



GEOLOGICAL SOCIETY OF MINNESOTA

NEWS

SUMMER 2008
VOLUME LXII NO. 1

<http://www.gsmn.org>

Mighty Microbe

Bacillus pasteurii is one of the more useful bacteria you'll ever meet. Researchers have discovered a way to use it to turn sandy soil, treacherous during earthquakes, into stable ground. Mix urea, soil and calcium, inject a little bit of the bacteria, and voila! The cementer bug feeds on urea and deposits calcite, which cements the soil together and turns shifting sand into sandstone.

2008 Board of Directors

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International Year of Planet Earth

The International Year of Planet Earth (IYPE) was proclaimed for 2008 by the General Assembly of the United Nations in its Plenary Session on the 22nd of December 2005. The Resolution was co-signed by 82 nations.

The **aim** of the International Year of Planet Earth is to demonstrate new and exciting ways in which Earth sciences can help future generations meet the challenges involved in ensuring a safer and more prosperous world. *Continued page 5*

Read about OneGeology – a flagship project of IYPE that involves Geological Surveys of the world, including our own in Saint Paul. The goal is to create dynamic geologic digital map data for the world. (p. 3)

Announcements

Water Resources Science Seminar Series meets
Fridays, 3:00-3:50 pm
375 Borlaug Hall, St. Paul campus U of M
<http://www1.umn.edu/twincities/maps/BorH/>

U of M, Dept of Geology and Geophysics
Spring 2008 Seminar Series
Seminars are presented on Thursdays (unless
otherwise noted) at 3:30 p.m. in 110 Pillsbury
Hall, followed by refreshments
<http://www.geo.umn.edu/docs/spr2008.htm>

Apr 5 GSM Town Hall Mtg (see p.7)

May 5 GSM Spring Banquet
Grand City Buffet
8912 Hwy 7, St. Louis Park

GSM NEWS

Editor: Judy Hamilton

Geological Society of Minnesota is a 501(c)3 nonprofit organization. Paid memberships in GSM allow everyone to attend seminars and labs free of charge. The purpose of this newsletter is to inform members and friends of the activities of the Geological Society of Minnesota. GSM NEWS is published four times a year: February 15, May 15, August 15, and November 15. GSM NEWS welcomes unsolicited Geology and Earth Science related articles and photographs. Deadline for article submission is the first of the month, before the date of publication. Send all material for GSM NEWS to the address below.

OFFICERS:

Ly Preece, *President*;
Open, *Vice President*;
Ed Steffner, *Treasurer*;
Open, *Secretary*.

Directors in addition to the officers listed above: Kathy Ahlers; Dick Bottenberg; Joan Furlong; Kate Hintz; Sandy Steffner.

Send all GSM membership dues, change of address cards, and renewals to:

GSM Membership Chair:
P.O. Box 390555,
Edina MN 55439-0555.

Membership levels are \$10 Full-Time Students;
\$20 Individuals; \$30 Families

Notes from the Board

New year, new people, new plans, and we're off to a great start for the new year.

The field trip committee is already working hard, with tons of ideas* about places to take us this year. North, south, east, west - you name it, they're working on it. It's early still. Some of these will pan out, while others may have to wait for later. Please watch the newsletter and listen for announcements.

But there's one trip in particular to keep your eye on: Ed Steffner is hard at work researching a possible week-long field trip to western Kentucky after Fathers' Day. You can look forward to mines, fossils, a chance to dig our own minerals, and of course Mammoth Cave isn't so very far away. So start now to fit it into your own schedule.

Plans for the 2008-2009 lectures are also well under way. This is all still jelling, but since 2007 to 2009 is the International Year of the Planet Earth, the lectures may develop a theme around better understanding our earth, how it was created, and how we use its resources.

Three of our members - Doug Zbikowski, Randy Strobel, and Joan Furlong - staffed a table for GSM at the Minnesota Earth Science Teachers Association. They talked with teachers and told them about the GSM and its outreach programs. They handed out lecture schedules and flyers. They even gave away four of our rock boxes to a few lucky schools.

As announced at the lecture in January, we have two officer positions available to be filled, one for Vice President, and one for the board. If you've been a member for a few years and you'd like to get involved, or if you're a new member and you'd like to get involved, or if you know somebody you'd like to get involved, please talk to the nominating committee (Doug Zbikowski, or Bill Robbins) or myself.

We're off to a great start for the New Year. It's going to be fun. It's going to be interesting. Hang on and we're off!

Ly Preece
President, GSM

*Is it actually allowed to measure ideas by mass? I don't know, some of these ideas, boy they're pretty hefty. And should these be metric tonnes?

OneGeology – A Centerpiece for International Year of Planet Earth

OneGeology is an international initiative of the geological surveys of the world and a flagship project of the 'International Year of Planet Earth'. The project's aims are to create dynamic digital geological map data for the world, making existing geological map data accessible in whatever digital format is available in each country. This will create a focus for accessing geological information for everyone.

The target scale is 1:1 million but the project will be pragmatic and accept a range of scales and the best available data. Know-how will be transferred to those who need it, adopting an approach that recognizes that different nations have differing abilities to participate.

At the March 2007 kick-off meeting in Brighton, England, eighty one participants from forty three nations and fifty three national and international bodies met and agreed unanimously to an Accord, providing the governance, technical and political essentials for OneGeology. Participants at the workshop asserted that geological map data are essential to advancing science and education in order to better provide solutions to the challenges of mitigating environmental hazards, ensuring the sustainable supply of energy, minerals and water, and addressing the urgent challenge of our changing climate.

OneGeology will be managed by a Steering Group composed of representatives from Geological Surveys and Organizations and will link to an International Coordinating Committee, comprising global geoscience and related bodies. OneGeology will be cognizant of, and proactively interact with, the wider geo-spatial community. It will also set up task groups to achieve its goals. A Secretariat will be established to ensure the sustainability and continuity of the initiative; this will be based in the British Geological Survey until December 2008.

The progress of OneGeology will be presented at the International Geological Congress in Oslo in August 2008, to demonstrate the resulting increase in Internet access to the map data.

The organizing committee that is facilitating the launch of OneGeology consists of Ian Jackson of the British Geological Survey, John Broome of Geological Survey of Canada, and Harvey Thorleifson of Minnesota Geological Survey.



IF YOU ARE one of those people who enjoy trips to Las Vegas, you might want to check out the Atomic Testing Museum on your next trip. In the 1950's, tourists stood on hotel roofs in Las Vegas to watch mushroom clouds rising from the Nevada Test Site 65 miles away. Since 2005, the Atomic Testing Museum, just minutes from the Strip in Las Vegas, Nevada, displays such artifacts as devices that monitored blasts and measured radiation levels; part of an underground testing tunnel; even a grain silo used for cattle-feed tests. Films and interactive videos address the bombing of Hiroshima and Nagasaki. There is a copy of a letter Albert Einstein wrote to President Franklin D. Roosevelt urging him to build the nuclear bomb. The museum's Ground Zero Theater replicates a test-site observation bunker, with concrete walls, wooden benches, red lights and a countdown clock. During a film of an actual nuclear test, a flash of white light and bursts of air fill the room as the floor vibrates.♦

THE SEARCH FOR DIAMONDS IN MINNESOTA

Our first lecture of 2008 was presented on Jan. 28th by Harvey Thorliedson, PhD, director of the Minnesota Geological Survey. The subject of diamonds proved to be a popular one; the attendance at this lecture was higher than any other lecture of this series. Dr. Thorliedson is an enthusiastic speaker, and the audience enjoyed listening and learning as he related the Minnesota diamond hunting experience to the one done in Canada in the 1980's. Canada now has several diamond mines in production.

Two Canadians who searched for diamonds for many years were instrumental in the initiation of diamond mining in Canada. Carles E. Fipke and Stewart Blusson searched for indicator minerals – minerals associated with diamonds – by taking soil samples from the areas where the geology was right. Kimberlite pipes bring diamonds to the surface, so locating a kimberlite pipe is the objective. However, most of Canada and much of Minnesota was covered by glaciers many times. With each glaciation, more and more rocks, soil, and diamonds were scraped off of the surface and dragged along the path of the glacier. This complicated things greatly. Soil samples had to be taken over many miles, following the path that the glaciers took. Looking for diamonds is literally, like looking for a needle in a haystack.

As the soil samples were analyzed, geologists looked for pyrope garnet, ilmenite, spinel, diopside, and olivine... and of course, diamonds. These minerals are typically found along with diamonds in Kimberlite pipes. Indicator minerals were not always found, or if present were very scarce. A 5-gallon pail of sediment might yield as little as 3 grains of garnet. Following the path, or “plume” of indicator minerals lead the explorers closer to the source. This slow, laborious, and expensive process eventually led the Canadians to their first diamond mine, the Ekati Mine, which now employs over 900 people.

Watch out! It's the cookie stampede at the break. →



Before the Lecture, Dr. Thorliedson chatting with Ly Preece, President of the Geological Society of Minnesota

Why would we expect to find diamonds in Minnesota? Dr. Thorliedson pointed out that most diamonds are found in Archean Craton, and Minnesota, along with Canada, as a lot of that, close to the surface. Dealing with the mess that the glaciers left has deterred diamond exploration, until now. The Minnesota Geological Survey has conducted an exhaustive and systematic sampling of sediment across the state, just like the one done in Canada, looking for indicator minerals. And yes, indicator minerals were found, suggesting that western Wisconsin and eastern Minnesota might be a source of diamonds.

If you want to learn more about the process of hunting for diamonds, there are a couple of books out, about the Canadian hunt: “Fire Into Ice: Carles Fipke and the Great Diamond Hunt”, and “Barren Lands”.♦



GOLD MINE FOR SCIENCE

In July 2007, the National Science Foundation (NSF) announced the selection of the Homestake Gold Mine near Lead, S.D., as the site of a national deep underground science and engineering laboratory. Currently scientists can carry out experiments as deep as 730 meters below ground at the Soudan Underground Laboratory, in the old Soudan iron mine in Northern Minnesota. The Homestake Gold Mine is the country's deepest mine, and reaches depths of 2,255 meters, so scientists are very excited at the prospect of a new lab at this greater depth.

Conducting research deep underground is important to many physicists, especially those studying particle physics, because thick layers of rock shield their experiments from contamination from cosmic radiation. A variety of earth sciences – from geomorphology to hydrology to economic geology – will also benefit from going underground and taking a deeper look at Earth's crust. By working at Homestake, geologists may gain a better understanding of how fluid flows through the upper crust, or assess opportunities for carbon sequestration.

NSF's approval of the Homestake proposal provides the project with \$5 million per year for the next three years for design study of the proposed lab. After the studies are completed, the lab's construction will require the stamp of approval from NSF, the National Science Board, and Congress. The Homestake collaboration has been developing its proposal for an underground lab over the past six years. It will be several more years before full-scale construction is approved, but the Homestake collaboration already has funding from the state of South Dakota for an interim lab, as well as \$70 million from philanthropist T. Denny Sanford, which means some experiments may begin before the end of 2008. The site will be solely dedicated to scientific pursuits so researchers will be able to conduct long-term studies over many decades.♦

~Katy Paul

IYPE 2008

Continued from page 1,

The achievement of this aim will be supported by two major programs:

- Outreach Program - including educational ventures at all levels
- Science Program - concentrating on 'big issues' of complex interaction within the Earth system, and its long-term sustainability.

The initiative will seek to raise the awareness of the contribution to, and role of the Earth sciences in society in the minds of politicians, decision-makers, the media and the general public.

Governments will be urged to pay greater attention to the Earth sciences as affecting many aspects of the everyday lives of their citizens, with particular reference to applications in educational systems, governmental legislation and civil regulations, so as to take full advantage of this extensive source of expertise and experience.

The men and women in Earth science today – pure and applied – constitute the largest living database of information about the past and present of planet Earth that has ever existed. We are also stewards of planet Earth. Humanity's survival – and that of life itself – depends on maintaining a functioning Earth System. For that reason, activities that interfere with this delicately balanced system are a matter of global concern.

The International Year will support research projects within the following eight broad themes.

- **Groundwater** – reservoir for a thirsty planet
- **Hazards** – minimizing risk, maximizing awareness
- **Earth and Health** – building a safer environment
- **Climate** – the 'stone tape'
- **Resources** – sustainable power for sustainable development
- **Megacities** – going deeper, building safer
- **Deep Earth** – from crust to core
- **Ocean** – abyss of time

Each of these themes is described in a separate brochure available on the website of the IYPE. To read or download the brochures, or to learn more about the outreach program, go to www.esfs.org.

WELCOME, NEW MEMBERS

Elmer Engman
Marilyn Nelson & Larry Kalina
Tracy Nelson
Terry Shidla

**Geological Society of Minnesota (GSM) invites you to the
First Geology Town Hall Meeting**

**Sat., April 5, 2008
1 – 4:00 p.m.**

Maplewood Library (Ramsey County Library)
3025 Southlawn Drive
Maplewood MN 55109
651-704-2033

Everyone interested in geology in the state of Minnesota is welcomed and encouraged to participate in this interactive half-day event.

Hear about current Minnesota initiatives in earth science, geological technology, and education. Brainstorm in small groups on possible collaborations, how to reach new potential members, and what we need to do to develop GSM into a 21st century nonprofit. Be a part of figuring out where we fit in and what we can do.

Your active participation and ideas will help the GSM board do long-range planning for our organization.

Free Light refreshments (cookies, coffee, water) served, or feel free to bring your own beverage

Directions:

I-694 to White Bear Ave exit (exit 50)
Go south on White Bear Ave to Co Rd D
At Southlawn Dr., turn left
(library is near Maplewood Mall)

Roger Knutson found an interesting clip on YouTube about the **giant syenite crystals** found in a cave in Mexico. The temperature inside the cave is 150 degrees and the humidity is 100%, so people can only stay in the cave for 5-10 minutes. Interested? Here is the link:

<http://uk.youtube.com/watch?v=9k22meEcTBM>

**INSTITUTE ON LAKE SUPERIOR
GEOLOGY
Fifty-fourth Annual Meeting
MAY 6 – 10, 2008
MARQUETTE, MICHIGAN**

The 54th Annual ILSG will be held at the Ramada Inn, in Marquette, Michigan. The meeting consists of field trips and a two-day technical session. Additional information and registration forms available at the ILSG website:

<http://www.lakesuperiorgeology.org/>

Highlights of Upcoming lectures...

Feb. 25 GEOLOGY OF ISLE ROYALE Laurel Woodruff, PhD, USGS

The geologic evolution of Isle Royale began about 1,100 million years ago when huge volumes of flood basalts of the Midcontinent rift erupted near the center of what is now Lake Superior and spread laterally across the Lake Superior region. The bedrock of Isle Royale is a series of stacked basalt flows correlated with volcanic rocks in Michigan and Wisconsin designated as the Portage Lake Volcanics. Sandstones and conglomerates of the Copper Harbor Formation conformably overlie the volcanic section and represent sediment influx into a subsiding basin that formed following the end of major volcanism.

Mar. 10 RECENT WORK ALONG THE SAN ANDREAS FAULT OF CALIFORNIA Sarah Titus, PhD, Carleton College

The San Andreas fault system in California is probably the best studied plate boundary zone in the world. After recognition of the seismic hazard posed by the San Andreas fault following the destructive San Francisco earthquake in 1906, a wide variety of geological and geophysical tools have been applied to understand plate boundary deformation. This talk will cover the tectonic evolution of the plate boundary system over the past 30 million years and what we know about historical earthquakes such as the San Francisco earthquake. More recent work on the fault will also be discussed, including new data from a drill hole that pierced the San Andreas fault near Parkfield this past summer and some of the surprising new findings that have come out of this work

Mar 24 THE ROLE OF FLUIDS IN GEOLOGY Martin Saar, PhD, University of Minnesota

Fluids play an important role in geologic processes. Dr. Saar will discuss some of the fluids that are being studied in the Geofluids Research Group which include groundwater in aquifers and karst (cave) systems, magma/lava, and gases (e.g., volatiles in magmas). The types of questions the Geofluids group tries to answer are: 1) How much groundwater is flowing from where to where at what rate with implications for drinking and irrigation water supply? 2) Where is renewable geothermal energy usage possible? 3) Can the greenhouse gas CO₂ be stored in saline aquifers? 4) How fast do caves form in Minnesota's SE karst system and how fast do water and contaminants move through karst caves? 5) What are the effects of magma permeability on volatile degassing rates and related volcanic eruption dynamics?

Apr 7 ANDRILL: ANTARCTIC GEOLOGICAL DRILLING Kate Pound, PhD, St. Cloud State University

Originally scheduled to talk about the Geology of New Zealand, Dr. Pound has just returned from Antarctica, and is excited to share with us the latest news of Antarctic discoveries. In its second season (2007/08) the ANDRILL (Antarctic Geologic Drilling Project, www.andrill.org) recovered a 1138 m sediment core from beneath the sea floor in McMurdo Sound, Antarctica. Together with the 1285 m core recovered the previous season, these cores provide a sedimentary record of climate and glacial change in Antarctica over the past 20 million years. The Middle Miocene Portion of this time interval has long been held as a critical time interval for the development of the modern Antarctic ice sheets, marking the change from a warm climatic optimum, to the onset of major cooling. Dr. Pound will provide background information about the geological context, drilling logistics, core recovery, and life in Antarctica.

Apr 21 DOES POLAR DRIFT DRIVE MEGA-EARTHQUAKES? Doug Zbikowski, BSME, Geo Society of Minn.

For many decades now, we've been told that most earthquakes are caused by plate dynamics driven by convection in the Earth. Although it is presently not possible to quantify the complete plate-convection relationship in the real world, this theory is certainly plausible, has evidence of viable mechanisms (slab pull, ridge push, and basal drag or traction), and today could claim that virtually no one opposes it. However, what if it could be shown that seismic energy worldwide forms an unseen but globally regular pattern—and that pattern is matched to the direction of polar drift and appears to reflect Earth's celestial situation? Could the gravity of the Moon and Sun contribute to earthquake energy? Doug Zbikowski will examine these questions in detail and the results may surprise you.

May 5 THE GEOPHYSICAL VIEW OF THE EARTH Justin Revenaugh, PhD, University of Minn

Our last lecture will be at The Spring Banquet, held at the Grand City Buffet, 8912 Hwy 7, St. Louis Park. Buffet from 5 – 7, and the lecture will begin at approx. 7 pm

Field Trips for 2008

The Field Trip Committee is in the early planning stages of this summer's field trips. Here are the ideas we have come up with so far:

Marion, KY to see the Fluorite Museum: This trip would be in the last half of June after Father's Day. Tentatively we would take a bus from here and go to Galena, IL and spend a day in that area. We would continue to Kentucky and visit the museum, mine for fluorite, look for fossils and visit Mammoth Cave. More will be decided after Ed Steffner gets back from the scouting trip on Feb. 20th.

Northern Wisconsin and Michigan: Aug. 1st and 2nd. Potential itinerary: Iron Mountain, MI to look at formations., Marquette, MI to see ejecta from a meteor crater, Amnicon Falls State Park, WI to see the Douglas Fault. Return to Superior WI.

Jay Cooke State Park and Agate Museum: A one day trip, tentatively Aug. 3, at the tail-end of the longer field trip.

Saint Anthony Falls Hydrology Lab: We are once again going to attempt to arrange a tour of the lab for sometime in July.

Western Minnesota: Tentatively in September or early October. Stay tuned for details.



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