



THE GEOLOGICAL SOCIETY OF MINNESOTA

News

*Volunteer
opportunities,
field trips,
lectures, and
public service,
since 1938*

From the President's Desk...

It was wonderful to see all of you for the in-person lectures this past fall. Our attendance numbers are continuing to rebound, and that is great. As I am writing this letter, we are not sure what room we will have for the spring semester lectures; but we should know by the time this is published. Keep checking the website for updates and watch your email.

We are now in the full grips of winter. With the freezing and thawing, this year the rocks are breaking apart, exposing their hidden wonders for us to find in the spring and summer. So it should be a great year for collecting.

The lectures for the second half of the year have been set, and it looks like Steve Erickson has outdone himself again. Thank you Steve. Also if the weather looks sketchy, watch your email for any last minute changes or cancellations.

Alan Smith has been hard at work updating and improving the GSM website. It will be much easier to use and should be coming on-line in the near future – if it is not already live. Thanks Alan!

Links to past lectures are now on our Facebook page for your viewing pleasure, so if you missed one or want to go back and watch it again you now can. Thank you Patrick Pfundstein.

I also want to thank Kate Clover, Mark Ryan, Harvey Thorleifson and Rich Lively for putting together such a great newsletter. It's fun reading about members' travel adventures, historical GSM news and the member profiles. Remember, you are welcome to submit stories of your travels, a book review or info on your favorite site for geology-related news. Contact Kate with questions or story ideas.

On Saturday 02/18/2023, Jeff Thole will host a lab at Macalester College from 10:00 to 12:00. The topic will be the Rock Cycle (Hand Identification). This will be another great lab, so bring your unidentified rocks and minerals, and we will try to figure out what they are. Location: Olin-Rice Science Center (Building 14), Room #100.

It is a few months out, but our annual Spring Banquet is scheduled for May 8th at the U Garden. Put that event on your calendar now. Look for an email notice as the date gets closer. I look forward to seeing you there for great food, lively conversations, and an interesting lecture from Justin Tweet on the Geologic Resources Division of the National Park Service. He's titled his talk "Snorkeling at Shadow Falls: Fossils of Minnesota."

Roger Benepe



GSM President, Roger Benepe

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GSM Field trip, 1940, Owatonna, Minnesota; Castle Rock.



GSM

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The Geological Society of Minnesota is a 501(c)3 nonprofit organization.

GSM Mail Address: Send all GSM membership dues, change of address cards, and renewals to: Joanie Furlong, GSM Membership Chair, P.O. Box 141065, Minneapolis, MN 55414-6065

Membership categories and dues:

Student (full time)	\$10
Individual	\$20
Family	\$30
Sustaining	\$50
Supporting	\$100
Guarantor	\$250

Individual and Family memberships can be renewed for 1, 2, or 3 years. Members donating at the Sustaining, Supporting or Guarantor levels will have their names highlighted in the GSM membership directory.

GSM News: The purpose of this newsletter is to inform members and friends of activities of interest to the Geological Society of Minnesota. GSM News is published four times a year during the months of February, May, August and November.

Newsletter contributions welcome:

GSM enthusiasts: Have you seen interesting

geology while traveling? If so, please consider sharing your experiences with others through our GSM Newsletter. Write a short article, add a photo or two and send it in. Deadline for submission is the first of the month before the publication date. Send your story to newsletter editor: Kate Clover, kclover@fastmail.fm Thank you in advance.

GSM Board Membership:

The GSM Board consists of members who have a special interest in advancing the goals of the society, including lectures, field trips, and community outreach. The Board currently has ten members, and our bylaws limit terms to four years to encourage turnover, and a change of perspectives and ideas.

The Board meets quarterly, on the second Thursdays of February, May, August, and November, or on a different date if conflicts arise. In-person meetings are from 7-9 PM at the Minnesota Geological Survey at 2609 W. Territorial Rd, St. Paul, MN 55114.

Board meetings are open to all GSM members. If you are a new or long-time member and Board membership is of interest to you, please consider attending a meeting. If you have a topic you would like the Board to consider, please contact Roger Benepe, rbtrilobite@gmail.com

Welcome New Members!

Vanessa Francisco, St. Paul
 Ursula Lang, St. Paul
 Steve Morgan & Suzanne McKay, Edina
 Eugene Ollila, Mpls

GSM Spring Banquet

Mark your calendar! We'll gather at the U Garden on **May 8th** for our Spring Banquet. Arrive after 5 for dinner from the menu or the buffet. The lecture will begin at 7pm.

Institute for Lake Superior Geology Annual Meeting April 2023

The Institute on Lake Superior Geology is a non-profit professional society with the objectives of providing a forum for exchange of geological ideas and scientific data and promoting better understanding of the geology of the Lake Superior region. The major activity of the Institute is an Annual Meeting with geological field trips and technical presentations. The annual meeting for 2023 will be held in Eau Claire, Wisconsin in April 2023. The meeting will be held at The Lismore in Eau Claire with

pre-meeting trips on Sunday April 23, the technical meeting on the 24th and 25th, and post conference trips on the 26th.

For more information, see the ILSG website: <https://www.lakesuperiorgeology.org/index.html>

GSM Member Profile

Tom Erickson



Tom Erickson checking out the columnar basalt along the coastline at Vik, Iceland

1. How long have you been a GSM member? What got you involved? Why do you stay involved?

Five to six years. I was approaching retirement and looking for activities that were in line with my interests. As geology was a childhood interest, GSM was an obvious avenue to explore. I began by attending lectures. I continue to be involved both for lectures and the field trips.

2. What originally sparked your interest in geology? What interests around the geosciences do you have today?

As a young child – age 8 or 10, I happened upon a fossil in a crushed limestone parking lot in Omaha. Not long after that our neighbors installed a patio that featured crushed limestone, and I found more! This sparked an interest in geology that lasted through Junior High, and I was excited about the sole geology course I'd heard was offered in High School. However, the counselor advising me about which courses I should take advised against this class. I was taken aback. He explained that geology was for the dumb kids, and that I was smart and would need to take biology and zoology so that I could become a doctor. I am sorry to report that I accepted this 'expert's' advice, and ended up hating zoology.

I did not return to geology when I went to university, but followed a meandering path that eventually led me to a career in technology design during which I worked for a small startup, then Apple, and then IBM. In my latter years at IBM, I was involved in a project that was applying artificial intelligence to oil exploration, and I got a crash course in petrology. I was intrigued to discover that, in a sense, many oil deposits are macro-fossils, their contours echoing the forms of craters, braided river beds, and other geomorphic features. I think this small 'aha' on my part resonated with my childhood fascination with fossils, and when I began 'practicing' for retirement a few years later, pursuing geology seemed like an obvious direction. I began taking geology courses at the University of Minnesota,* and joined the GSM and began attending lectures.

* Should readers not be aware, anyone 62 ½ years or older can take courses at the U (or any State of Minnesota institution)

for free (or \$10/credit); thus far, I've taken *Introductory Geology, Mineralogy, Petrology, Geomorphology, and Rocks in Space*.

3. What do you dig about the GSM?

Field trips. And the lectures.

4. What is your favorite geology-related travel destination? And why? What field trips have you taken with GSM?

I love Yosemite National Park. I go there once or twice a year for a week of hiking, and it's been interesting to experience the way my view of it has changed as I've learned more about geology and geomorphology. I've explored the three glacial moraines in Yosemite Valley, surveyed the surprisingly diverse types of granite throughout the park, and marveled at the anomalous metamorphic rocks at May Lake, in the middle of what is otherwise an entirely igneous province.

I have been on several field trips with the GSM. My favorites have been the longer trips sponsored by the Institute for Lake Superior Geology: one to the big island of Hawaii in 2020 (just before Covid), and one last summer to Iceland. I remember, on the first day of the Hawaii trip, we had started out for our first official stop, but then pulled over to look at a road cut. Forty-five minutes later we were still there, all poking about happily, and I realized I'd found my people!

5. Favorite geology related book?

I have just finished reading "Otherlands," by Thomas Halliday, who is an evolutionary biologist and paleontologist. Published in 2022, it is both a superb science book (50 pages of references), and it has remarkably lyrical and compelling descriptions of ancient ecosystems.

6. Anything else? Collections?

Being at an age where I am averse to accumulating more stuff, I am grappling with the tension between minimalism and the desire to have a 'few samples' of interesting rocks. My current plan is to limit myself to two types of specimens: cobbles from the shore of Lake Superior, one side cut off and polished to reveal the internal structure of the rock; and rocks that are of rheological interest, primarily various forms of lava, but also a ventifact or two.

Notes from the Past

GSM News, November 1943

EDITORIAL, ALGER R. SYME, EDITOR

This is the second issue of THE MINNESOTA GEOLOGIST. We don't know yet whether this little effort will 'die aborning' or not. We are going to make every effort to continue it, but the item of expense continues to worry us, and as yet, remains unsolved. As nearly as we can estimate it, publication for eight months would cost approximately \$100.00. It is still, therefore, an experiment.

It occurred to us that you would like to know something about our officers, and other prominent members of our Society. Accordingly, with your permission, therefore,

we will include a "Thumbnail Sketch" of one of them in each successive issue of this publication. Your comment on this feature will be welcomed.

Mr. Hanley's condition is unchanged. He is mentally alert as ever, and enjoys keeping up with the news. If you haven't sent him a card, you might do so at Thanksgiving time.

Dr. Thiel's course on Historical Geology is well started, and is being immensely enjoyed by those in attendance. Average attendance so far is over 80.

The officers regret that it was necessary to put off the meeting on November 8th, but as the subject of this lecture is the Biwabik Iron Formations of the Mesabi Range, they felt that no one would want to miss it, and that in fairness to those who couldn't attend, it was better to continue this lecture until November 15. The date of all future lectures in this course will be put ahead one week.

We have received a number of complimentary letters upon the first issue of this publication, with such expressions as "splendid, well worthwhile, very fine, good for the Society", etc., etc. We would like to hear from more of you, as to whether you think there is sufficient benefit to the Society to warrant the effort involved.

The EOS Science News by AGU

Weekly, I receive The EOS E-Alert with Earth and Space Science news from the American Geophysical Union. The weekly blog includes links to two-to-four page articles about the earth and oceans sciences, health and ecosystems, education and careers and more. Articles are not too technical. And it's free! Get EOS in your mailbox: click here: <https://eos.org/newsletters>

These are among the articles I've recently found interesting:

New Tectonic Plate Model Could Improve Earthquake Risk Assessment, 21 December 2022 | Morgan Rehnberg

Even at the Bottom of the World, the Ocean Is Belching Plastic, 17 January 2023 | Bill Morris

How Animals May Have Conquered Snowball Earth, 9 January 2023 | Chris Baraniuk

Kate Clover

2023 MESTA Conference

The Geological Society of Minnesota has been privileged to be a part of this event for many years, providing information on the GSM organization and the Lecture schedules. This year was particularly exciting as we donated "Bedrock Geology of Minnesota" cards gifted to us by the Director of the Minnesota Geological Survey, Dr. Harvey Thorleifson. Postcards featuring "Yellowstone National Park" were given to us by Justin Tweet, and some "Splendid Sands" calendars donated by GSM's Kate Clover were also given away. Kate was also instrumental in producing these beautiful calendars. Additionally, we gave away about two-dozen "permissioned" hash slabs containing Ordovician fossils. Our table was very busy!

For those of you who would like to know more about this conference, you can check out the MESTA web page containing information about this year's event, as well as past MESTA Conferences, at:

[2023 MESTA Conference - Minnesota Earth Science Teachers Association \(mnearthscience.org\)](https://mnearthscience.org). Then, mark your calendars for the first Friday in February for the 2024 MESTA Conference and sign up!

Theresa Tweet



Theresa Tweet sharing information with teachers about GSM

2022 GSM Holiday Party

After missing two years due to COVID-19, Sandy & Ed Steffner once again hosted a favorite GSM tradition on Saturday, December 10, 2022: the GSM Holiday Party. Guests started arriving at 3 PM to this potluck celebration, with ample appetizers and punch to keep us satisfied until the main meal started shortly after 5. No one left hungry. Around 28 people attended, from as far away as Duluth. Most attendees were veterans of previous holiday parties, but I was very glad to see some new faces as well. As always, after dessert was served, our host Ed brought out his accordion and led us through a sing-along of our cherished "geology carols" – holiday tunes with the lyrics adapted for geology and paleontology. While our singing won't win any awards, we had a great time singing (and laughing and groaning) through GSM classics such as "The 12 Days Revisited (As Based on Hard Rock Science)" and "Rockin' around the Christmas Tree".

As it happened, the following evening our lecture was "Hunting for Dinosaurs: The Search for Ancient Giants" by Alex Hastings of the Science Museum of Minnesota. We thought our carol "Deck the Halls with Bones of T. rex" would be highly appropriate. Mary Helen Inskeep obliged by entertaining us, sans accordion, with a great rendition during Cookie Break.

Ed and Sandy, thanks for once again bringing us a great evening of fun, conversation, food, and music, with your hospitality.

Dave Wilhelm

Fall 2022 Lecture Attendance

Fall 2022 brought GSM back to live lectures for the first time since the pandemic started. As expected, attendance has not returned to pre-COVID levels, but has reached

very respectable numbers. For the seven lectures, our total attendance was 399, an average of 57. By comparison, average attendance for fall 2019, just before the pandemic, was 88. Our best attended lecture, with 77, was “Ice Age and More Recent Extinctions: First Signs of Human Impacts on the Earth System” on November 28. This past fall, we had over 13 new attendees (this information was not recorded for each lecture). As usual, some new attendees came because of a friend’s recommendation or by finding our website. However, a significant number came because they visited our booth at the Rock and Mineral Show this past September.

Dave Wilhelm

Inside the Volcano

As Kate Clover and Jack Matlock related in the November 2022 issue of this Newsletter, last summer 16 intrepid souls participated in a two-week circumnavigation of Iceland, with detours to the interior, organized by the Institute on Lake Superior Geology (ILSG). Our leaders Phil Larsen, Al MacTavish, and Peter Hinz are professional geologists who had led similar trips numerous times, and we learned much from them, both of the geology and the culture of this island nation. This trip has material for a dozen Newsletter articles; today, I am writing of our adventure “Inside the Volcano” on our last full day in Iceland.

Inside the Volcano is a unique experience: Thrihnukagigur (Icelandic: Þríhnúkaígur) is the only volcano in the world where visitors can take an elevator and safely descend into a magma chamber. If you think that sounds exciting, you are right!

First, a bit about the volcano: Thrihnukagigur volcano is dormant (of course!) – it last erupted over 4,000 years ago. There are no indications of it erupting again in the near future. The volcano’s name, mostly unpronounceable for anyone but locals, can be directly translated as “Three Peaks Crater.” The name comes from cave explorer Árni B. Stefánsson, who discovered it in 1974 and was the first to explore the vault. For years, Stefánsson pleaded the case for making it accessible; it opened for tourism in 2012. The three craters (one of which we descended) are prominent landmarks, standing against the sky on the highland edge, about 13 miles southeast of Reykjavík.

Our tour started with bus pickup at our hostel. (We were on a budget in Iceland.) Although it was August, the weather was heavily overcast and quite chilly and windy. About a half hour later, we arrived at a ski chalet surrounded by idle ski lifts. Given the weather, I was wearing about four layers, over which I was fitted with a full-length, bright yellow raincoat. After initial instructions, our group set out on the walk to “Base Camp.” This walk was quite the experience: two miles over well marked flat terrain through driving sleet (in August!); I was glad to be wearing all my layers, which were adequate but certainly not overkill. Base Camp was formed from three work sheds, normally used for construction workers. The sheds were brought in by helicopter, just like everything else on location that’s too

heavy for human transport. They’ve renovated the place to make it feel both warm and cozy. The Base Camp staff made us feel right at home when we arrived after the hike.

After warming up for 20 minutes, we geared up for the main attraction, the descent. Helmets and harnesses were required too, plus the raincoats, as we still had a few hundred yards to walk to the lift. This trek was up the slope of the cone. The rope handholds along the path were necessary to prevent us being knocked over by the gale-force winds.

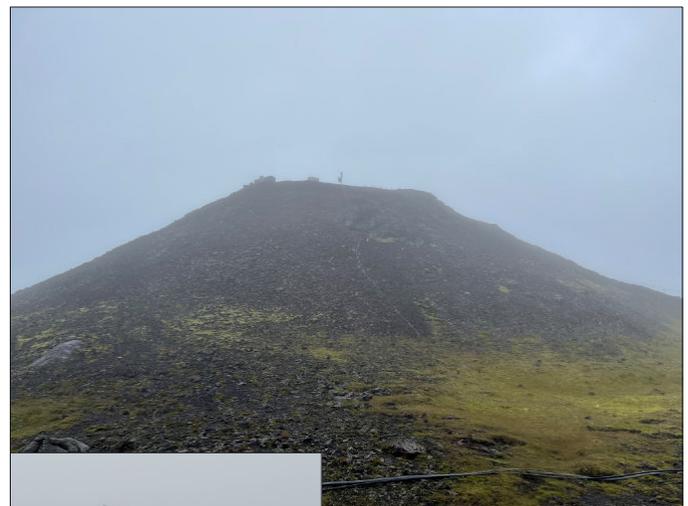
At the top of the cone is a



Base Camp (Kate Clover)



Kate, Maggie Upton, & Susan Brink harnessed up for the descent



Thrihnukagigur cone (Kate Clover)



Our ascent of the cone through nasty weather

funnel-shaped opening, about 12×12 feet wide. There is an innovative method to lower visitors down through the crater’s opening - a system that’s normally used

to carry window cleaners on the sides of skyscrapers – an open elevator. A basket that holds six to seven people is connected to a truss that spans the crater opening. Massive cables move the basket up and down the bottle-shaped vault. For safety, we were connected by harness first to the walkway across the opening, then to the basket in which we descended. Several guides, all highly



On the walkway to the lift (Maggie Upton)



In the lift ready to descend



Looking down into the abyss

Liberty into the chamber. So make no mistake – it’s huge! The interior was well enough lit that I got decent photos with my handheld camera (although I discarded quite a few as too blurry).

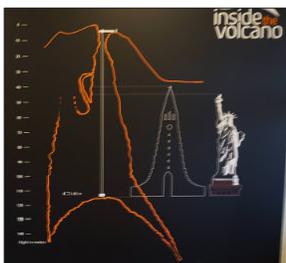


Diagram of the volcano



Poster showing the descent

trained and experienced mountain guides and cave explorers, were with us at all times. The 400-foot journey took about six minutes. The slow speed ensured our safety, but also provided us the opportunity to enjoy the amazing scenery. The lift is as large as the opening allows; we could hear it scraping the walls at the narrowest points. Near the top, where sunlight reaches, lichens cover the rock surfaces. These disappear as we descend farther. And of course there was no wind once we pass the neck of the volcano.

As we descend, the magma chamber widens considerably into a bottle-shaped volcanic vault, measuring 160x220 feet at the bottom. Ample artificial lighting highlights the vivid colors in the chamber. Beyond where we could walk, volcanic passages continue down to the southwest, to a total depth of about 700 ft.

The various bright colors in the crater add to its splendor, and its size is enormous – and to some extent intimidating. To put it in context, the base is equivalent to almost three full-sized basketball courts planted next to each other and the height is such that it would easily fit a full-sized Statue of

Liberty into the chamber. So make no mistake – it’s huge! The interior was well enough lit that I got decent photos with my handheld camera (although I discarded quite a few as too blurry). This is a one-of-a-kind chamber. A magma chamber is often referred to as the heart of a volcano. It’s there that the liquid rock waits to find a way through to the surface, causing a volcanic eruption. In most cases, the crater is plugged after the eruption by cold, solidified lava. Thrihnukagigur volcano is a rare exception to this, because the magma in the chamber seems to have disappeared. It’s believed that the magma solidified into the walls or simply retreated back into the

depths of the Earth. It’s like somebody came and pulled the plug and all the magma ran down out, revealing the rift beneath the surface.

We spent a good 30 minutes at the bottom of the chamber. During that time, we saw the lift ascend twice returning earlier adventurers and descending again with new ones. There is a short trail around the bottom of the magma chamber. Although there were plenty of handholds, I was glad I had brought a walking stick to help negotiate the very uneven terrain in the low light. Although helmets are required, in fact the interior of the magma chamber is very stable (and a helmet would protect only from the smallest rocks falling from such heights).

The guides explained that when they close the site for the season, they spread tarps along the bottom. When they return in the spring, they never find newly fallen rocks.

On the way back from the crater, we made another stop at Base Camp; this time we were greeted with bowls of hot soup, both vegetarian and with lamb. This was particularly welcome on such a nasty day. It was all you can eat, so we had our fill. Base Camp is also the only



Columnar jointing on the magma chamber wall



The lift on its next descent



We wait for our return ride to the surface, below a cavity in the chamber wall



The hot soup tasted great! Clockwise from lower left: Al MacTavish (co-trip leader), Graham Wilson, Jack and Jeanne Matlock, Duane Hasagawa and Barb Heideman



Arctic fox near Base Camp (Kate Clover)

place on Earth where you can buy Inside the Volcano products and souvenirs. I bought a T-shirt as my souvenir from Iceland.

While in Base Camp, we were delighted to spot a few arctic foxes, the only land mammals native to Iceland. They came to this

isolated North Atlantic island at the end of the last ice age, walking over the frozen sea. Also known as the white fox, polar fox, or snow fox, it is a small fox native to the Arctic regions of the Northern Hemisphere and common throughout the Arctic tundra biome. It is well adapted to living in cold environments, and is best known for its thick, warm fur that is also used as camouflage. We saw them in their dark summer coats, although it felt and looked far from summery that day. Although I was not quick enough to get any photos of these elusive creatures, fortunately Kate was.

All that remained was another two-mile trek through the still driving sleet back to the ski chalet, and a bus ride back to Reykjavik. This adventure on our last full day in Iceland certainly was an exclamation point to end our trip, an experience that I will always cherish. If you visit Iceland, don't miss this opportunity (but I do wish you better weather). Photos by Dave Wilhelm except as noted.

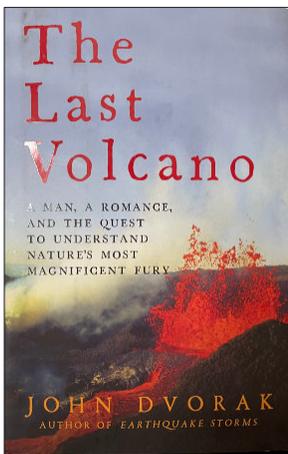
Inside the Volcano website: <https://insidethevolcano.com/>

Dave's photos: <https://tinyurl.com/ILSG2022IcelandDay14>

Dave Wilhelm

Book Review

The Last Volcano: a Man, a Romance, and the Quest to Understand Nature's Most Magnificent Fury, by John Dvorak. Published 2015.



The Last Volcano - Book Jacket

This book is about Dr. Thomas Jaggar and his legacy. Foremost, he was the founder of the Hawai'i Volcano Observatory (HVO) at Kilauea volcano, one of the world's most active volcanoes. But far more, over his fifty years studying Kilauea and Mauna Loa Volcanos and Halema'uma'u (the crater at the summit of Kilauea), plus other volcanoes around the world. He and others made great advances in understanding volcanoes as well as building instruments to monitor volcanic related activity.

From the book's first pages, I was drawn in. The Last Volcano begins with the 1902 eruption of Mount Pelee on

the small Caribbean island of Martinique and the story of a boat, adrift and overtaken by the eruption cloud which destroyed the city of St. Pierre and killed about 26,000 people. Jaggar was at Harvard when Mount Pelee erupted; and in short time, he found a sailboat that would take him to the Caribbean. Experiencing the aftermath of the eruption refocused Jaggar's career. He knew he had to study volcanoes and learn the signs of impending eruptions in order to reduce human losses from future events. Visiting St. Pierre after the eruption, he realized he had seen this destruction before. At age thirteen, he had visited Pompeii with his family; for Jaggar, that was the most exciting city on his family's European trip.

Eventually Jaggar visited Hawai'i where he saw Halema'uma'u Lava Lake with its sputtering molten lava. He was entranced. Returning to Harvard, he tried repeatedly to find support and funding and to convince people that a "geonomical observatory" was needed at the volcano. Finally, in 1912, Jaggar secured funding and established a small science station on the edge of the Kilauea's crater.

In this non-fiction geology book, with language that is not too technical, Dvorak tells of the early years of volcanology and Jaggar's fifty years of studying volcanoes in Hawaii, at Vesuvius, and in Yellowstone, Alaska and Japan. The book chronicles how Jaggar's HVO grew from a small structure to a world-class facility. Many of the volcano monitoring techniques used worldwide today were first developed and tested at HVO. The book also tells of the contraptions they rigged up (and repeatedly modified) to probe lava temperature, to sample the gases, and to detect and record earthquakes. Curiously, Jaggar also built the first amphibious landing vehicles (think Duck Boats), plans for which were later modified by the US military to transport troops and goods over land and water during the Second World War.

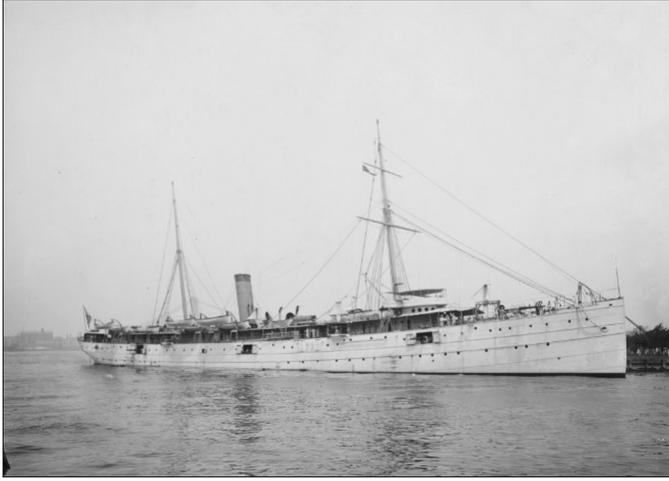
The book tells of his painful first marriage, and the story of Isabel Maydwell, a widowed school teacher who went to Kilauea after her husband's death. She and Jaggar eventually married, and they lived in a small house overlooking the lava lake. Together, they ran the science station and chronicled the island's volcanic activity for more than twenty years.

Author John Dvorak, PhD, who has studied earthquakes and volcanoes around the world, examined thousands of documents in preparation for this book including many written by Jaggar, who himself, tried to write 2000 words daily documenting what he and his staff were observing and learning. The book also tells of other early scientists who were drawn to study volcanoes on the Aleutian chain in Alaska, Vesuvius in Italy, and Sakurajima in Japan.

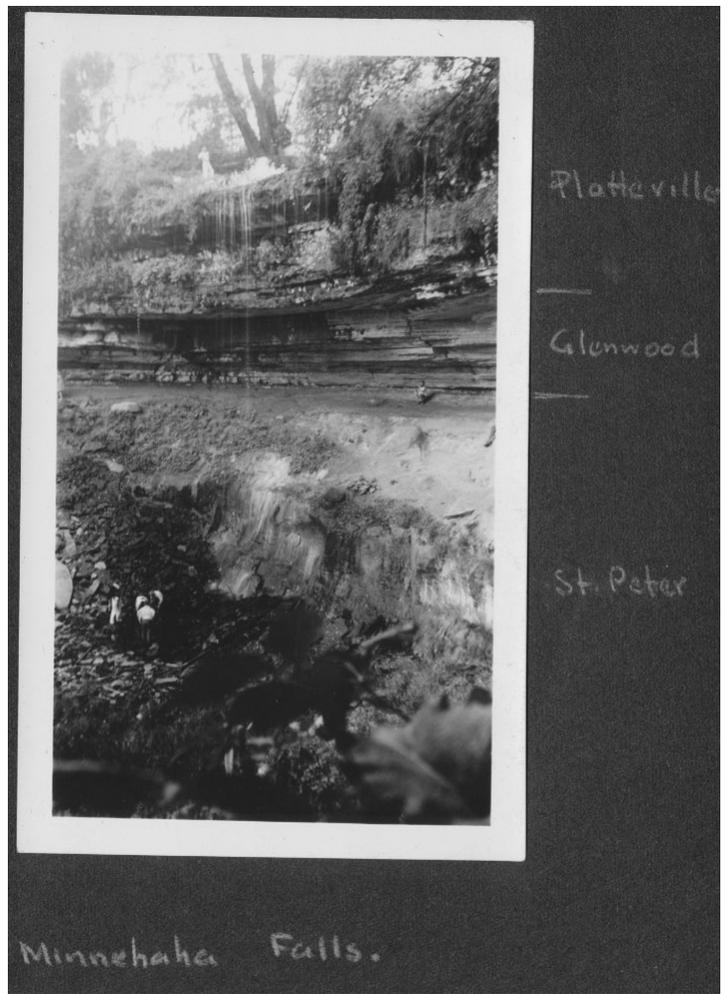
Photos are included in the book. My favorites are those of Jaggar's first amphibious vehicles and the photo of a geologist using headphones attached to a four-foot tall megaphone listening to steam emission near Mount Vesuvius.

I enjoyed the book: learning about the early science of volcanology, picturing the risky treks to collect gas samples and probe lava temperature, and mentally visualizing the overland travels by mule and horse or the arduous hikes chasing the volcanic eruptions on Hawai'i.

Dvorak has also written other books about the San Andreas Fault, the creation of the North American continent, and eclipses. I'll check those out next.



USS Dixie (1893): From May 14 to June 6 1902, the USS Dixie was on special duty, transporting provisions and relief supplies for the victims of the volcanic eruptions of Soufrière, and Mount Pelée. The USS Dixie was built as a steam brig, a two-masted sailing ship with auxiliary steam power. Photo credit: US Naval History and Heritage Command. Photoz



Minnehaha Falls Geology, GSM field trip, 1939



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