



GEOLOGICAL SOCIETY OF MINNESOTA

NEWS

FALL 2009
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<http://www.gsmn.org>

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ANNUAL MEETING/ FALL BANQUET September 21, 2009

Grand City Buffet
8912 Hwy. 7
St. Louis Park, MN
(952) 912-0888

**Lecture: Geology of New Zealand
By: Dr. Katherine Pound,
St. Cloud State University**

Business: Election of new Board Members

UPDATE: Historical Marker Installation Completed At Split Rock

The Split Rock installation was completed by Doug and myself in May and the results are excellent. You will be proud of the graphics and quality of the plaque itself. You must stop by and see it when up to the Shore.

There are six locations yet to be completed. They are Interstate Park, Gooseberry Falls, Flood Bay, Frontenac, McCarthy Beach and Beaver Creek. The Gooseberry plaque is being updated and replaced. Frontenac and McCarthy Beach will receive new stone pedestals with capstone structures on which the plaques will be mounted. The other locations have boulders hand-picked and placed for shaving a flat service on which the plaques will be mounted.

We hope to obtain the bronze plaques in the next few weeks and begin installations thereafter. Your committee is quite excited as they hope to be present for the mountings when the time comes.

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THE EARTH SCIENCE LITERACY INITIATIVE

Welcome New Members

**Susan Brink
Hugh B. Cowan
Kristin Jung
Sandra Muellner
Phil Schuster
Rolf Westgard**

Defining a set of essential ideas that a literate American should know about the geosciences is a critical national need in an information-rich age characterized by a rapidly changing planet and numerous resource challenges. Critical decisions involving Earth science are continuously made within the political and educational realms, with significant impacts on all American citizens. In today's world, it is no longer sufficient for scientific communities to assume that simply doing a good job of carrying out cutting edge research is sufficient. The research community simply must do a better job of making sure that its scientific discoveries do not get buried in libraries or on the Internet, but make it into mainstream circles. The research community must do a better job of helping the public understand the most important concepts emerging from geoscience research. However, understanding scientific discoveries requires a science-literate population. The Earth sciences literacy document will help accomplish that goal, and can help inform those who will make future decisions involving governmental legislation and educational science standards.

The Earth Science Literacy framework document of Big Ideas and Supporting Concepts (BIaSCs) is a community effort representing the current state-of-the-art research in Earth sciences. It has been written, evaluated, shaped, and revised by the top scientists working in Earth science. Because of its validity, authority, and succinct format, the ESL framework will be influential in a wide variety of scientific, educational, and political settings. Future governmental legislation will be guided by it, and future national and state educational standards will be based upon it.

This guide presents the big ideas of Earth science that all citizens should know, determined by the Earth science research and education communities. Several workshops involving hundreds of scientists and educators from academia, government, and industry were dedicated to creating this document, and it has undergone an extensive period of public review. This document, representing the current scientific knowledge in Earth science, is helping to shape decisions by government and industry and helping to guide the direction of educational curricula. It is a work in progress because the scientific process continues to improve our understanding of Earth.

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GSM NEWS

Editor: Judy Hamilton
Production Mgr: Katy Paul

Geological Society of Minnesota is a 501(c)3 nonprofit organization. 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*
Dick Bottenberg, *Vice President*
Paul Jansen, *Treasurer*
Sandy Steffner, *Secretary*

Directors in addition to the officers listed above: Megan Jones; Edward Steffner; Alan Smith; Harvey Thorliefson; one vacancy.

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



Conrad Zbikowski measures the chosen stone for installation at Beaver Creek Valley State Park



Doug Zbikowski sizes up the location for the replacement plaque at Gooseberry Falls



Ed Steffner and Doug Zbikowski “present” a full-color graphic panel at Split Rock Lighthouse

Historical Marker Project
Continued from Page 1

In fact, the committee hopes to drill a hole or two and maybe even help with the chiseling of the boulder faces.

We are finding that the expenses, primarily from the Sesquicentennial Grant, are coming in far below budget or expectation. The remainder will be returned to the State unless they obtain authorization to apply the remaining funds to additional markers and other park locations.

All finished projects will have photos taken for the archives and some will be published in upcoming newsletters. The GSM Historical Marker Committee has worked diligently on this project and we are about to see the fruits of our efforts unfold.

Submitted by:
Historical Marker Committee Chair
Ed Steffner

* * * * *

The items below were submitted a few years back by an old friend of GSM. If you guess who it is, I’ll give you a nice (but small) Lake Superior Agate. - *The Editor*

How do geologists season their food?
With Basalt and Pebbler

What do geologists drink?
Quartz and quartz of milk

With the development of the Internet, our society has very rapidly gone from being information-poor to information-overwhelmed in the area of science (and many other areas as well). There is an overwhelming amount of information available, but not necessarily any sense of how to navigate through it or determine what is most important. Someone trying to find out about an Earth science topic (a lawyer, engineer, museum director, textbook writer, legislator, etc.) could easily be overwhelmed by the amount of information available. A prioritization of essential ideas, carried out by the scientific communities, would provide the basis and framework that would help people navigate through the rapidly expanding amount of scientific information.

One obvious area for the importance of BIaSCs is in school curricula. If you are trying to design an Earth science module, how do you now choose from amongst all of the information available? How do you make sure that the most important information comes clearly through all of the available details? The situation is further complicated because of the decentralized way our country works, in that each state sets its own standards. There is the potential for a wide diversity in the nature and quality of Earth science education in America. A publicly-available set of BIaSCs will help ensure that these state standards are accurate, relevant, and up-to-date.

Another area in which BIaSCs are important is in the creation of textbooks. It is somewhat ironic that the need for textbooks is now very great, but for a very different reason than it once was. In the past, textbooks were vital for providing access to information. Given the explosion of information available instantly over the Internet, they no longer are needed for that purpose, but are now extremely necessary for presenting, in a clear, comprehensive and coherent way, the essential information on a topic. However, textbook writers face the same challenge that teachers face: how to select for presentation the most relevant and important scientific information. Scientists become experts in ever-increasingly small sub-fields of research. Future Geoscience textbooks will be greatly improved as a result of communities coming together to generate frameworks of essential information.

The importance of these BIaSCs is by no means limited to K-16 education. Many Americans have learned much of what they know (or misunderstand) about Earth science from sources outside of school: personal experiences, popular media, informal education venues such as museums and parks, and non-formal groups such as youth groups. Earth science literacy principles will provide a consistent framework within which informal and non-formal educators could work to reinforce essential understandings.

It is quite possible that, from the perspective of future civilizations, the 21st century will be defined by three things: climate change, water availability, and energy resources; all three are deeply rooted in the areas of Earth science. Many important political, legal and ethical decisions are being made related to these issues that already severely affect the lives of all Americans. The lack of clear, concise and comprehensive community-driven guidelines puts all Americans at risk of bad decisions made either through ignorance or self-interest. For example, the resistance within certain spheres to accept the relevance and validity of global climate change for as long as it did caused our country significant embarrassment at an international level, and severely delayed international attempts to address the matter.

Unfortunately, we also live at a time when there are strong movements that seek to discredit the discoveries of scientific research. Whether acting out of fear, misunderstanding or malice, these movements often portray the healthy debate of scientific inquiry as confusion and a lack of agreement. An individual or set of individuals pushing certain self-serving agendas can almost always find a quote or viewpoint that backs their idea. Many of the foundations of our

sciences, such as the age of the Earth, radioactive decay, biological and planetary evolution, climate change, and even the existence of plate tectonics, are discredited and ridiculed by extracting fragmented quotes from prominent scientists and taking them out of context.

At the same time that tremendous scientific advances are being made, increasing percentages of Americans are refusing to believe them. For example, paleontologists have recently made tremendous headway in resolving the evolutionary history of vertebrates. However, a recent study found that the number of Americans who actually believe that evolution occurs has dropped down to 40% (compared to about 80% for many Scandinavian countries). In fact, out of 32 modern countries, only one country, Turkey, had a smaller percentage of its citizens believing in the occurrence of evolution. In a frighteningly ironic dichotomy, America has one of the most advanced and educated scientific communities in the world but one of the most scientifically ignorant populations. It is hoped that basic “Big Ideas” of Earth science, created by the Earth science community and supported and endorsed by the major Earth science organizations, will be extremely powerful in combating these destructive elements. Again, it is not enough that the Earth science communities carry out good research. These discoveries need to be communicated to the American people, and the people need to have sufficient literacy in the geosciences to understand those discoveries. Defining a set of geoscience BIaSCs will clearly show that the entire community is very unified in their convictions of the reality of a basic set of ideas and concepts.

BIG IDEAS:

1. Earth scientists use repeatable observations and testable ideas to understand and explain our planet
2. Earth is 4.6 billion years old.
3. Earth is a complex system of interacting rock, water, air, and life.
4. Earth is continually changing.
5. Earth is the water planet.
6. Life evolves on a dynamic Earth and continuously modifies Earth.
7. Humans depend on Earth for resources.
8. Natural hazards pose risks to humans.
9. Humans significantly alter the Earth.

Each of these Big Ideas has several Supporting Concepts which further define and expand them. You can learn more about the BIaSCs and also download a copy of the document in either PDF or TEXT format at www.earthscienceliteracy.org.

*Submitted by
Katy Paul*

Abstracts of Upcoming Lectures

The Rock Elm Meteorite Impact Structure, Wisconsin

October 5, 2009

William S. Cordua

The Rock Elm Structure is a geologically anomalous, nearly circular region 6.3 km. in diameter in west-central Wisconsin. It is interpreted as formed by an extraterrestrial impact during the middle Ordovician 430-505 Ma. Both gold and diamonds are found in unusual quantities in the alluvium of streams draining the feature. The talk will outline the geological features there, and review the evidence for its interpretation as an impact structure. It will also discuss how the feature affects local land use, and provides an opportunity for developing some of the unique local geological resources for geotourism.

All you wanted to know about wellhead protection but were afraid to ask

October 19, 2009

Steve Robertson, Minn. Dept. of Health, Minnesota

“Of the many programs in Minnesota designed to protect drinking water resources, wellhead protection planning is the only one with an emphasis solely on prevention. It is also the only one requiring substantial geologic and hydrogeologic expertise. The wellhead program is administered by the Minnesota Department of Health and is an arena in which science and public policy intersect. Most Minnesotans rely on groundwater as a source of drinking water. The principal objective of wellhead protection planning is to safeguard drinking water resources by protecting the recharge areas for aquifers supplying public water supply wells. Characterizing the geological and hydrogeological setting of well fields is essential to this effort. In addition, aquifer settings vary widely across Minnesota, discouraging one-size-fits-all approaches. This presentation will introduce the topic of wellhead protection planning, describe the criteria used for different settings, and with a variety of case studies and examples will show that, in the end, successful outcomes are all about the geology.”

Metamorphism, melting, and mountains

November 30, 2009

Prof. Donna Whitney, U of M Geology Department

Metamorphic processes at all scales -- from crystal nucleation and growth to the thermal and mechanical evolution of the lithosphere -- are dynamically linked to processes in the mantle and at the Earth's surface. Until recently, the metamorphic rocks that are exposed at the Earth's surface in modern and ancient mountain systems were believed to be 'old' and the metamorphism was assumed to have happened long before the processes that brought the rocks to the Earth's surface. In fact, many geologic maps automatically labeled exposures of metamorphic and associated igneous rocks as 'Precambrian basement'. Recent work has shown, however, that some metamorphic rocks are the same age as the volcanic rocks, sedimentary basins, and fault zones that were involved in the unroofing of the metamorphic rocks, and that metamorphism and crustal melting were occurring during the erosion and faulting that brought rocks from the deep crust to the surface. Important information for reconstructing metamorphic processes is the pressure-temperature-time paths that the rocks followed during a tectonic event. In addition, geologists are increasingly recognizing that metamorphic reactions are strongly influenced by deformation, and it is important to integrate microstructural evidence for mineral deformation mechanisms and conditions with information about the mineralogical transformations that occur during metamorphism. In this talk I will present new results from field and experimental studies that provide information about metamorphic processes from the crystal scale to the tectonic plate scale.

Submitted by Steve Erickson

STATE FAIR REMINDER

Don't forget, the state fair starts Thursday, August 27. If you signed up to work the GSM booth, you have received a copy of the staffing list with your name, date and time you are to work.

You don't have to be knowledgeable about geology to staff the booth, just enthusiastic. When people ask you a question at the booth, invite them to a lecture with talks by experts, and give them a brochure. There are also books and other material to show them.

The children, especially, love to look at and examine the rocks and many like to discuss what they may have found in their backyards or on a trip.

If you like to people watch, it's really a fun time.

MEMBERSHIP RENEWAL

Reminder... if the label on this newsletter has the date 10/1/09, your GSM membership expires September 30th. With your 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. Please renew your membership by filling in the form below and mailing it to the address given.

**Geological Society of Minnesota
P.O. Box 390555
Edina, MN 55339-0555**

Membership Renewal - October 1, 2009 to September 30, 2010

- \$10 Student \$20 Individual \$30 Family
 \$50 Sustaining \$100 Supporting \$250+ Guarantor

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**Glacial Geology Field Trip in
Chippewa County**

Kent Syverson, professor of geology at UW-Eau Claire, will be leading a Saturday glacial geology field trip in Chippewa County on September 26, 2009. This field trip for laypersons showcases a recent Wisconsin Geological and Natural History Survey Bulletin (#103) and colored map describing the landscape and glacial history of Chippewa County. The field trip will help people understand how a glacial geologist gathers and interprets data in order to understand the geological history "puzzle." The trip is very appropriate for motivated students and their parents. The field course will be run through UWEC Continuing Education and should be a fun time. The Chippewa Moraine Ice Age Reserve will be the site of a couple of the field trip stops.

If you are interested in more details, see <http://www.uwec.edu/ce/enrichment/life/glacial/index.htm>. or contact Kent Syverson (syverskm@uwec.edu.715-836-3732).

(This is not a GSM arranged trip.)



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