GSM NEWS

GEOLOGICAL SOCIETY OF MINNESOTA
WINTER 2003 ● VOLUME LVII NO. 4 ● www.geo.umn.edu/orgs/gsm

GSM agrees to fund marker at Split Rock

Visitors to the 1910 Split Rock Lighthouse on Minnesota's North Shore will soon get a geology lesson along with the history and scenery presented at the site.

The GSM Board has voted to commit up to $3,600 for an informational panel at the State Historic Site, which will explain the geologic history of the North Shore and Split Rock. GSM Public Service Chairman Doug Zbikowski has spearheaded efforts involving the Minnesota Historical Society, Geological Survey and Department of Transportation.

Split Rock (MHS photo)

The full-color educational panel will be 52 inches wide by 30 inches tall and be made out of weather-and-fade-resistant plastic. It will be mounted on a custom railing module on the lakeside balcony next to the visitor center. This overlook is open to the public, even though a fee is required to visit the lighthouse. The overlook is where people gather for tours.

Split Rock cliff is an anorthosite body embedded in the 1.1 billion-year-old magma intrusions that underlie much of the region. The panel will explain how the anorthosite emerged from beneath the Earth's surface and was exposed by glacial and other erosion.

The Split Rock site is one of 26 sites included in a statewide geological marker project for which texts and marker designs were developed by this partnership, including the DNR for sites in state parks. The package was rejected for funding by the Federal Highway Administration even though a very similar project was approved by the FHWA just a few years ago. It is speculated that White House orders to cut spending led to the Federal agency's refusal.

Out & About with the GSM

Above: A youthful tour participant checks out electronic 3D goggles during the GSM trip to the Markhurd Corp. in Maple Grove, where members saw how maps are produced from aerial photos.

Below: A GSMer braves frigid winds and slashing rain to view rock exposures on the GSM/Society of Mining Engineers field trip on the Mississippi in Minneapolis. Some 60 members made the riverboat trip with UM Geology Professor Calvin Alexander.

GSM NEWS

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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 three weeks before the date of publication. Send all material for GSM *NEWS to:* GSM News, c/o Tom Smalec, 797 Newell Drive, Apple Valley, MN 55124, or to the e-mail listed above.

GSM OFFICERS - 2004

Paul Martin, *President*
Roger Benepe, *Vice President*
Ted Chura, *Treasurer*
Dorothy Kuether, *Secretary*
Directors in addition to the officers listed above: Cindy Demers; Bill Farquaher; Marlys Lowe; Rose Mary O'Donovan; Tom Smalec.

CHANGE OF ADDRESS & NEW MEMBERSHIPS

Send all GSM membership dues, change of address cards, and renewals to the GSM Membership Chair: Gail Marshall, 12232 Allen Drive, Burnsville, MN 55337; phone 952-894-2961. ***See form on Page 7.***

Membership Levels:
$10 Full-Time Students

From the President... Paul Martin

GSM off to great start for new season

Our GSM year is off to a great start ! The first event was our annual fall banquet, with entertaining slides of the spring and summer field trips. We later elected new board members: Dorothy Kuether and Roger Benepe.

As of this writing we have had two lectures in our 2003-2004 series on "Geologic Landscapes." Both lectures were educational, and Roger Kuhns dramatic slides of the 1980 Mt Saint Helens explosive eruption were particularly dramatic. The field trip/demonstration on mapmaking at the Markhurd Company in Maple Grove was well-attended and very instructional as well.

On October 11, about sixty member of GSM participated in a wonderful geological boat trip down the Mississippi from Boom Island to just above the Marshall/Lake street bridge. This trip was a new venture in cooperative efforts between us and the Minnesota Society of Mining Engineers (SME). SME actually did most of the organizing, and about fifty of their members from all over the state attended. Our good friend Calvin Alexander, Geology professor at the University of Minnesota, provided most of the geological narration during the excursion.

We went through the upper and lower St Anthony locks, and had a light lunch as part of the trip. We introduced two eminent Minnesota scientists Mark Seely, a climatologist who is heard regularly on MPR, and our new director of the Minnesota Geological Survey, Harvey Thorleifson. It was good to meet and hear from both of these new friends.

GSM members should be interested in a new project of Science Museum of Minnesota. This effort supported by a large grant from NSF aims to strengthen scientific interest and learning in the state of Minnesota. Their main stated aim is to work closely with
Community Bases Science Organizations (CBSO). We are definitely one of those, and will be active participants in some parts of the CBSO project,

We should hear more about this in the coming months. However if any member thinks of some project we could embark on that would produce a specific tangible product, please let us know what it is. Contact Kip Langnese or Paul Martin with your ideas.

Members who visit Split Rock Light house in future should see a large new display, which we (meaning Doug Zbikowski and the Public Service committee) helped develop.

At our recent annual meeting members in a non-binding poll expressed great interest in our helping with that project, So at our October meeting the Board voted to support that project up to a maximum amount of $3,500. This is right in line with that part of our "Mission" which states that we support "a series of geological markers located throughout the state". We're not sure exactly when this display will be installed.

A final new project that we might be involved with is assisting a fledgling geological society in the Arrowhead region (Duluth and Iron Range). They are still small in number but there seems to be a lot of enthusiasm. Stay tuned for more on that.

At our October Board meeting, we also elected officers for 2004. New board members Dorothy Kuether and Roger Benepe were elected secretary and Vice President resp, while Ted Chura and I will continue as Treasurer and President respectively.

Personally I, and previous presidents of GSM are very much in debt to outgoing secretary Judy Hamilton. She has been dedicated to the job and has done it well. She is a friend to all who know her, and we will miss her at our board meetings. She has taken up the sport/hobby of flying, and we truly wish her happy landings!

New GSM booth debuts at Mineral Show

By all measure, our participation in the Midwest Mineral Convention and Show was a great success. Thanks to all the volunteers who helped man the booth, including Tom Schoenecker for his tireless help in setting up and transporting the booth materials.

All totaled, this event added more than $250 to our treasury. But even more important are the new membership enrollments. Without doubt, the conventioneers gained both a positive and progressive image of the GSM.

This event also allowed us to establish contacts with professionals from the across the nation, enriching our Organization beyond measure. Paul Janke, author of "A Correlated History of the Universe" graciously added his time and talents to the GSM booth. He contributed the poster that is visible in the photo. The folded version is available to all GSM members.

While at the mineral convention, a couple exhibitors approached the GSM booth and asked if they could have a handful of our fliers for free distribution at their shops. MO'R Designs is a unique gift shop located in Gaviidae Common, Sax Wing in downtown Minneapolis. Their inventory includes crystals, fossils, meteorites and minerals, as well as lapidary carvings.

Lake Superior Gemstones is located in Lutsen, Minnesota. They specialize in rough and polished Thomsonite, "The worlds most beautiful gemstone". This semiprecious gemstone, the most colorful member of the hydrous silicates, can be found in only one place on the North American continent: In Keweenawan lava flow outcroppings along Minnesota's beautiful North Shore.

If you're in Princeton, MN, Val Carver operates a shop called Rocks and Things. In addition to interesting specimens of Minnesota rocks, he stocks rockhound supplies and tools, and tumbling grits and polishes. His website is: www.rocksandthings.com

Again thanks to all the volunteers whose unbridled enthusiasm and dedication contributed to our success.

- Bruce Goetteman

The GSM"s new display booth deployed at the Midwest Mineral Show in Cottage Grove in August.

Volunteers make State Fair a success

Well, the 2003 Fair is over and it signals the end of summer and the beginning of a new year for the GSM.

From all reports, the changes made in the fair booth were well accepted. We did have a few spelling errors in our signs (not a good idea in the Education Building) and some complaints about congestion in the booth, but all in all, the fair went great. We'll try to get the spelling corrected and some more room in the booth next year.

I would like to thank all of those who helped this year. There were more than 65 people who worked in the booth, so I can't name them all. However, I would like to mention Walt Blowers, Chuck Brennecke, Nino Andrae, and Bill Robbins who worked two shifts and Dick Hegland who worked three shifts.

How did you like our new booth backdrop? Sure beats the old doors doesn't it? The new backdrop was made possible because of a special donation by Don and Nora Mattsson. We all owe them a special thanks.

A thanks also to our committee who planned and implemented the changes in the booth. The committee included Roger Benepe, Bruce Goetteman, Paul Martin, Dave Wilson, Ted Chura, and myself. Roger deserves a special thanks for getting us the new backdrop for a very special price.

Last but not least, we owe a thanks to Leroy Hart of Plymouth for the donation of our new mineral collection.

I'm sorry if I have left anyone out. Again, thanks to everyone who helped with this year's fair.

- Tom Schoenecker

The Greatest Lake: Agassiz

New Geo Survey chief started career studying the lake

Submitted by Dr. Thorleifson

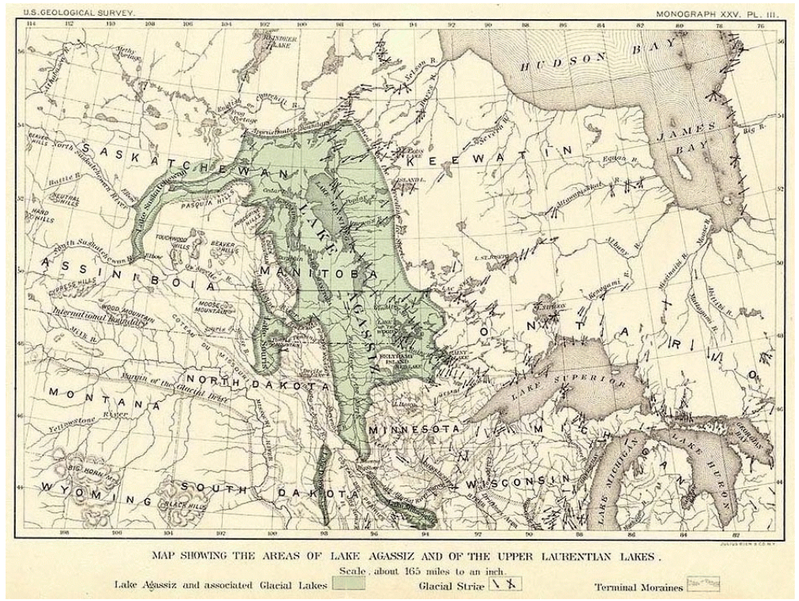
Harvey Thorleifson has been appointed Director of the Minnesota Geological Survey and Professor in the Department of Geology and Geophysics at the University of Minnesota. He assumed his duties on July 1, 2003, succeeding Dave Southwick who fulfilled this role from 1993 until 2002, and Val Chandler, who served as Interim Director over the past year.

Dr. Thorleifson is originally from western Manitoba. He completed undergraduate education in geography and biology at University of Winnipeg, and then completed a Masters program in geology at University of Manitoba. His Masters thesis dealt with the history of Lake Agassiz, including a compilation of related investigations across northern Minnesota from the Red River Valley to the Lake Superior basin. He subsequently spent three years at the University of Colorado in Boulder, where he completed a doctoral dissertation on the glacial history of the Hudson Bay Lowland in northern Ontario. After joining the Geological Survey of Canada in 1986, he managed field programs across much of Canada. He spent the late 1980s working on gold exploration in northern Ontario, and his early 1990s work emphasized supporting the fabulously successful Canadian diamond exploration scene.

Dr. Harvey Thorleifson

In recent years, his work has increasingly emphasized water-related topics, including regional groundwater modeling, Red River flooding, offshore surveys, soil chemistry, Lake Winnipeg shoreline erosion, and climate change. Concurrently, he has been active in helping to coordinate innovations in computer-based, 3D geologic mapping methods.

Harvey is the President of the Geological Association of Canada. Harvey is Past Chair of the Ottawa Branch of the Canadian Institute of Mining, Metallurgy, and Petroleum, and he toured Canada speaking on diamond exploration as a CIM Distinguished Lecturer in 1999/2000. He has given energetic and enthusiastic presentations on diamond exploration at many venues, including investment seminars in Hong Kong, Japan, Korea, and across Australia, and he represented Canada at international diamond-related meetings. He has been active in outreach, and recently authored two chapters for a book on the history of the junction of the Red and Assiniboine Rivers in downtown Winnipeg, Manitoba. He was co-chair of workshops held on new 3D geologic mapping methods for groundwater applications held in Illinois in 2001 and in Denver in 2002, and he is co-organizer of similar sessions in Seattle this November, and in Niagara Falls in May 2004.



Warren Upham's original 1895 USGS monograph, "Glacial Lake Agassiz," which includes the map above, is now on the Web at **www.lib.ndsu.nodak.edu/govdocs/text/lakeagassiz/.** Scanning the 650-page document, with its two appendices, index, 38 plates and 35 figures, was a three-year labor of love undertaken by North Dakota State University Government Documents Librarian Kathy Thomas. Below: A modern Minnesota DNR map of the lake.

Dr. Thorleifson has been active in the development of indicator mineral methods since 1986. He focused on gold grains and till geochemistry in the mid to late 1980s, and then became involved in kimberlite indicator mineral research, initially in the Beardmore-Geraldton district of northern Ontario. He subsequently carried out kimberlite indicator mineral surveys in the Canadian Prairie region, after the discovery of kimberlites in Saskatchewan in 1988. He has been a frequent organizer of and speaker at indicator mineral and diamond exploration short courses.

While many geologists us became aware of indicator mineral methods in the 1980s in the form of gold grains counts, and subsequently these methods were credited as the key to the huge diamond discoveries in Canada in the 1980s, the focus now is shifting to development of base metal applications. Thorleifson has been active in this field. He mapped a 400-km plume of Cr-diopsides dispersed from the Thompson nickel belt. In association with this indicator mineral research, Thorleifson has become a proponent of low-density indicator mineral and soil geochemical surveys, to outline trends in indicator mineral distribution, to clarify regional glacial sediment provenance in order to better design and interpret indicator mineral surveys, and to map background trends in soil chemistry for many applications.

According to Thorleifson, new 3D geological mapping methods are particularly applicable to regional applications in groundwater protection and groundwater management. He observes that, in the case of regional groundwater analyses, it is not possible to obtain new, consistent, high-quality subsurface information for the entire area, so it is necessary to find ways to appropriately use previously acquired data of varying detail, and it is critical to guide interpretations with high-quality data from cored sites and geophysical surveys, as well as the best available insights into the origin of the deposits. But as our computing power increases, as our insights into geological processes progress, as the amount of available data rapidly increases, and as the urgency of optimal protection and wise use of our groundwater increases, sound regional geological models will increasingly be required, and users will be best served if the mapping is digital and interactive. Thorleifson has developed new geological mapping methods that address these needs, including interactive 3D reconstructions of large drillhole databases and associated geologic interpretations that can be implemented in a truck, on a desktop, or in a 3D virtual reality room.

Harvey is pleased and excited to have arrived in Minnesota. He anticipates being able to make rapid progress in the sort of geological mapping, research, and methods development in which he has been involved, given the highly advanced state of this activity already in place in the state. Harvey reports that he is happy to have joined the Minnesota Geological Survey team, and he looks forward to cooperation with geologists across the state.

Crookston slide linked to lake clays

A landslide that did $1 million of damage to homes and businesses along the Red Lake River in Crookston in September can be attributed to movement within a thick layer of clay that formed about 10,000 years ago, when the Red River Valley was under the waters of Lake Agassiz, according to Harvey Thorleifson and Ken Harris of the Minnesota Geological Survey.

The sinking ground in Crookston is a type of slow landslide also known as slumping or riverbank failure. It occurs because the clay has broken along faults, most of which run parallel to the river. Having lost some of its support, the block of ground then sags down and sideways into the river channel.

According to MGS surveys, the clays that are failing are more vulnerable to slumping than soils elsewhere in the state. These vulnerable soils occur in a belt about 40 miles wide (including 25 miles in Minnesota) extending along the Red River from the Fargo-Moorhead area to the Canadian border.

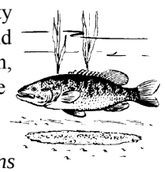
"This won't happen just anywhere," Thorleifson said. "But people who live above these layers of clay need to know that this can happen."

Riverbank failure sunk land by 3 feet in a Crookston neighborhood. Photo courtesy Crookston Daily Times.

Chris Behling, a soils engineer from the U.S. Army Corps of Engineers, said the low river level was the main trigger of the landslide.

- UM News Service

Were there fish in Lake Agassiz?



According to Dr. K. W. Stewart, a zoology professor at the University of Manitoba, fossil remains of only four fish species have been found in the former lake bed. However, based on their current distribution, Stewart estimates that 34 of Manitoba's 86 fish species entered the province through Lake Agassiz. These include goldeye, lake sturgeon, lake trout, northern pike, and walleye. - *Item posted by Dr. Edmund Sass, Professor of Education at the College of St. Benedict/St. Johns University at* www.cloudnet.com/~edrbsass/agassiz.htm, *which features numerous Ice Age and Pleistocene links.*

Losing the lake chilled the world

A study published in Science Magazine in August indicates the rapid draining of Lake Agassiz into the Atlantic about 8,200 years ago altered the world's climate.

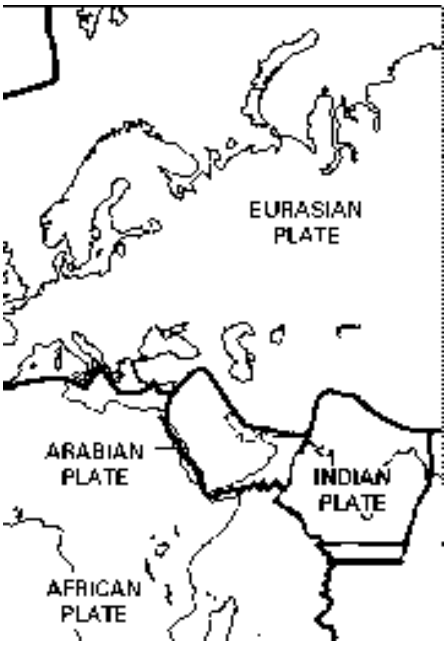
The research by David Leverington of the Smithsonian Institution, Garry Clarke of the University of British Columbia, James Teller of the University of Manitoba and Arthur Dyke of the Geological Survey of Canada suggests the vast lake drained in 9 to 12 months after its water tunneled under the Laurentide ice sheet to Hudson Bay. The lake surface stood 200 feet above sea level, while the base of the ice sheet was 300 feet below sea level, and gravity took its course.

The flood of freshwater disrupted ocean currents, including the Gulf Stream, and caused a 200-year cooling period throughout the Northern Hemisphere, according to the new research. Temperatures in the region dropped by an average of 9 degrees Fahrenheit. The finding is based on ice core specimens and other studies of ancient weather indicators from Europe and Greenland.

At its greatest extent, Lake Agassiz covered 135,000 square miles and contained 39,000 cubic miles of water. Geologists believe there were at least 18 outburst floods during the lake's 5,000-year existence.

Iraq: *Petroleum And/or Paradise*

A swath of southern Iraq has been called many things: Land of the swamp people. Mother of all untapped oil reserves. Scene of the worst environmental crime in history. Cradle of civilization. Saddam's slaughterhouse, and a 21st century battlefield. But the great expanse known to scientists as the Mesopotamia Marshlands, figures to be one of the keys to what will become of postwar Iraq. In an arid, windblown region where oil means wealth but water means survival, dueling forces stand ready to shape the fate of the Fertile Crescent that provided the right ingredients to spawn Mesopotamia, the first civilization.



Saddam Hussein purportedly drained these wetlands — satellite images show only 7 percent of the fragile ecosystem still intact — as part of his campaign to crush Shiite Muslims who rebelled against him in 1991. Before Hussein used a system of dikes and canals to divert the river waters, the intricate maze of pools, streams, and marshes was a dazzling delta that sprawled to the horizon. Refugees now describe much of it as an ocean of fetid mud with polluted groundwater, sprinkled with garbage and land mines. Other sections are dry and dusty, dotted with the flattened, crinkled remains of the magnificent stands of reeds that once stood up to 15 feet tall.

Though Hussein gets most of the blame for destroying the marshes, neighboring Turkey and Syria have played a role by damming rivers upstream to irrigate farms. Iran is building a huge dam that the U.N. Environment Program believes will further drain the marsh.

The marshes served a crucial role in the health and nutrition of the whole Persian Gulf region. The marshes were an important source of protein, in the form of fish and water buffalo, and served as a filter for the Tigris and Euphrates rivers that flank and feed it. Wetlands act as natural wastewater treatment systems for waterway contaminants. Now the two rivers are carrying waste from Iraq directly into the Persian Gulf, posing a threat to a fishery on which the entire Gulf region depends.

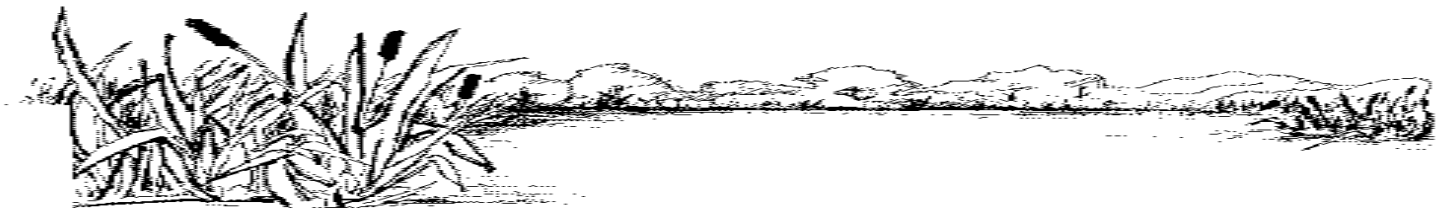
Geologists believe fabulous sources of untapped oil percolate beneath sections of this expanse, which was bigger than the Everglades and half the size of Switzerland little more than a decade ago. Yet some environmental engineers advocate reflooding the region to restore the habitat, the surviving fraction of which still harbors the vestiges of rare birds, fish, and what remains of a 5,000-year-old subculture known as the Marsh Arabs, people who live on floating islands handmade from enormous reeds

No one knows for sure how many untapped oil reserves lie in the marshes, but it's certainly a prolific oil-bearing region. And with the prospect of the prison-like country opening its doors, oil companies around the world are hungrily eyeing a postwar Iraq. Oil production could provide the revenue needed to restore the Mesopotamia Marshlands to some semblance of its past splendor.

Suzie Alwash, a geologist, and Director of the restoration project, "Eden Again," said there is no hard evidence that there is oil under all the marshlands, but that the vast region could accommodate both petroleum and paradise. There are a half-million Marsh Arabs, most of them displaced and many living in refugee camps. Eden Again's goal is to make the swamps suitable to restore their culture — an environmental and anthropological task of perhaps unprecedented proportions. The future of the marshlands is one more issue facing the custodians of postwar Iraq.

- Katy Paul

For More information: http://www.iraqfoundation.org/projects/edenagain/index.html



Rockin' GSMers stuff 106 rock boxes for schools

On Saturday, October 18 the GSM Public Service Committee and the Education Outreach Committee teamed up to hold a rock box building party. In less than three hours, these *rockin'* GSMers assembled 106 rock boxes, which will be distributed free to school classrooms through the GSM School Outreach Program. Special thanks are due to the following hard-working volunteers: Paul Martin, Gerry Paul, Ted Chura, Cindy Demers, Alex Demers, Kari Demers, Bill Farquhar, and Doug Zbikowski. After the work was done, sustenance was required and we indulged in apple cider, pizza, Krispy Creme donuts, and cookies. We did say sustenance, not balanced nutrition!

In a related development: Dr. Kent Kirkby from the U of M Geology/Geophysics Department has generously given two large boxes of college-level introductory geology texts to the GSM. These publisher samples are intended to be distributed to practicing teachers who are interested in a modern text for reference. Distribution has already begun through the School Outreach Program and will continue while the supply lasts. Thus, teachers with an already established strong interest in Geology can receive a reference text along with their classroom geology presentation, rock box, and other educational materials. Requests for a text by practicing teachers outside of the School Outreach Program will also be accepted. Many thanks to Dr. Kirkby for this outstanding educational opportunity for Minnesota teachers!

-Doug Zbikowski

Morton gneiss chosen to represent US at World Peace Palace

A 15-centimeter-wide piece of Morton gneiss from Southwestern Minnesota was chosen as the United States' representative in a walkway being built at the World Peace Palace in The Hague, Netherlands.

The U.S. Geological Survey selected Morton gneiss as the nation's representative as it is believed to be the oldest rock in the country, dated at 3.6 billion years. The Minnesota Geological Survey contributed the actual sample that went to the project.

The Peace Palace Walkway will include unique stones contributed by more than 160 nations from around the world.

Geological Society of Minnesota
c/o Gail Marshall, Membership
12232 Allen Drive
Burnsville, MN 55337

Membership Renewal – October 1, 2003 to September 30, 2004

☐ $10 Student ☐ $20 Individual ☐ $30 Family

☐ $50 Sustaining ☐ $100 Supporting ☐ $250+ Guarantor

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(As you would like it to appear in the GSM Directory:)

ADDRESS _____ PHONE (_____)_____

_____ZIP_____ E-MAIL _____

Moose Lake agate center opens doors

The Moose Lake Agate and Geological Interpretive Center (MAGIC) in Moose Lake State Park opened in July 2003 as part of the City of Moose Lake's community-wide Agate Days celebration.

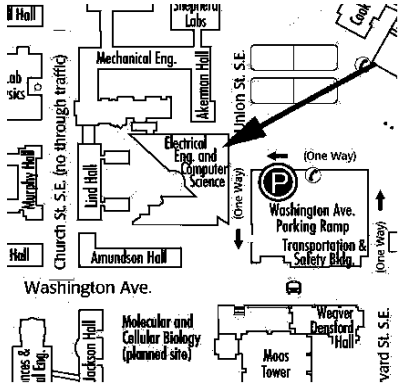
The 4,500-square-foot center includes interpretive displays, a multi-purpose classroom, Nature Store gift shop, park offices, a resource workroom, restrooms, and exhibition hall that showcases Minnesota's officials state gemstone, the Lake Superior agate.

The park lies in an area covered by glacial till and outwash deposits. Large ice blocks which melted after the glacier retreated created both Moosehead and Echo Lakes.

To reach the park, take I-35 to Moose Lake exit 214. Go east on County Road 137 a half-mile to the park signs. *-MN DNR*

Lecture Room Set

The GSM Winter Lecture series has returned to Room 3-210 in the Electrical Engineering Building on the U of M Minneapolis campus. For a current schedule, see the website.



GSM adds 2 new MN sample collections

The family of GSM rock and mineral collections has now grown to six as coordinator Bruce Goetteman has created a new Minnesota Surficial Geology Collection and a Cook County-Gunflint Trail Collection.

The Surficial Geology Collection contains examples of five different tills associated with the major glacial events that occurred in Minnesota during the Quaternary.

The Gunflint Trail Collection is based on the GSM Field Trip of 2002. It contains six specimens of the bedrock exposed in that area, including Saganaga Tonalite and a very fine-grained gabbro.

You can order the new collections through the GSM website.

GSM NEWS
c/o Tom Smalec
797 Newell Drive
Apple Valley, MN 55124

FIRST CLASS MAIL

MEMBERSHIP RENEWALS:

CHECK THE DATE ON THE LABEL

With your membership support, GSM can continue to offer a fine lecture program, provide area schools with an invaluable resource through the Outreach Program, and introduce you to the pool of talented professionals in the field of geology. Fill out the form on Page 7 and mail it with your check to Gail Marshall, Membership Chair, 12232 Allen Drive, Burnsville, MN 55337.