley. We hope to have field trips that include the bedrock and surficial geology from the Adirondacks, Taconics, Champlain Valley, and Green Mountains.

Social Events at Fort William Henry Hotel

Reception: October 12, 2018 - 5:30-8:30 pm - Complimentary hors-d'oeuvres and cash bar.
Banquet: October 13, 2018 - 6:00-8:00 pm - Barbeque buffet ($25 professional, $10 student) and cash bar.

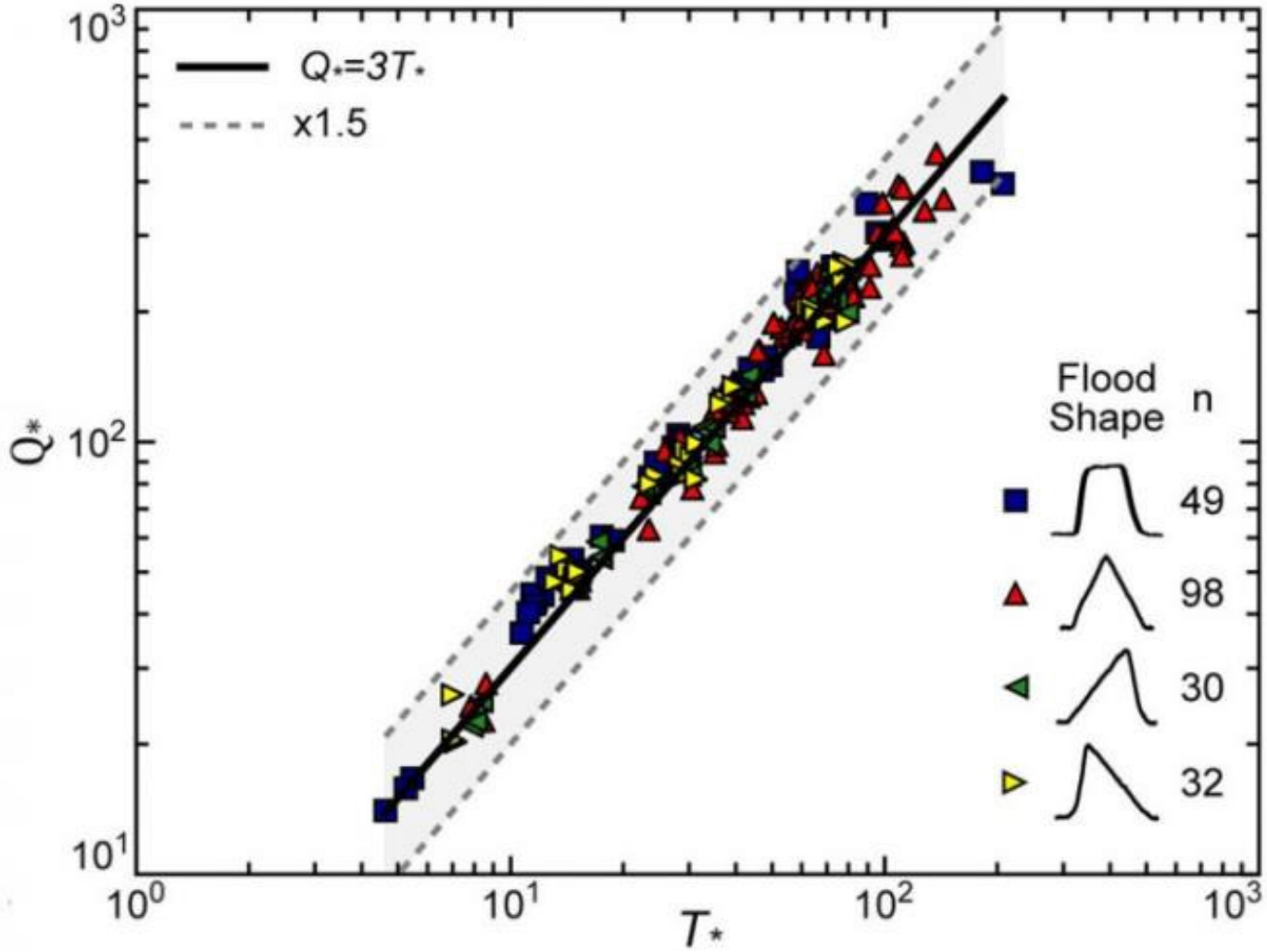
Lodging - A large block of rooms is available at the Fort William Henry Hotel at excellent rates ($89-139/night). Call the hotel directly to reserve a room (800) 234-0267 or (518) 668-3081. Be sure to give the group code - New England Intercollegiate Geological Conference - to receive the group rate. There are numerous other hotels and campgrounds in the Lake George region if you wish to stay elsewhere or if the Fort William Henry Hotel is booked. Lodging and additional information about the region is available by visiting the Lake George Chamber of Commerce.

Registration Online registration is preferred (Note registration form works best using a computer rather than a mobile device). If paying by check, please download and mail the paper form along with payment. **http://w3.salemstate.edu/~lhanson/NEIGC/Conference.html**

INSENSITIVITY OF TOTAL SEDIMENT FLUX TO HYDRAULIC DETAILS

By Valeriy Ivanov, 6 September 2018 Source: Geophysical Research Letters

The total sediment mass transported by flow under different sets of regimes is insensitive to the exact details of hydraulic forcing, but what matters is cumulative transport capacity.



A measure of integrated transport capacity (T*) for streamflow events corresponding to different hydraulic regimes (flood shapes as inset plots) are plotted versus a measure of cumulative sediment flux (Q*). The black line is a linear trend line fit. For a given T*, the sediment flux data are collapsed to nearly a point. All floods but one are within a factor of 1.5 of the mean trend, implying that there is no systematic variation in the data with respect to flood magnitude, duration, or shape. Credit: Phillips et al., 2018, Figure 3b

One of the main challenges in geomorphology and landscape evolution is the space-time variability of driving factors that lead to a distribution of geomorphic responses. By using an elegant experimental design, Phillips et al. [2018] show that the total bed-load sediment transport does not depend on the details of the transient hydraulic forcing. What matters is a measure of integrated transport capacity: flow impulse. This finding has broad implications for landscape evolution modeling and assessment of future geomorphic conditions under uncertain hydrometeorologic regimes.

Citation: Phillips, C. B., Hill, K. M., Paola, C., Singer, M. B., & Jerolmack, D. J. [2018]. Effect of flood hydrograph duration, magnitude, and shape on bed-load transport dynamics. Geophysical Research Letters*, 45.* https://doi.org/10.1029/2018GL078976

LANDSLIDES TRIGGERED BY THE 6TH SEPTEMBER 2018 HOKKAIDO EARTHQUAKE

Edited from a posting in The Landslide Blog by Dave Petley 6 September 2018
https://blogs.agu.org/landslideblog/2018/09/06/landslides-6th-september-2018-hokkaido-earthquake/

There is little doubt now that the major impact of the 6th September 2018 Hokkaido earthquake [Editor: Mw=6.6] is in the form of geotechnical failures. Whilst there is abundant evidence of liquefaction, it is the dramatic landslides (some reports suggest about 800 individual events) that have caught the eye and, sadly, caused most of the casualties in all probability.

The ridge landslides are shown in the image below – here we seem to see failure from the ridge crest (which is typical for earthquakes) along the vast majority of the topographic feature. Sadly, at the toe of the slope were located a number of houses. The level of destruction seems to be very high; at 3 am the likelihood of escape for the occupants would have been low. Fortunately the integrity of at least some of the houses may have protected the occupants:-

The ridge failure landslides from the 6th September 2018 Hokkaido earthquake. Image via SCMP.

In some cases the runout distance seems to be high. Note that the exposed slopes look to be both deeply weathered and wet, although there is not much evidence of water flowing.

The second area shown in the maps above is the zone of extremely dense landslides shown in the image below:-

Again note that most of the landslides, which are again in deeply weathered materials, originate from the ridge crest. The runout distances look quite long again, and in some cases they have coalesced in the drainage lines (channels) to form larger flows.

Given the earthquake magnitude (Mw=6.6 or 6.7), and depth (USGS reports 33.4 km), this level of landsliding is unusual. Indeed the USGS PAGER tool continues to indicate a low level of landslide activity. It is likely that this high level of landslides is the result of the effects of Typhoon Jebi (Typhoon 21 in Japan), which passed over Japan in the few days before the earthquake. This might have saturated the slopes. Alternative factors may include some aspect of the shaking – perhaps the frequency was exactly right to create dramatic topographic amplification in this topography. Or

The area of intense landslides from the 6th September 2018 Hokkaido earthquake. Image via Tokyo Keizai.

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perhaps the materials – these slopes may well be formed from young volcanic deposits I suspect – were particularly susceptible to seismic shaking. I wonder if there might be an element of liquefaction in some of these failures? I am sure a great deal more detail will emerge in the days ahead. Comments and observations are very welcome.

GSNH PARTNERS WITH AMERICAN GEOSCIENCES INSTITUTE

GSNH received a letter thanking us for sponsoring and advertising their webcast series on aquifers and wells from AGI's Heather R. Houlton. I urge you to watch upcoming webinars and retrieve the recorded webinars using the link below. Below is the edited content of that letter. Editor.

We want to thank you and GSNH for being a media partner for our most recent GOLI webinar, "A Journey through the Geology and Aquifers of New England and Why Groundwater Wells Need to be Re-developed." We have recorded and posted the webinar here: http://bit.ly/goli-webinar20180830-about. This webinar [was] the first in a series of four by Ray Talkington, Theodore Morine, and Frank Getchell covering topics of aquifers and well development. At the conclusion of the series, an on-demand course will be developed using the content from all four webinars to provide the community access to the information and to obtain Continuing Education Units (CEUs).

This webinar was a great success, thanks to your engagement as a media partner. The total number of registrants for this event was 262, while the total number of attendees was 136.
The second webinar in this series titled, "Why and How Does a Groundwater Well Decline in Performance and What Causes a Well to Plug" is at: http://bit.ly/goli-webinar20180920-about. Thank you again for being a media partner for the webinar. As a result, we reached a wide variety of people across many different industries, both in the U.S. and internationally. Sincerely, Heather Education & Outreach Specialist, American Geosciences Institute

SCIENTISTS SAY GEOLOGICAL EPOCH THE ANTHROPOCENE IS HERE

http://www.geologyin.com/2018/01/scientists-say-geological-epoch.html?m=1

An international working group that includes geologists Jan Zalasiewicz, Mark Williams and Colin Waters, from the University of Leicester's School of Geography, Geology and the Environment and archaeologist Matt Edgeworth has, since 2009, been analyzing the case for formalization of the Anthropocene, a potential new epoch of geological time dominated by overwhelming human impact on Earth.

The group has found that a broad range of potential physical, chemical and biological markers characterize the Anthropocene, the clearest global markers being radionuclide fallout signals from nuclear testing and changes in carbon chemistry through fossil fuel burning -- these in particular show marked changes starting in the early to mid-1950s.

Rocks fused with plastic, first discovered on a Hawaiian beach, could be one of the geological proofs needed to declare that human activity has triggered a new geological epoch, called the Anthropocene(Credit: P. Corcoran et al/GSA TODAY)

The group, with a number of invited scientists, has now reviewed present knowledge on where these and other markers form the clearest, sharpest, and most stable signal in strata that might be used to define the Anthropocene as a formal unit of the Geological Time Scale.

The current study, which is published in the journal Earth-Science Reviews, informs the scientific community where they should start the process of collecting and analysing continuous core samples of strata across the proposed Holocene-Anthropocene transition.

The study considered a range of arguments in support of and against hosting a 'golden spike' in a range of potentially suitable environments across the globe. They found that Anthropocene strata are often thin -- but also that they are globally distributed and may be clearly recognised by geologists.

Professor Colin Waters, who led the study, said: "Of the 65 'golden spikes' of the Geological Time Scale currently ratified, all but one are located in strata that accumulated on the sea floor, the one exception being the ice core used to define the base of the Holocene Epoch.

"This study considers those environments in which the very short history of the Anthropocene is best recorded. In addition to such traditional geological strata, we have also considered human-generated deposits, sediments accumulating in lakes, estuaries and deltas, peat bogs, cave mineral deposits and even biological hosts such as corals and trees.
The presence of annual layers or growth rings within many of these provides geologically unprecedented accuracy in the placement of the primary reference marker, wherever this might be ultimately chosen."

Professor Jan Zalasiewicz said: "This preliminary assessment of potential 'golden spike' locations around the world is important in that it clearly shows we are spoilt for choice -- there are very many possibilities where the Anthropocene might be effectively defined. Now we have a lot of work in front of us in examining the most promising locations in enough detail to really pin down how the Anthropocene might be clearly and precisely recognized around the world."

Professor Mark Williams said: "The range of environments we are working with is remarkable -- from polar ice and snow layers to deep lake and sea floors to the skeletons of reef corals and stalactites in caves. The fact that signals of the Anthropocene are so sharply visible in all of these shows just how pervasive human impact has been on the planet in post-war times."

Scientists within the Anthropocene Working Group are working towards developing a proposal, based upon finding a 'golden spike', more technically known as a Global Boundary Stratotype Section and Point (GSSP).

This is a reference level within recent strata somewhere in the world that will be proposed to most clearly and consistently characterize the changes as the Holocene, which represents the last 11,700 years of geological time on this planet, gave way into the Anthropocene about 65 years ago.

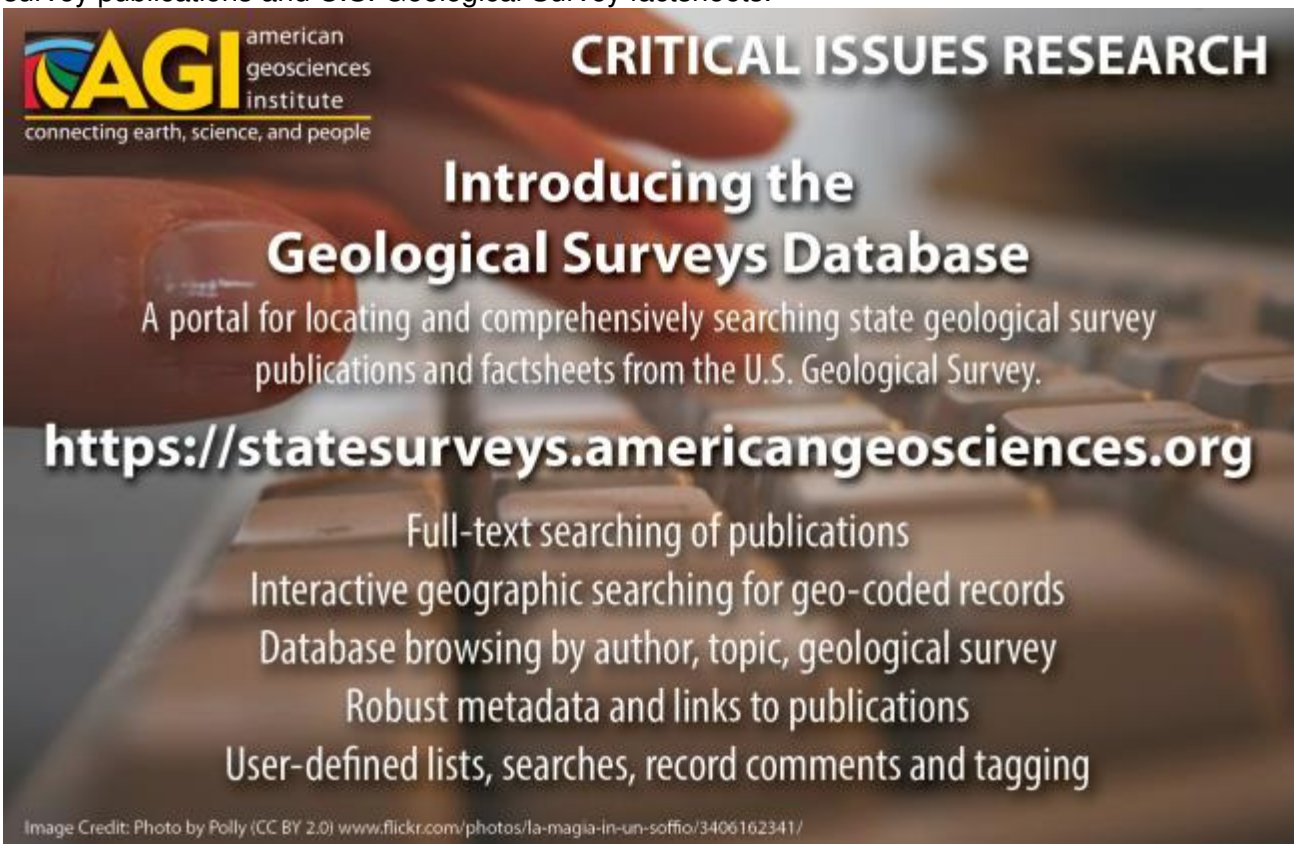
Once this detailed work is completed in a few years' time -- a required part of the process in seeking formalization of the term by a number of geological bodies -- it will first be submitted for scrutiny to the Subcommission on Quaternary Stratigraphy of the International Commission on Stratigraphy. There is no guarantee, though, that the proposal will be accepted.

(*The above story is based on material provided by University of Leicester.*
http://www.geologyin.com/2018/01/scientists-say-geological-epoch.html#pX7K4KKWmKSK5I4m.99)

Geo fun – don't try this in your backyard.

GEOLOGICAL SURVEYS DATABASE LAUNCHED

The American Geosciences Institute's Critical Issues program is pleased to announce the launch of the Geological Surveys Database, a collaborative effort between the American Geosciences Institute's Critical Issues program, GeoRef, and U.S. state geological surveys to help increase the discoverability and use of geological survey publications. As of July 2018, the Geological Surveys Database replaces the Critical Issues Research Database and provides an improved portal for decision makers and others to locate and comprehensively search thousands of state geological survey publications and U.S. Geological Survey factsheets.



The Geological Surveys Database provides users with the ability to search against structured metadata (i.e., title, author, notes, etc.) that has been developed by GeoRef staff and supplemented with state geological survey data. The database also provides full-text searching of publications, meaning that users can search against the entire text of the publications in the database.

The Geological Surveys Database (https://statesurveys.americangeosciences.org) is seamlessly integrated into AGI's Critical Issues webpages so that users can find relevant state survey publications and USGS factsheets as they browse Critical Issues web-based content. The Critical Issues website also hosts a Quick Search portal (https://www.americangeosciences.org/critical-issues/geological-surveys-database) which allows users to search the entire Geological Surveys Database to find the ten most relevant publications related to their search terms.

Should you have any questions about the database, please direct them to me at lmg@americangeosciences.org.

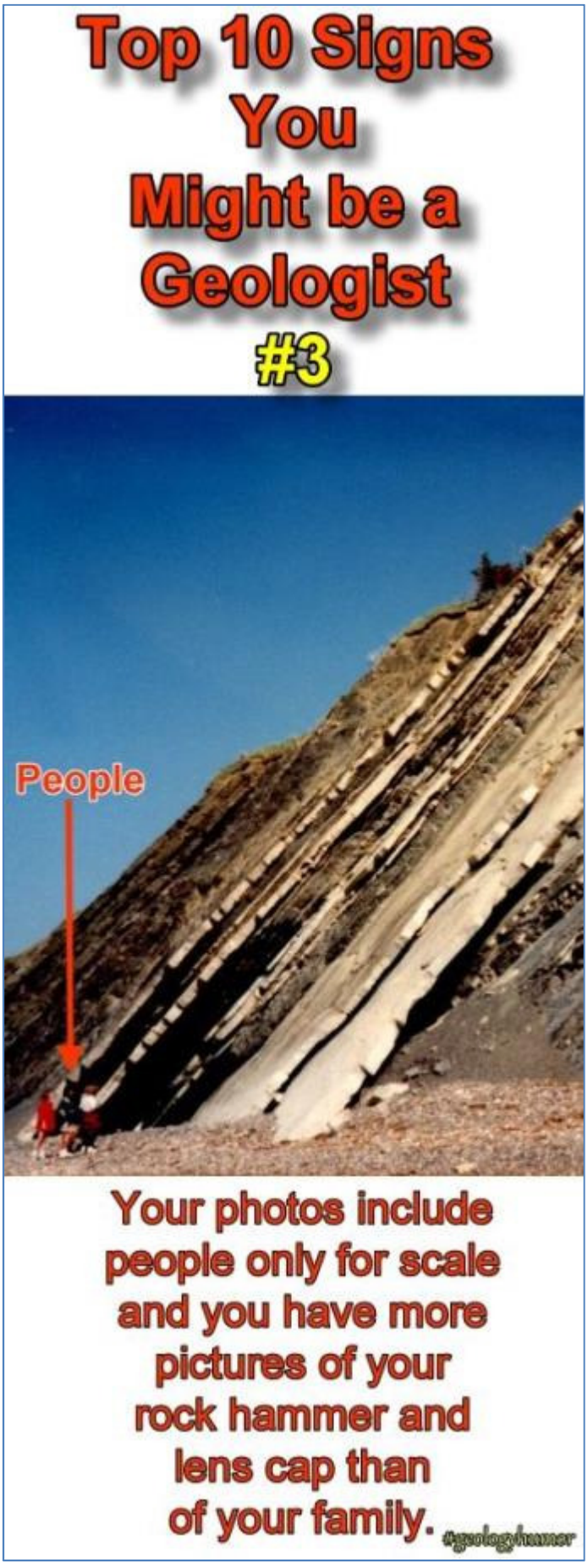
Sincerely, Leila M. Gonzales, Ph.D.
Technical Specialist
American Geosciences Institute
4220 King Street | Alexandria, VA 22302 | USA
www.americangeosciences.org
phone: 703.379.2480 ext. 103

DATES TO REMEMBER

September 27, 2018 - **Annual Pedro de Alba Lecture in Geotechnical Engineering**. Guest speaker Dr. Harry G. Poulos from the University of Sydney, Australia. Also planned is a technical afternoon session with Dr. Poulos and another one or two speakers on the topic of deep foundations. Help us update our e-mail list. Jean Benoît, Professor Department of Civil Engineering University of New Hampshire Kingsbury Hall, W 177, Durham, New Hampshire 03824 jean.benoit@unh.edu.
Website for The University of New Hampshire Annual Pedro de Alba Lecture
in Geotechnical Engineering -
http://unh.edu/geotech/Geotech_deAlba%20Lecture.html

October 12th - October 14, 2018 - **NEIGC** - Hosted by the Natural Sciences Department at Castleton University and The Geology Department at Colgate University. The conference location will be in Lake George, NY. Friday night reception and Saturday night banquet at the Fort William Henry Hotel. The conference will honor Bruce Selleck and William Kidd and their numerous contributions to our understanding of the geology and geological evolution of the Adirondacks, the Taconics, and the Champlain Valley. We hope to have field trips that include the bedrock and surficial geology from the Adirondacks, Taconics, Champlain Valley, and Green Mountains. If you are interested in running a field trip or if you would like more information please contact: ISBN: 978-0-922152-61-2
Tim Grover (tim.grover@castleton.edu)
Helen Mango (helen.mango@castleton.edu)
Martin Wong (mswong@colgate.edu)
William Peck (wpeck@colgate.edu)
http://w3.salemstate.edu/~lhanson/NEIGC/Conference.html

October 18, 2018 – **GSNH annual dinner meeting** and elections at Makris with Meredith Kelly of Dartmouth College speaking on The Ice Age in the Tropics - a Perspective from the Rwenzori Mountains of Uganda.



THE NH GEOLOGICAL SURVEY GROUND WATER LEVEL NETWORK SUMMARY Submitted by Josh Keeley of the NHGS

The NHGS posts 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.

Resident frog at the Campton well in late July, 2018.

BOD SLATE FOR ELECTION - FROM YOUR GSNH NOMINATING COMMITTEE

The following slate of candidates for the GSNH Board of Directors is offered for your consideration (as per the GSNH Constitution and By-laws). Current GSNH members may vote on the slate of nominees at the GSNH Fall 2018 Annual Dinner Meeting, on Thursday October 18, 2018 at Makris Lobster and Steak House in Concord. Write-in candidates are also welcome.

President – Wayne Ives Wayne was graduated with a geology major at Albion College in Michigan. He worked in groundwater exploration consulting for ten years conducting geophysics, drilling and testing wells, and managing projects in New England, New York, California, Georgia, Virginia and Sudan. He left consulting to work for the Superfund Program at the Department of Environmental Services, where he quickly began managing several Superfund Sites while serving as the Program's hydrogeologist. After seven years in Superfund, Wayne transferred to the Water Division to become the state's Instream Flow Specialist where he has been working for 18 years protecting stream flow quantities and managing water withdrawal issues.

Society VP – Doug Allen - Doug is a Senior Hydrogeologist and Project Manager with Haley & Aldrich, Inc. in Bedford, specializing in environmental site investigations and remediation, application of GIS to environmental projects, engineering geology, and hydrogeological studies. He is a licensed PG in New Hampshire and New York, with a MS in geology from Lehigh University and a BA in Environmental Science from the University of Rochester. Doug has played an active role in GSNH since joining in 2002, volunteering on the membership committee (maintaining the membership database, preparing member directories, and communicating event information to members) since 2004 and previously served on the Board of Directors as Secretary, Society Vice President, and Member-at-Large. Doug and his family live in Warner where he serves on the Town's Conservation Commission. Doug appreciates the professional fellowship that GSNH brings to the geological community of New Hampshire and looks forward to ongoing active participation.

Council VP – Thomas Fargo - Tom received his Bachelors and Masters Degrees in geology from the State Universities of New York at Fredonia and Buffalo, respectively. He moved to Dover, NH in 1988 to pursue a Ph.D. in geology at UNH. Tom spent many years working in environmental consulting, primarily in New England, before "retiring" in 2000. During a nine-year sabbatical he engaged in many citizen volunteer pursuits, including serving in the NH House of Representatives in 2007-08. Tom returned to full-time employment with the NH Department of Environmental Services in 2009 and is currently working as a Project Manager in the Oil Remediation and Compliance Bureau. Tom is a licensed NH Professional Geologist and a long-time member of the GSNH.

Treasurer – Abby Fopiano - Abby Fopiano is the Water Well Program Manager at NH DES. Abby has extensive experience from work as a consultant developing and permitting public water supply wells in MA and NH. She also has expertise in the private sector managing operations associated with an analytical laboratory, water system operations, water well pump installation and well drilling. Abby is NH Professional Geologist, has a Geology degree from the University of Montana and a masters in Hydrology from the University of New Hampshire. She's been serving as the Society's webmaster for the last four years, and has served two terms as a Member-at-Large.

Secretary – Shane Csiki - Shane serves as the Fluvial Geomorphologist, and Administrator of the Flood Hazards Program in the New Hampshire Geological Survey. He earned his Ph.D. in Geography from the University of Illinois at Urbana-Champaign in 2014, and this past year, earned a Master's of Public Administration from the University of New Hampshire at Manchester. Shane's professional interests include river processes, flood hazards and water resources issues. He is enthusiastic about the mission of state geological surveys and in organizations dedicated to a healthy earth science community, as GSNH fulfills in New Hampshire. His personal interests include books, and studying the history of places and our nation's roads and highways.

Member-at-Large (Three Positions)

Sharon Lewandowski - Sharon is currently a Geologist at the NHDES in Concord, New Hampshire and is a registered P.G. in New Hampshire and North Carolina. She grew up in New Hampshire and earned her B.S. and M.S. in Geology from Bowling Green State University in Bowling Green, Ohio. Sharon started at AECOM when she moved back to New Hampshire in 2014 after working as a Hydrogeologist for eight years in Greenville, North Carolina. She has been a member of GSNH since

2015 and is excited about her continued involvement with the geological community in New Hampshire.

Bill Abrahams-Dematte - Bill is a Project Hydrogeologist/Scientist for AECOM Environment in Chelmsford, MA and Manchester, NH, where he has worked for the last 17 years. Prior to AECOM, Bill worked for Continental Placer in Laconia, NH, as a private consultant in Williston, VT, and for the Vermont Association of Conservation Districts in Montpelier, VT. Bill specializes in environmental site investigations, site characterization and remediation, hydrogeological studies, data management, GIS, and geotechnical work. Bill has been a member of the GSNH for the last 17 years and has held several positions with the Board of GSNH: Council VP for a 1-1/2 year term (2010-2011), Webmaster for the GSNH website (2011-2013) and Treasurer (2013-present). His other professional associations include the GSA, NGWA, and AIPG societies as well as being a New Hampshire, Tennessee, & New York licensed PG. Bill lives in Wilton, NH and appreciates the GSNH for providing a means to being more connected with the New Hampshire geological community, for the excuse to go out and hike around on a bunch of rocks, and for the opportunity to meet new people.

Jennifer Lambert - Jenny is a Senior Project Hydrogeologist with the Nobis Group in Concord, New Hampshire, working primarily on issues related to contaminant transport in groundwater. She has a B.A. from Hamilton College and a M.Sc. from the University of Waterloo, both in geology. She worked in environmental consulting in Massachusetts and then in Pennsylvania before moving to New Hampshire in 2012. Jenny is a licensed Professional Geologist in Pennsylvania and New Hampshire. She has been a member of GSNH for 5 years, and would like to become more involved with GSNH and the greater geological community.

Geological Society of New Hampshire

Topic: The Ice Age in the Tropics - a Perspective from the Rwenzori Mountains of Uganda
Speaker: Meredith Kelly, Department of Earth Sciences, Dartmouth College

Thursday, October 18, 2018
Location: Makris Lobster House Restaurant
354 Sheep Davis Rd, Concord, NH 03301

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

RSVP by 4 pm Friday, October 12, 2018 to get the reservation price
SPACE AT THIS VENUE IS LIMITED T0 80...RESERVE EARLY!

Advance Reservations: _____Member (Dues Paid) $27.00
_____Non-member $30.00

_____**Please indicate special food issues – leave blank for none.**

- Member at the Door $29.00
- Non-Member at the Door $32.00
- Students $10.00 with valid student ID card (Reservation Requested)

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

Reply via e-mail to: Sharon.Lewandowski@des.nh.gov
Mail to: **Sharon Lewandowski**
GSNH Dinner Meeting, PO Box 401, Concord, NH 03302.
Checks payable to: GSNH.

Name(s) _____

Address: _____
Your phone or e-mail: _____

The dinner and lecture program counts as 1.5 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:

(Employer): _____

_____

_____

Home Telephone: _____

Office Telephone: _____

New Hampshire PG # (if applicable) _____

Education: Degrees received or in progress:

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 (Newsletter or Website, circle preference)
__ Other:

Membership Category:

_____ 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: _____