# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

Vol. LXI, No. 1 | Robert Burger, Editor | September, 2008

**Wednesday, September 17, 2008**
**The Pittsburgh Geological Society Presents**

## THE MAKING OF A HIGH-POROSITY, HIGH-PERMEABILITY RESERVOIR—THE MURRYSVILLE SANDSTONE OF PENNSYLVANIA

RICHARD SMOSNA, West Virginia University, and
MELISSA L. SAGER, Dominion Exploration & Production Inc.

Reservoir characteristics of the Upper Devonian Murrysville Sandstone in southwestern Pennsylvania are outstanding: porosity exceeds 20% and permeability approaches 1000 md. The purpose of our study is to document the petrographic features of this sandstone by thin-section analysis, SEM microscopy, and X-ray diffraction and to explain the origin of its very good porosity and permeability. Sidewall cores from a well in Westmoreland County show the formation to be quartz-rich, fine- to coarse-grained, and texturally submature. It formed as a high-energy, transitional-marine braid delta, part of the Acadian clastic wedge. The porosity is so very good for a number of reasons. (1) Delta-plain sands (channel, bar, and sand-flat facies) were moderately sorted and well washed. Original porosity was thus high. (2) Currents also destroyed many mechanically unstable lithic grains, and the resulting sediment became quartz-rich. Consequently, during shallow burial the sandstone suffered just a moderate degree of compaction and porosity loss. (3) The mixing of river water and sea water in the deltaic environment allowed iron mineralization to take place during deposition and early diagenesis, creating thin chlorite coatings on the detrital grains. Access of fresh water to the Murrysville, however, soon ended because of an ensuing transgression. Nevertheless, chlorite coatings proved effective in preserving much of the remaining porosity in that they inhibited the precipitation of destructive quartz overgrowths. (4) Leaching of chemically unstable lithic grains and feldspars in the deep subsurface generated additional porosity. (5) Porosity reduction by late-stage calcite cement was volumetrically unimportant because of the limited amount of carbonate imported from outside the formation. Permeability in the Murrysville Sandstone is so very good because of the rocks' very good porosity, coarse grain size, and the low clay content (both detrital matrix and authigenic chlorite).

**Social hour - 6:00 p.m.** **Dinner - 7:00 p.m.** **Program - 8:00 p.m.**

Dinner will cost $20.00/person, **students $5.00**; checks preferred. **Reservations should be emailed to Steve McGuire at stephen.mcguire@veoliawater.com**, please title as "PGS Dinner Reservation." If you are unable to use email, call (412) 809-6723 and leave your name and number of reservations needed by **noon, Monday**, **May 19**.

**Meeting will be held at Foster's Restaurant, Foster Plaza Bldg 10, Greentree.**

# Pittsburgh Geological Society

## GREETINGS FROM THE PRESIDENT

Welcome to the 2008-2009 season of the Pittsburgh Geological Society. I am looking forward to serving as your president, and I anticipate a program which will be conducive to professional growth and satisfaction.

We plan to have speakers who will discuss in-depth topics of interest to both established professionals and students. Next to our monthly meetings, I personally feel that the best activities we can provide are workshops aimed at encouraging students and advancing their entry into the profession. We will continue with these programs. Our contacts with the general public are also worthwhile activities—providing information about geologic hazards and supporting the Carnegie Science Center Regional Science Fair are examples.

The society also faces challenges. We need to expand our active membership. Past and inactive members will be encouraged to become active again. Of particular importance will be attracting additional junior members and encouraging them to assume leadership roles in the society.

Another issue of major concern to all geologists—junior and senior alike—is the requirement for continuing education credits needed to maintain state registration. The "devil is in the details" is particularly applicable in this regard because time and expense are involved. Clarification of this issue would be beneficial to all practicing geologists. .

Opportunities are also possible to advance the standing of the society. Sponsorship of the 2011 Northeast Section meeting of the Geological Society of America is one of these. Another, more immediate opportunity is participation in the Field Conference to be held in the "oil patch" of northwestern Pennsylvania in 2009.

I hope I can work with all of you in strengthening the Pittsburgh Geological Society, advancing the society, and serving your own individual needs for professional development.

Mike Forth P.G.
President

**DON'T FORGET TO RENEW**

It's time to renew your PGS membership for the 2008-2009 season. Please fill out the membership application included with this newsletter and return it with your dues to John Harper at the address on the form.

## PGS FALL FIELD TRIP

PGS is tentatively planning an autumn field trip on Saturday and Sunday, October 18-19, 2008. The trip—*Glacial and Coastal Landforms of Western PA*—will be led by Patrick Burkhart, Associate Professor, Slippery Rock University and past-president of PGS.

On Saturday, participants will examine eskers in Butler and Lawrence Counties—classic features and new discoveries will be visited. There will also be discussion of ongoing controversies involving aggregate mining. Sunday features an excursion to Presque Isle State Park and the Tom Ridge Environmental Education Center in Erie to examine the history of coastal engineering on the spit.

Participants may attend either or both days, perhaps camping near McConnell's Mill on Saturday evening. Point of departure for the trip is likely to be the main parking lot at McConnells Mill State Park. 9:00 a.m. departure times are likely both days. Travel will be by van.

Fee for the trips is tentatively set at $25 per day, which will include soft drinks and snacks. Trip members are encouraged stay for a possible picnic and camping near McConnells Mill. Fees for meals and accommodations will be extra. Attendance will be limited to 20 individuals.

*If you have news items you would like included in the PGS Newsletter, please send them to Bob Burger at r.burger@verizon.net.*

**PAlS FIELD TRIP**

The Carnegie Museum's Section of Invertebrate Paleontology, PAlS group will be running a field trip entitled *Geology and the French and Indian War in Western Pennsylvania* on October 4, 2008. This trip complements the PGS Forbes Road field trip ran this past Spring and the 250th anniversary of the founding of Pittsburgh. Field trip participants will visit Ft. Necessity and Jumonville Glen on Chestnut Ridge. For more information, or to reserve your spot, contact Albert Kollar at kollara@CarnegieMNH.org.

**DID YOU KNOW . . . ?**

- While sea level was low during the last glacial period, discharge from the Wisconsinan glacier incised the lower Mississippi valley; subsequent sea-level rise during the Holocene resulted in valley filling and delta construction.
- Most meteorites having identified sources come from the Moon, Mars, or 4 Vesta, the second most massive body in the asteroid belt.
- The kimberlites exposed in the Tanoma coal mine in Indiana County are porphyritic type-1 kimberlites with megacrysts of chromium diopside, garnets, ilmenites, and phlogopite. The garnets are chromium-poor pyropes and the ilmenites are chromium-rich (but, there aren't any diamonds!!!).
- Pangea, the supercontinent that existed in the Late Permian and Early Triassic, is one of the cornerstones of modern geological concepts, yet the mechanisms responsible for its formation are not well understood.
- Carbonate debris resulting from accretion of small, solid particles occurs with altered glass spherules in deposits from the Cretaceous-Paleogene boundary in Texas, northern Mexico, and New Jersey, indicating that a large amount of particulate carbonate was present within the impact plume from the Chicxulub bolide impact in Mexico.

**PGS Website of the Month**

**http://earthquake.usgs.gov/learning/glossary.php**

- The Pacific plate is plummeting beneath the North American plate in the Cascadia subduction zone at a rate of 40 millimeters per year.
- Sulfur is essential in the formation of many magmatic-hydrothermal ores—not only does it help precipitate ore minerals, but it also helps transport copper and gold in aqueous solutions to sites of ore deposition.
- Oil emplacement in sandstones does not lead to preservation of primary porosity, and the supply of silica for quartz cementation is derived from internal sources.
- At the global scale, man-induced increases in sedimentation nutrient yields are major threats to coral reefs.

**FALL NORTH AMERICAN COALBED METHANE FORUM ANNOUNCED**

The North American Coalbed Methane Forum Fall Session will be held on Tuesday and Wednesday, October 21-22, 2008 at the Lakeview Conference Center near Morgantown, WV. For more information, please contact Ihor Havryluk at 412-445-5803, havryluk@zoominternet.net or Dr. Kashi Aminian at 304-293-7682 ext. 3406, kashayar.aminian@mail.wvu.edu.

**PA GEOLOGIC FIELD CONFERENCE**

The theme of this year's Field Conference of Pennsylvania Geologists is *Geology of the Gettysburg Mesozoic Basin and Military Geology of the Gettysburg Campaign*.

The conference will take place on September 25-27, 2008 with the headquarters encamped at the Wyndham Resort Hotel in Gettysburg, Pa. The first day will follow a transect across the Gettysburg basin with visits to sites of various depositional environments, including the basal fanglomerate, fluvial playa, lacustrine and shoreline, and upper fanglomerates. The second day will be spent inside Gettysburg National Military Park with stops at railroad cuts west of town, the Lee Memorial, Little Round Top, Devil's Den, the Peach Orchard, and Cemetery Ridge.

There are still a few spaces open on this conference. For more information, and to register for the event, visit http://fcopg.org.

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PITTSBURGH GEOLOGICAL SOCIETY
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# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

Vol. LXI, No. 2 | Robert Burger, Editor | October, 2008

**Wednesday, October 15, 2008**

**The Pittsburgh Geological Society and the Association of Engineering Geologists Present**

## Austin Dam, Pennsylvania: The Sliding Failure of a Concrete Gravity Dam

by Daniel Martt, American Geotechnical and Environmental Services, Inc.

The Austin Dam, a concrete gravity structure, failed catastrophically on September 30, 1911 less than two years after its construction. Forensic engineering evaluations have been conducted since immediately following the disaster. Engineers involved in the construction of the dam recognized early on that the dam failed by sliding on its rock foundation. The dam had been constructed on interbedded sedimentary rocks and its foundation was taken to a very shallow depth of approximately four feet. Although studies of the orientation of the failed concrete blocks of the dam and other site evidence pointed to a sliding failure, no detailed quantitative studies have been done until recently (Martt, Shakoor and Greene, 2005). As part of the current study, test pit investigations yielded samples of foundation materials for direct shear testing. The test pits indicated that a critical interface for sliding was at a sandstone/shale contact located a shallow depth below the base of the dam. Stability analyses based on shear strength tests of the different interfaces of the foundation (concrete/sandstone, sandstone/sandstone, sandstone/shale, shale/shale showed that the dam was deemed safe for a bearing capacity type failure, but unsafe with respect to sliding and overturning. The lowest calculated factor of safety for sliding was 0.6 corresponding to the sandstone/shale interface; the probable sliding plane. The major factors believed to contribute to the failure were: low shear strength of the foundation materials, inadequate provisions for reducing under seepage and weak cyclopean concrete. The project stands as the sixth worst dam failure in U.S. history in terms of loss of life and represents an excellent case history. This paper will address all of the various design, construction, and geologic site conditions that contributed to the failure as well as review the lessons learned that can be directly applied to current gravity dam design. Often the lessons learned from one failure greatly outweigh what can be gleaned from numerous successful dam projects.

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**Meeting will be held at Foster's Restaurant, Foster Plaza Bldg 10, Greentree.**

## PROPOSED GEOHAZARD LEGISLATION

On September 19, 2006, a landslide occurred at the old Dixmont Hospital location on Route 65 in Kilbuck Township. The slide stopped highway and railroad traffic for days. Following the event, a Task Force, comprised of assorted professionals, was formed to investigate the landslide. In addition to the Final Report, House Bill 2759 and House Resolution 845 also resulted from that Task Force. As there were multiple interest groups on the Task Force, the legislation is a patchwork of assorted ideas. It is a good start even if it is not perfect.

Prime sponsor Representative Petrone introduced the Bill which was referred to the House Environmental Resources and Energy Committee on September 9, 2008. In general, the legislation proposes to have the Pennsylvania Department of Conservation and Natural Resources (DCNR) map "geologically hazardous areas". Where they exist, "earth disturbance activities" in those areas would require a "geologic report" which would be reviewed and approved by the PA Department of Environmental Protection (PADEP) or the County Soil Conservation District. PADEP would be responsible for promulgating regulations and for subsequent enforcement activities.

The passage of the Bill is uncertain for the 2007-2008 legislative session but the Pennsylvania Council of Professional Geologists (PCPG) has submitted general preliminary comments on the Bill. The Geohazards Committees for both PGS and PCPG have been reactivated and are preparing for a formal response by collecting detailed comments on the Bill in case an opportunity to comment arises. As it would be counterproductive for individual geologists to "shotgun" comments to legislators, the PGS Geohazard Committee will be collecting comments from western PA for consolidation and submittal to PCPG who will then combine ours with theirs and submit the entire package of comments when the time is appropriate.

Please take time to review the proposed legislation and submit your comments to Judy Neelan at jneelan@verizon.net or mail them to PGS, PO Box 58172, Pittsburgh PA 15209.

## ORIGINS OF WESTERN PA PLACE NAMES

There are several stories concerning the origin of the name Negro Mountain in Somerset County. The most probable one concerns John Hyatt, a native of Maryland who was an early settler in the area around Confluence, Somerset County. While traveling to the Turkeyfoot settlement with several other settlers and a number of slaves, Hyatt and his party were attacked by Indians, who mortally wounded Hyatt's strongest and most valuable slave. Supposedly the slave was buried there and Negro Mountain was named in his honor. The mountain, which is the surface expression of Negro Mountain anticline, includes Mt. Davis, the highest point in Pennsylvania at 3,213 feet above mean sea level.

## DID YOU KNOW . . . ?

- Coesite and diamond, ultrahigh-pressure polymorphs of, respectively, silica and carbon, occur in collisional orogens where buoyant continental crust has been subducted to mantle depths and later exposed at the Earth's surface.
- Geochemists have found evidence that suggests that the end-Permian extinction, which resulted in 90% of all extant species dying out, occurred as the result of extreme oceanic anoxia that may have led to hydrogen sulfide buildup.
- Joints and fractures enhance the permeability of shales because they are significantly larger than the matrix pore throats in the rock.
- Researchers recently found a 1,440-million-year-old granite boulder in an Antarctic till deposit that can be matched to North American Laurentian granites. This supports the postulated fit of East Antarctic and North America more than a billion years ago.
- Some of the earliest recorded accounts of salt resources in North America were from the 1700s along the Kanawha River in what is now West Virginia.
- There is actually an economic value for fossilized dung—by the phosphate industry. In England in the late 1800s the industry employed thousands of people and mined as much as two million tons of coprolites.

# 2009 Oil Creek Then & Now Calendar

Celebrate 150 years of petroleum production in Northwestern Pennsylvania with the **2009 Oil Creek Then & Now Calendar,** produced by the Pittsburgh Geological Society. This calendar features amazing historic photographs of the Oil Creek Area during the 1860s, soon after the drilling of the Drake Well in 1859. Each month highlights a historically significant location from Titusville to Oil City with a rare "Then" photograph, a full color "Now" photograph, and descriptive captions that detail the dramatic changes the area had undergone over the last 150 years. Historic photographs are generously provided by the Drake Well Museum, and the present day photographs were taken in 2007-08 by Pittsburgh Geological Society member John Harper.

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***Now through November 31st!***

**Payment:** 

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**Price:** $14.00 +S&H: $3.95 US, $4.95 Canada & Mexico, $7.25 Everywhere Else
**Delivery:** Calendars will be shipped to you directly in mid December, in time for the holidays.
**Note:** Limited quantities will be available at the meetings for purchase ($14.00 + tax)

**PGS HISTORIAN REQUEST**
*from Judy Neelan, PGS Historian*
As PGS' new official Historian, I have begun the effort of sorting through papers and ledgers that have accumulated over the years. Ed Girard and Chuck Shultz helped with the first crude separation of material. As I would like to complete the sorting before the end of the year, I am interested in any additional information, papers, etc. that may be floating around out there. If you have any old meeting minutes, newsletters, Treasurer's reports or year-end reports, now is your opportunity to clear them out of your attic. I am also looking for obituaries, photos, and any other news stories that may have been written about PGS or its members over the years. When the task is finished, I will report on what we have and what we still need. If you have anything, please bring it to the PGS meeting or call me at 412 442-4087 and I will arrange to get it.

**NEXT MONTH'S MEETING**
Our meeting next month will be held on Wednesday, November, 19. Dan Billman of Billman Geologic Consultants will present *The Marcellus and other Shales*. See you in November!

**PGS MEMBER RECEIVES AWARD**
Jim Hamel received the "Distinguished Practice Award" from the Engineering Division of the GSA, at the GSA Annual Meeting in Houston, TX on October 6, 2008. This award was based on Jim's work on landslides over the past three decades.

**PGS Website of the Month**
**http://earthquake.usgs.gov/learning/glossary.php**

***Please note: As a result of rising costs from our caterers, PGS dinner prices are now $25.00. Student price will remain at $5.00.***

**PGS Board-of Directors**

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Vol. LXI, No. 3 | Robert Burger, Editor | November, 2008

**Wednesday, November 19, 2008**
**The Pittsburgh Geological Society Presents**

## Geologic Overview of Appalachian Shale Natural Gas Plays (or ….. Why here? Why now?)

by Dan Billman, Billman Geologic Consultants

Throughout this presentation we are going to look into the basics of the geology of numerous Appalachian Basin shales, including the Marcellus Shale and how that geology affects some of the "non-geologic" aspects of the play. One can hardly open the newspaper, turn on the local (or even national) evening news or news radio, or surf the internet without finding reference to the Marcellus Shale. But why? Those who have worked in the oil and gas industry in the Appalachian Basin for any period of time know the stories of drilling Oriskany Sandstone wells and taking gas kicks in the Marcellus Shale. You'd let it blow down a bit and you kept drilling. Of course it had gas in it! The Marcellus Shale has long been considered one of the main source rocks for oil and gas in the Devonian. But a little "puff" doesn't equal a drilling boom. How did we leap from source rock to reservoir?

It took a combination of two technology shifts and two mind shifts. Technologically, drilling techniques have improved and specifically horizontal drilling is allowing companies to encounter 1000's of feet of reservoir in their wellbore, instead of ten's of feet. Secondly, hydraulic fracturing techniques in shale reservoirs (pumping water and proppant under pressure to break up and hold open the rock, typically called "fracs") have advanced considerably since the days of nitroglycerine fracs in shale wells in Kentucky and West Virginia. With the updated frac designs comes increased water use. A typical shale frac may use 500,000 to 1,000,000 gallons of water. That's a lot of water… where did it come from and how much might need to be disposed of? But what about the mind shifts?

Geologically, we have only recently started looking at shales as reservoir as well as source and seal. Sure we completed shale gas wells for years, but those were typically considered structural/fracture plays. This is different. Now we are looking at the gas "trapped" in the black shale matrix …. not the gas "freely moving" in

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the fracture system. We may need the fracture system to get the gas out, but that isn't where it resides currently.

The second mind shift didn't occur in a gas geochem lab, a major corporation research center, over a pile of geologic maps or in a logging truck at 3:00am. It occurred on Wall Street. Only recently did Wall Street begin to look at unconventional or continuous gas plays as a positive for a company. Previously, Wall Street wanted "sexy", "big bang for the buck" prospects. Offshore, sub-salt, deep water, over-thrust, etc. With the success of unconventional gas plays such as the Barnett Shale (Fort Worth Basin, Texas), Pinedale Anticline (Wyoming), Bakken Shale (Williston Basin) and others, Wall Street has finally realized that maybe (just maybe) "slow and steady might win the race".

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**ORIGINS OF WESTERN PA PLACE NAMES**

Burgoon Run is a small stream that flows down the eastern escarpment of Allegheny Mountain (the Allegheny topographic front) at Horseshoe Curve in Cambria and Blair County, Pennsylvania. The name is derived from the Burgoon family who settled in the area around Cresson and Munster in the 1700s. Burgoon Run lends its name to the Burgoon Formation, a Mississippian-aged sandstone that is called "Big Injun" by drillers in western Pennsylvania.

**PGS Website of the Month**

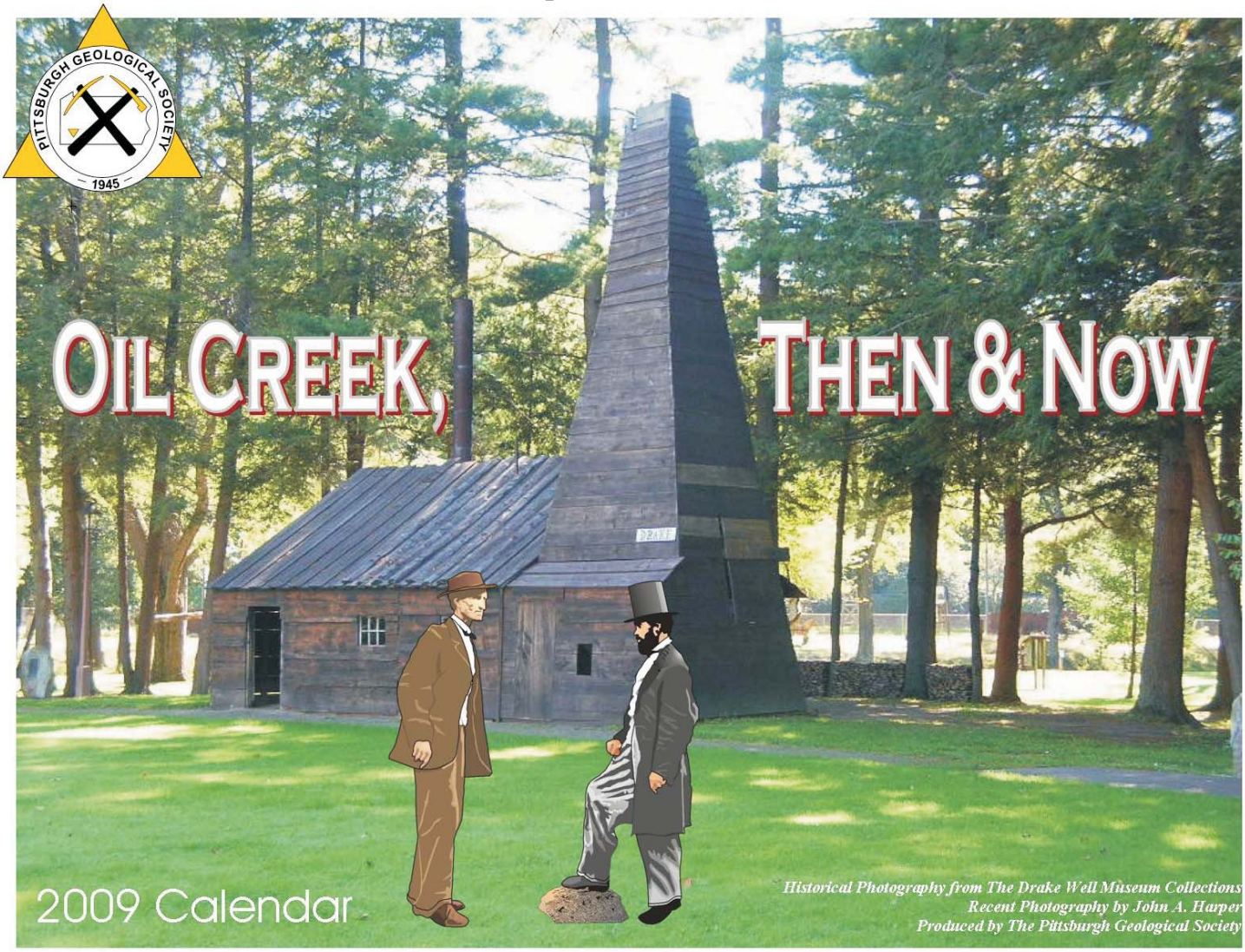
http://csep10.phys.utk.edu/astr161/lect/earth/magnetic.html

**DID YOU KNOW . . . ?**

- Human modification of sensitive slopes in western Pennsylvania is responsible for more than 90 percent of the landsliding that occurs in the area.
- The dysaerobic zone is the portion of the sea floor between aerobic and anaerobic waters in poorly ventilated marine basins; the term was originally used to describe the biofacies and lithofacies exposed over time to oxygen levels ranging from 0.3 ml/l to 1.0 ml/l.
- One of the most important physical weathering processes in cold climates is the repeated growth and melting of ice crystals in the pore spaces or fractures of soil and rock.
- West Virginia's coal fields produce 15% of the country's coal and 50% or our coal exports.
- If the earth did not rotate on its axis, winds would follow the direction of the pressure gradient. But earth's rotation creates the Coriolis force that turns the flow of air.
- There is not a lot of true shale in western Pennsylvania; most of what we call shale in the Pittsburgh area is actually fissile argillaceous siltstone.
- Scientists have found evidence in the form of a boulder that confirms the speculation that Antarctica split off from North America around 600-800 million years ago.
- Coal mining and coal-mine fires emit significant amounts of methane and carbon dioxide, respectively—as much as 8% of the $CH_4$ and 2 to 3% of the $CO_2$—of the annual 1% global increase to the atmosphere.
- Despite the fact that the name Quaternary is the most widely used stratigraphic unit in field mapping, it has been the most controversial in its definition and rank; only recently has it been agreed that the Quaternary Period spans the last 2.6 million years of earth history.
- Polychlorinated biphenyls, sewage, fertilizers, pesticides, household cleaning products, polycyclic aromatic hydrocarbons, and heavy metals are just some of the common contaminants found in the alluvium and waters of the Hudson River.

# The Pittsburgh Geological Society

## in conjunction with OIL150, the Drake Well Museum, and the Pennsylvania Geological Survey, presents

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PITTSBURGH GEOLOGICAL SOCIETY
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# THE PITTSBURGH GEOLOGICAL SOCIETY

## 2008-2009

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**Pittsburgh, PA 15222-4745**

# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

Vol. LXI, No. 4 | Robert Burger, Editor | December, 2008

**Wednesday, December 17, 2008**
**The Pittsburgh Geological Society**
**Annual Guest Night**

# Travels with a geologist—or looking at tourist attractions through a geologist's lens

by Michael Bikerman, University of Pittsburgh, retired

What does a retired geologist do when encountering a variety of new and fascinating places? Can you remove geology from a traveler as a retiree traveler is removed from the geology office? Come and view the results of recent visits to Copper Canyon in Mexico, various and sundry European localities, including Giant's Causeway in Northern Ireland and Madeira and one of the Canary Islands, as well as Morocco, Panama Canal, Ecuador, Peru and a few of the Caribbean islands. See volcanoes, granites, Karst and coral reefs, and some amazing geotechnical feats in a potpourri of images from around the world. Come, savor the world with me at the PGS spouse/friend/guest event!

**Social hour - 6:00 p.m.** **Dinner - 7:00 p.m.** **Program - 8:00 p.m.**

Dinner will cost **$25.00/person**, **students $5.00**; checks preferred. **Reservations should be emailed to Steve McGuire at** **stephen.mcguire@veoliawater.com**, please title as "PGS Dinner Reservation." If you are unable to use email, call (412) 809-6723 and leave your name and number of reservations needed by **noon, Monday**, **December 15**.

**Meeting will be held at Foster's Restaurant, Foster Plaza Bldg 10, Greentree.**

# Pittsburgh Geological Society

**6th ANNUAL STUDENT NIGHT**
**CALL FOR ABSTRACTS!**

Students are invited to submit abstracts of a Senior Research Project, Senior Design Project, Master's or PhD Thesis for presentation at the Sixth Annual Student Night joint meeting of the Association of Engineering Geologists, the Pittsburgh Geological Society, and the Geotechnical Group of the Pittsburgh Section of the American Society of Civil Engineers. Abstracts on the following topics are welcome:

- Geology,
- Engineering Geology,
- Geotechnical Engineering,
- Environmental Engineering,
- Hydrogeology,
- Hydrology

Three students will be selected to give a 15 minute oral presentation based on their abstract submittal. Students not selected to give an oral presentation will be invited to present a poster summarizing their research work. **The 3 students selected to give oral presentations will receive $100 awards. The top 3 students who participate in the poster session will each receive $50 awards.** All students who present their research, either verbally or orally will receive a one year membership into PGS, a special award certification, and dinner that evening. Please limit abstracts to a maximum length of 350 words. The meeting will be held at 6:00 p.m. on Wednesday, April 15, 2009 at Foster's Restaurant, Foster Plaza Bldg. 10, Green Tree, PA

**Due Date for Abstract Submittal is March 6, 2009.**

Notification will be given to the selected speakers by March 13, 2009. Abstracts may be submitted via email to barnerwl@cdm.com and cc: magrs@yahoo.com. If you have any questions or require a mailing address for abstract submittal please call Wendell Barner at 412-208-2409.

**DON'T FORGET TO RENEW**
It's time to renew your PGS membership for the 2008-2009 season.
Please fill out the membership application included with this newsletter and return it with your dues to John Harper at the address on the form.

**ORIGINS OF WESTERN PA PLACE NAMES**
Somerset County was created in 1795 from the western part of Bedford County. Its county seat, Somerset, was incorporated in 1804; both were named for Somersetshire, England. Somerset County is home to Mt. Davis, the highest point in Pennsylvania.

**PGS Website of the Month**
http://www.forces.si.edu/soils/

**MEMBER NEWS**
PGS board member and Geologist at the Carnegie Museum of Natural History, Albert Kollar, led two field trips during this past November. The first was to discuss the Geology of Frick Park for the Nine Mile Run Watershed Association. The Frick hike attracted an all time high number of 73 participants. The second trip was to Riverview Park for Venture Outdoors. The highlight of this trip was a view of the Birmingham "red beds" at a location where they gave way in late summer resulting in a major landslide. Both of these geology hikes received publicity in the Sunday Pittsburgh Post-Gazette Region section, November 2nd and 23rd, respectively.

**SPECIAL THANKS**
Thank you to all who donated at the November meeting to the Greater Pittsburgh Community Food Bank/KDKA Turkey Fund. One hundred dollars was collected and the contribution was matched by National City Bank. So your gift turned into two hundred dollars that night!

## PGS STUDENT WORKSHOP

submitted by Judy Neelan

The "So You Want To Be a Geologist" workshop is scheduled for February 7 at DEP on Washington's Landing in Pittsburgh. The course, designed for and limited to students, will run from 10 a.m. until about 2:30 p.m. Four professionals will speak about careers in geology, academic preparation, job trends, interviewing skills, resume preparation, professional behaviors, and licensing. The cost is free to students, and lunch (pizza and soft drink) will be provided. Dress is casual. The course is limited to 25 students. RSVP to Judy Neelan at 412 442-4087 if you wish to reserve a space. Details and directions to DEP will be provided at a later date.

## DID YOU KNOW . . . ?

- Our primary source of data concerning Holocene terrestrial vegetation change is the detailed regional analyses of terrestrial plant pollen preserved in lake sediments.
- Pennsylvania has two significant slate-producing districts—the Lehigh/Northampton district in the east-central part of the state and the Peach Bottom district in southeastern PA.
- All gravity anomalies come from horizontal variations in density. If the earth were composed of layers of horizontally uniform density, there would be no gravity anomalies.
- Variations in oxygen isotope compositions of calcareous shell-forming lake biotas has been assumed to track changes in lake water chemistry, and so can be used for detailed paleoclimatological reconstructions.
- Infiltration of intermittent streamflow is one of the primary mechanisms for groundwater recharge in semiarid regions.
- Vents associated with coal-mine fires are often encrusted with minerals derived by sublimation from gases released in the fire.
- New images from the Cassini spacecraft confirm that the surface of Saturn's moon, Titan, has a lake of liquid ethane, methane, nitrogen, and other hydrocarbon compounds.
- The demand for high-tech items such as cell phones, computers, and flat-screen TVs might be driving our society to exploit natural resources of rare metals, such as platinum, indium, and antimony, to the point where they will no longer occur naturally on Earth.
- The US has more than 170 active volcanoes.
- New data show that dinosaurs evolved rapidly during the first third of their reign on Earth, but that from the Middle Jurassic to the end of the Cretaceous evolution of new species slowed considerably.
- A new study of rainfall in North Africa indicates that the 1999-2002 drought was the worst in that region since the 15th century.


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PITTSBURGH GEOLOGICAL SOCIETY
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# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

Vol. LXI, No. 5 | Robert Burger, Editor | January, 2009

**Wednesday, January 21, 2009**
**The Pittsburgh Geological Society**
**and the Society of Mining Engineers present**

# Coal Mine Roof Safety in the Illinois Basin

by Greg Molinda
Lead Research Scientist, Geologist
National Institute for Occupational Safety and Health (NIOSH)

Some of the most difficult coal mine roof in the United States can be found in the Illinois Basin. Factors contributing to the high roof fall rate include weak, moisture-sensitive roof rock; high horizontal stress; and limited longwall mining. The depth of cover ranges from 90 to 1,000 feet, and roof damage from horizontal stress can be severe. Moisture-sensitive roof rock, which contributes to roof skin deterioration and roof fall, is common above the Springfield-Harrisburg #5 and Herrin #6 seams in the Illinois Basin. The roof fall rate increases significantly in the humid summer months. Using laboratory and field studies, the National Institute for Occupational Safety and Health (NIOSH) has shown that highly moisture-sensitive roof rock can be directly correlated to poor roof conditions. Roof skin deterioration can also lead to rock unraveling and ultimately to time-dependant roof falls. Controlling the skin is the key to reducing rock fall injuries, and roof screening is, by far, the best remedy. Illinois Basin coal operators have been successful in reducing the number of rock fall injuries and roof falls in recent years. NIOSH has documented best practices for screen installation, which has resulted in safe, efficient operations. Other solutions to skin failure include the use of denser five bolts/row patterns to reduce spans between bolts; systematic supplemental support in intersections; straps and large pans to protect operators; and air conditioning to remove moisture from the intake air.

**Social hour - 6:00 p.m.** **Dinner - 7:00 p.m.** **Program - 8:00 p.m.**

Dinner will cost **$25.00/person**, **students $5.00**; checks preferred. **Reservations should be emailed to Steve McGuire at** smcguire@chesterengineers.com, please title as "PGS Dinner Reservation." If you are unable to use email, call (412) 809-6723 and leave your name and number of reservations needed by **noon, Monday**, **January 19**.

**Meeting will be held at Foster's Restaurant, Foster Plaza Bldg 10, Green Tree.**

# Pittsburgh Geological Society

**PGS SPRING FIELD TRIP**

Albert D. Kollar is offering to lead a one day PGS spring field trip to explore the geology and history along the Montour Trail. The Montour is a 46 mile multi-use, non-motorized recreational rail-trail that extends some 10 miles west and 15 miles south of Pittsburgh running from Coraopolis to Clairton, Allegheny County, Pennsylvania. The Montour Railroad (1877 – 1984) owned and operated the line through the mid-1970s for the sole purpose of coal transportation. For the PGS field trip, a 30-mile section from Moon Township near Coraopolis to the Greer Tunnel, near Hendersonville, Washington County will be examined. The trail has limited access via designated parking lots and is best toured by bicycle. However, we will travel by vans instead and visit ten stops to examine rocks deposited during the Earth's greatest ice ages in the late Carboniferous (Pennsylvanian-age Conemaugh and Monongahela Groups) through early Permian (Dunkard Group), and Pleistocene where the Carmichaels Formation forms stream terraces. Along the trail we will visit the Enlow, National, and Greer Tunnels—built in the 1920s—and see evidence of the great McDonald oil field, as well as reclaimed Pittsburgh Coal strip mines, and brownfield sites. One stop in particular will be examined in Moon Township, where a famous late Pennsylvanian amphibian skull was discovered by a Pitt geology student several years ago and is now part of ongoing study by Carnegie Museum of Natural History geologists and paleontologists.

**PGS STUDENT WORKSHOP**

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## ORIGINS OF WESTERN PA PLACE NAMES

Raccoon Creek, the large Beaver County stream that flows into the Ohio River near the Ohio border, is an English translation of the Delaware Indian name, Nachenum-hanne, which means Raccoon stream.

## DID YOU KNOW . . . ?

- McDonald oil field, the giant field that runs from just north of Washington, PA to Neville Island, is the second largest oil field in the state in terms of production.
- Nodules of barite that contain galena and sphalerite can be found in a calcareous shale below the Upper Freeport coal in the vicinity of Vandergrift, Armstrong County.
- The Middle Devonian Marcellus shale has made lots of headlines recently; the average composition of this rock is 20 percent quartz silt, 50 percent clay, 5 percent pyrite, and 25 percent calcite, based on specimens from Pennsylvania, New York, Ohio, West Virginia, and Virginia.
- Analysis of $^{87}Sr/^{86}Sr$ isotopes from Pennsylvanian and Permian "fresh water" limestones in the Appalachian basin indicates deposition in semi-arid lakes in a landscape in which weathering was limited.
- Middle Silurian-age "iron sandstones" (prominent bodies of hematitic sandstone) are geographically extensive in central PA and occur in sufficient thickness so that the total iron tonnages are moderately large.
- Recent data indicate that the cores of Jupiter and Saturn, composed of a soup of liquid metallic helium and hydrogen, are four times hotter than the surface of the sun.
- Carbon dioxide is soluble in crude oil, and under favorable conditions of pressure, temperature, and composition the gaseous and liquid phases are miscible with oil.
- Although bone is originally composed of hydroxyapatite, it is almost always converted to francolite, a fluorine-bearing apatite, during fossilization, a process that often beautifully preserves the original structure.
- A foreland basin is a sedimentary basin lying between the front of a mountain belt and the adjacent craton.
- If you are confused by the plethora of stratigraphic names within the Appalachians, you are not alone; as a result of 170 years of local and regional studies, the basin is replete with a complexity of names for the same strata, and you can even find name changes across topographic quadrangle boundaries.
- The southern part of the North Sea is a major gas province where gas generated from Carboniferous source rocks is now trapped in Carboniferous through Triassic reservoirs.

## PGS Website of the Month

**http://geology.about.com/**

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# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

Vol. LXI, No. 6 | Robert Burger, Editor | February, 2009

**Wednesday, February 18, 2009**
**The Pittsburgh Geological Society presents**

# Three Geophysical Methods for Detecting Subsurface Anomalies

by Peter J. Hutchinson, PhD., PG
The Hutchinson Group, Ltd., Murrysville, PA

Deep-mine voids are an insidious subsurface mining hazard and identification is imperative to minimizing subsidence to roads, bridges, buildings and other infrastructures. Three common geophysical methods exist for detecting subsurface voids; electrical imaging in the form of continuous vertical electrical sounding (CVES); mapping using microgravity measurements; and seismic imaging. All three have limitations resulting from cultural noise, surface mining, and anomalous lithology.

CVES is the most common method of imaging subsurface voids and is effective at predicting voids to at least 100 feet below grade. The electrical resistivity of a geologic unit is measured in Ohm-meters and is a function of the porosity, permeability, water saturation and the concentration of dissolved solids in pore fluids. Electrical imaging (EI) methods measure the bulk resistivity of the subsurface by injecting current into the ground through surface electrodes. EI methods, in a continuous vertical electric sounding mode, can provide accurate estimates of depths, thickness and electrical resistivity of subsurface layers. The disadvantage to resistivity methods is that the survey must be conducted far away from grounded structures, so the survey cannot be collected near metal fences, pipelines, and railroad tracks. The EI method is also one of the more labor-intensive geophysical methods for data collection. Four examples of CVES imaging: State College, Pennsylvania; Sweetwater, Texas; St. Marys, Pennsylvania, and Akron, Ohio, show the efficacy of this tool for predicting subsurface anomalies.

A microgravimeter measures the acceleration due to the earth's gravitational field and is a slow, sounding-type tool. Microgravity measurements require an accurate vertical and horizontal position for each location and a detailed survey must be conducted. Microgravity measurements are not readily impacted by cultural noise and can be used in urban settings including buildings. Microgravity measurements in a high school in State College, Pennsylvania indicated the presence of voids that may adversely impact a proposed vertical expansion of the building. Microgravity mapping of a warehouse near Oklahoma City, Oklahoma detected the dissolution of gypsum that was used as fill.
(*Continued on next page.*)

**Social hour - 6:00 p.m.** **Dinner - 7:00 p.m.** **Program - 8:00 p.m.**

Dinner will cost **$25.00/person**, **students $5.00**; checks preferred. **Reservations should be emailed to Steve McGuire at** smcguire@chesterengineers.com – please title as "PGS Dinner Reservation." If you are unable to use email, call (412) 809-6723 and leave your name and number of reservations needed by **noon, Monday**, **February 16**.

**Meeting will be held at Foster's Restaurant, Foster Plaza Bldg 10, Green Tree.**

Seismic methods involve bouncing elastic waves (i.e., acoustic) off of subsurface density contrasts. Reflection seismic techniques record the 2-way travel time of a wave front from the source to receiver. Refraction seismic methods exploit Snell's Law, which states that the refraction of a wave front is caused by the change in density experienced by a wave when it changes medium. Either of these two methods, when deployed conventionally, requires that data collection occur in a straight line with significant coverage on either side of the target. Seismic methods are interpretive and processing of the profiles requires extensive knowledge of the processing techniques, the rock/soil layers, and velocity of the materials. Three seismic methods are commonly used by The Hutchinson Group: a proprietary "single-fold" refraction method; multichannel analysis of surface waves (MASW), a reflection method; and tomography, a refraction method. Single-fold seismic reflection methods were instrumental in mapping shallow mine workings in Penn Hills, Pennsylvania and fault plane imaging in Austin, Texas. The MASW method is an up-and-coming seismic reflection method based upon the velocity of surface waves. Tomographic refraction mapping in Bellefonte, Pennsylvania imaged subsurface highwalls and auger mining.

# Pittsburgh Geological Society

**PGS STUDENT FIELD WORKSHOP**

The Pittsburgh Geological Society once again invites students of geology & engineering geology to attend the 7th installment of the "Student Field Workshop." At this workshop, you will have the opportunity to work along side an experienced drilling contractor and learn from field-wise geological professionals. It will be an excellent learning opportunity and your chance to ask all those questions regarding life after college. During the event, you will be introduced to sampling techniques, soil and rock descriptions, well installation, monitoring equipment, and designing a drilling program.

The course will be held **Saturday March 28, 2009**, at Slippery Rock University, Slippery Rock, PA, in the Swope Music Hall/Aebersold Rec Center parking lot. Cost to attend is $15.00 for PGS student members and $20.00 for student non-members. Pizza and soft drinks will be provided for lunch and are included in the fee. **Register ASAP as space is limited**. Please note that payment is not required at the time of registration and may be made at the February or March PGS meeting, or the day of the workshop.

The drilling process is often dusty, wet, and muddy. In addition, this workshop will be held outdoors, rain or shine, so watch the weather forecast and dress accordingly.

This course is limited to active students and recent graduates, so please, no corporate trainees. To sign up, contact: Frank Benacquista, PG at rollerbit@comcast.net or 412-469-9331.

**PGS SPRING FIELD TRIP**

PGS is running a one-day field trip to explore the geology and history along the Montour Trail. The trip, which will be led by Albert Kollar, is being offered on Saturday, May 9, 2009.

The Montour Trail is a 46-mile multi-use, non-motorized, recreational rail-trail that extends 10 miles west and 15 miles south of Pittsburgh running from Coraopolis to Clairton, Allegheny County, Pennsylvania. The Montour Railroad (1877 – 1984) owned and operated the line through the mid-1970s for the sole purpose of coal transportation.

The PGS field trip will cover a 30-mile section from Moon Township, near Coraopolis, to the Greer Tunnel, near Hendersonville, Washington County. Participants will travel by vans and visit ten stops to examine rocks deposited during the Earth's greatest Phanerozoic ice ages in the late Carboniferous (Pennsylvanian-age Conemaugh and Monongahela Groups) through early Permian (Dunkard Group), and Pleistocene where the Carmichaels Formation forms stream terraces. Along the trail we will visit the Enlow, National, and Greer Tunnels, visit the location where a former Pitt geology student discovered a now-famous Pennsylvanian amphibian skull, see evidence of the great McDonald oil field, and see reclaimed strip mines in the Pittsburgh Coal and brownfield sites.

Details regarding registration, fees, and meeting location have yet to be arranged. This is sure to be a fascinating trip, so stay tuned for updates in future emails and newsletters.

## CALL FOR NOMINEES

PGS is calling on the membership for interested candidates for next year's officer and director-at-large positions.

There are three director-at-large positions that need to be filled. These positions are for a term of two years and require regular attendance at the board meetings held one hour prior to the social hour of each monthly society meeting. The position requires that you become involved at some level in the monthly operations of the society by aiding the officers and committees in various ongoing projects.

If you are an active member of the society and have an interest in being a candidate, or know of a member that you think would be a good candidate, please inform **Ray Follador**, Nominations and Elections Committee Chair, ASAP at geodawg@comcast.net or (724) 744-0399. A list of all candidates will be announced at the April meeting with the election to be held at the May meeting.

## ORIGINS OF WESTERN PA PLACE NAMES

Bakerstown, a small community in northern Allegheny County, is named for Thomas Baker from Nova Scotia. Baker bought two lots of Depreciation Lands (land given to Revolutionary War Veterans in payment for their services) at the crossroads of the Packsaddle Trail (now Bakerstown Road) and the Venango Trail (now PA Route 8) around 1810. One of the early buildings in Bakerstown, the Hull House, was a "station" on the "Underground Railroad." Bakerstown gave its name to the Upper and Lower Bakerstown coal seams near the top of the Glenshaw Formation of the Conemaugh Group. In certain localities around western Pennsylvania these seams are considered economically mineable.

## 7th ANNUAL STUDENT NIGHT CALL FOR ABSTRACTS!

Students are invited to submit abstracts of a Senior Research Project, Senior Design Project, Master's or PhD Thesis for presentation at the Seventh Annual Student Night joint meeting of the Association of Engineering Geologists, the Pittsburgh Geological Society, and the Geotechnical Group of the Pittsburgh Section of the American Society of Civil Engineers. Abstracts relating to subjects such as geology, engineering geology, geotechnical or environmental engineering, hydrology, and hydrogeology are welcome.

Three students will be selected to give 15 minute oral presentations and receive $100 awards. The remainder of students will be invited to present posters summarizing their research work. The top three selected students presenting posters will each receive $50 awards. All students who present their research, either verbally or orally, will receive a one year membership into PGS, a special award certification, and dinner that evening.

Abstracts submitted must be 350 words or less. Due date for submittal is Friday, March 6, 2009. Notification will be given to the selected speakers by March 13, 2009. Submit abstracts via email to barnerwl@cdm.com and cc: magrosspgs@verizon.net. If you have any questions or wish to submit your abstract by mail please call Wendell Barner at 412-208-2409.

The meeting will be held at 6:00 p.m., Wednesday, April 15, 2009 at Foster's Restaurant, Foster Plaza Bldg. 10, Green Tree, PA

## DID YOU KNOW . . . ?

- A team of researchers from Kingston University in London has found high levels of metals, such as lead, chromium, and manganese, in wine from France, Germany, and Spain.
- In areas of gently dipping rocks, such as in western PA, surface features such as joints can often be correlated with preferred hydraulic fracturing directions in shallow wells.
- More than 95 percent of Earth's freshwater occurs in subterranean aquifers.
- If you're worried about global warming, stop eating mushrooms! Researchers say that mushrooms growing in northern hemisphere forests are helping to slow climate change.

## PGS Website of the Month

**For the skeptics among us:**
**http://www.paulmacrae.com/?p=62**

**PGS Board-of Directors**

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**Other PGS Positions**

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| **AAPG Delegate:** | Dan Billman | **Webmaster:** | Mary McGuire | **Historian:** | Judy Neelan |
| **Newsletter Editor:** | Robert Burger | | | | |

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**News items**: To submit a news item in the PGS Newsletter, please contact Robert Burger at (724) 818-5659, mail at 1885 Redcoach Road, Allison Park, PA 15101, or email at r.burger@verizon.net. Be sure to also send an email address and phone number where you may be contacted.

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PITTSBURGH GEOLOGICAL SOCIETY
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# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

Vol. LXI, No. 7 | Robert Burger, Editor | March, 2009

**Wednesday, March 18, 2009**
**The Pittsburgh Geological Society**
**and the**
**Pittsburgh Association of Petroleum Geologists**
**present**

## Relation Between Volcanism, Tectonism and Hydrothermal Activity Along the Global Mid-Ocean Ridge System

by Susan E. Humphris, Woods Hole Oceanographic Institution
AAPG Distinguished Lecturer

Just over 30 years ago, scientists exploring the global mid-ocean ridge system made the spectacular discovery of black smokers—hydrothermal chimneys made of metal sulfide minerals that vigorously discharge hot, particulate-laden fluids into the ocean. These chimneys are the surface manifestation of convection of seawater through the oceanic crust and water-rock reactions that produce hot, hydrothermal fluids that discharge at the seafloor. This hydrothermal circulation process plays an important role in regulating the chemistry of seawater, building mineral deposits, and supporting chemosynthetically-based ecosystems.

Early studies focused on hydrothermal systems on the fast-spreading East Pacific Rise, where shallow magma lenses beneath the ridge crest provide heat to drive convection of seawater through the oceanic crust. Ten years later, studies of the slow-spreading Mid-Atlantic Ridge revealed much larger mineral deposits – a surprising result given the lower magma delivery rate and heat availability.

Through the use of different deep-submergence technologies, this talk will explore the characteristics of vents and their associated communities along the mid-ocean ridge, and the varying relations between volcanic and tectonic processes at sites on ridges of different spreading rates. It will focus in particular on how one active hydrothermal system has constructed a large mineral deposit on the Mid-Atlantic Ridge, and how recent experiments at that site have shed light on the role tectonics and faulting play in the evolution of long-lived hydrothermal systems.

**Social hour - 6:00 p.m.** **Dinner - 7:00 p.m.** **Program - 8:00 p.m.**

Dinner will cost **$25.00/person**, **students $5.00**; checks preferred. **Reservations should be emailed to Steve McGuire at** smcguire@chesterengineers.com, please title as "PGS Dinner Reservation." If you are unable to use email, call (412) 809-6723 and leave your name and number of reservations needed by **noon, Monday**, **March 16**.

**Meeting will be held at Foster's Restaurant, Foster Plaza Bldg 10, Green Tree.**

# Pittsburgh Geological Society

**PGS STUDENT FIELD WORKSHOP**

Attention students! There are still a few slots left for participants at Pittsburgh Geological Society's "Student Field Workshop." At this workshop, you will have the opportunity to work alongside an experienced drilling contractor and learn from field-wise geological professionals. It's an excellent learning opportunity and your chance to ask all those questions about life after college. At this event, you'll be introduced to sampling techniques, soil and rock descriptions, water well installation, monitoring equipment, and designing a drilling program.

The course will be held **Saturday March 28, 2009**, at Slippery Rock University, Slippery Rock, PA, in the Swope Music Hall/Aebersold Rec Center parking lot. Cost is $15.00 for PGS student members and $20.00 for student non-members. Pizza and soft drinks will be provided for lunch and are included in the fee. **Register ASAP as space is limited**. Please note that payment is not required at the time of registration and may be made at the March PGS meeting or the day of the workshop.

The drilling process is often dusty, wet, and muddy. In addition, this workshop will be held outdoors, rain or shine, so watch the weather forecast and dress accordingly.

This course is limited to active students and recent graduates, so please, no corporate trainees. To sign up, contact: Frank Benacquista, PG at rollerbit@comcast.net or 412-469-9331.

**PGS SPRING FIELD TRIP**

PGS is running a one-day field trip to explore the geology and history along the Montour Trail. The trip, which will be led by Albert Kollar, is being offered on Saturday, May 9, 2009.

The Montour Trail is a 46-mile multi-use, non-motorized, recreational rail-trail that extends 10 miles west and 15 miles south of Pittsburgh running from Coraopolis to Clairton, Allegheny County, Pennsylvania. The Montour Railroad (1877 – 1984) owned and operated the line through the mid-1970s for the sole purpose of coal transportation.

The PGS field trip will cover a 30-mile section from Moon Township, near Coraopolis, to the Greer Tunnel, near Hendersonville, Washington County. Participants will travel by vans and visit ten stops to examine rocks deposited during the great ice ages of the Phanerozoic—the Pennsylvanian-age Conemaugh through early Permian Dunkard Groups, and Pleistocene stream terraces in the Carmichaels Formation. Along the trail we will visit the Enlow, National, and Greer Tunnels, visit the location where a former Pitt geology student discovered a now-famous Pennsylvanian amphibian skull, see evidence of the great McDonald oil field, and see reclaimed strip mines in the Pittsburgh Coal, and brownfield sites.

Details regarding registration, fees, and meeting location have yet to be arranged. This is sure to be a fascinating trip, so stay tuned for updates in future emails and newsletters.

**ORIGINS OF WESTERN PA PLACE NAMES**

Bradford, in McKean County near the New York border, is situated on Tunungwant (pronounced TOON-un-gwant) Creek. The first settlers in the area were New Englanders who arrived around 1825. The town was established in 1837 as Littleton, and later renamed Bradford in honor of a New Hampshire town that was the original home of many of its settlers. Oil was discovered here in 1871, and by 1881 it had become Pennsylvania's most important oil-producing area, accounting for about 75% of the production of the entire planet. With the introduction of waterflooding early in the twentieth century, Bradford field, considered to be the world's first giant oil field, gained new life, but it has been in decline ever since. Bradford gave its name to the Upper Devonian Bradford Group, which contains many of the important gas reservoirs in Pennsylvania.

**PGS Website of the Month**

**http://avo.alaska.edu/activity/Redoubt.php**

## NEXT MONTH"S MEETING

The April meeting of the PGS will be the 7th Annual *Student Night*, which will be held jointly with the Association of Engineering Geologists and the Geotechnical Group of the Pittsburgh Section of the American Society of Civil Engineers. Several senior and graduate level geology and geotechnical engineering students prepared and submitted abstracts related to their disciplines for review. Judges from each of the above organizations reviewed the abstracts and selected winners. At this meeting, the authors of the three most outstanding abstracts will talk about their research projects. In addition, several of the runner-up students will show posters summarizing their research work. The meeting will be held at 6:00 p.m., Wednesday, April 15, 2009 at Foster's Restaurant, Foster Plaza Bldg. 10, Green Tree, PA.

## SPRING NORTH AMERICAN COALBED METHANE FORUM

The North American Coalbed Methane Forum will hold its Spring session on April 20 – 21, 2009 at the Hilton Garden Inn Pittsburgh/Southpointe near Canonsburg, PA. For more information, please contact Ihor Havryluk at 412-445-5803, havryluk@zoominternet.net or Dr. Kashi Aminian at 304-293-7682 ext. 3406, khashayar.aminian@mail.wvu.edu.

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## DID YOU KNOW . . . ?

- Based on sizes of eggs and bones, as well as the behavior of modern reptiles and birds, scientists think that male dinosaurs probably attended their nests, rather than females.
- Quaternary depositional units in glaciated shield areas are arranged in unconformity-bounded, lithologically varying packages that should make them ideal candidates for description using a sequence stratigraphic approach.
- Skeptics of solar power, take heed—the sun provides enough energy every day to provide a full year of power to human infrastructure. We just need a more efficient way to convert sunlight to electricity.
- The habitat of primitive (i.e. Lower Paleozoic) vertebrates has long been controversial, ranging from fresh-water to marine.
- The Devonian in the Appalachians contains at least four clusters of pyroclastics beds—volcanic ash falls—mostly in the lower and middle section of the system.
- Tectonic thickening is an important part of the growth of anticlines in southwestern Pennsylvania, with a basal detachment zone, a lower imbrication zone, and an upper wedge zone all playing important roles.
- Drilling for oil and gas in the US is declining in response to the 2008 oil and gas price collapse and financial crisis; further declines are expected through 2009.
- Oceanic lithosphere is produced at different rates along spreading centers, and this creates different structural architectures along mid-ocean ridges.
- A new concept, called threshold hillslopes, holds that slopes have a natural limit to their steepness that is determined more by the internal strength properties of the bedrock than by climate or tectonic factors.
- Based on fossil evidence, Antarctica's climate more than 14 million years ago was similar to that of present-day southern South America.
- The Wenchuan earthquake, which hit China on May 12, 2008 and killed more than 87,600 people, had a displacement of 13 feet (4 meters). The energy released took about 2,000 years to accumulate.

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# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

Vol. LXI, No. 8 | Robert Burger, Editor | April, 2009

## Wednesday, April 15, 2009
## 7h Annual Student Night
### Joint meeting with the Pittsburgh Geological Society, the Association of Engineering Geologists, and the American Society of Civil Engineers

**PGS Award Winner**

## Use of remote sensing in the collection of discontinuity data for the analysis and design of cut slopes

by **James E. Fisher,** Kent State University

Remote sensing techniques have been used frequently in slope stability studies. This use has been generally confined to identifying slope failures, determining the size and extent of possible failures, or measuring the temporal changes in a slope that could suggest impending slope failures. This study was conducted to examine the use of LIDAR and photogrammetry in the collection of discontinuity orientation data for slope failure analysis. The objectives of this study were to compare: 1) LIDAR and manually collected discontinuity data to test the reliability of the remote sensing method; 2) the application of both LIDAR and manually collected data in kinematic and factor of safety analyses for cut slopes; and 3) the use of LIDAR and photogrammetry techniques for collection of discontinuity data.

Data collection for the different methods was done at two different sites. LIDAR and manual data collection was done at an abandoned limestone quarry, adjacent to Claytor Dam and Interstate 81, near Radford, Virginia. Data collected to produce photogrammetric models was done along I-81 in the Christiansburg area, northeast of the quarry site. Collecting both manual and LIDAR data in the same location allowed statistical comparison of the two methods. The LIDAR and photogrammetry techniques were compared qualitatively since two different locations were used to collect the data sets.

Results show that both LIDAR and manual methods yield statistically similar discontinuity orientations. However, differences did exist between the two data sets that can be attributed to shadow zones produced during the LIDAR data collection, and to the size of measurable joint surface area, which needs to be sufficiently large for LIDAR to resolve the surfaces. For the quarry slope stability analysis, both the LIDAR and manual methods found possible wedge and toppling failures in the quarry, with joint roughness and water pressure along discontinuities being the dominant factors in influencing failure occurrence.

For the LIDAR and photogrammetry techniques, different software packages allow users to collect discontinuity data differently by either 1) the user finding discontinuities in the 3D models from which to directly collect orientation data, or 2) by allowing the software to find discontinuity surfaces via user input parameters, with discontinuity orientation derived from those surfaces. In either case, user bias is an important factor in the collection discontinuity orientations, which suggests that geologists should be knowledgeable in using the software in order to collect reliable data for slope stability analysis.

**Social hour - 6:00 p.m.** **Dinner - 7:00 p.m.** **Program - 8:00 p.m.**

Dinner will cost **$25.00/person**, **students $5.00**; checks preferred. **Reservations should be emailed to Steve McGuire at** smcguire@chesterengineers.com, please title as "PGS Dinner Reservation." If you are unable to use email, call (412) 809-6723 and leave your name and number of reservations needed by **noon, Monday**, **April 13**.

**Meeting will be held at Foster's Restaurant, Foster Plaza Bldg 10, Green Tree.**

# Pittsburgh Geological Society

### ASCE Award Winner

## Rock-slope design in western Pennsylvania: a rational approach

by Maria C. Jaime, Dept. of Civil and Environmental Engineering, University of Pittsburgh

Rockfall along highways that crisscross the rolling hills of Western Pennsylvania poses a serious challenge in terms of both the highway maintenance and the highway safety. Rockfall events are frequent occurrences in the region. These events are dictated not only by the engineering designs, but also by the local geological setting. One of the tools that have been widely employed by engineers to obtain an estimate of the path of a fallen rock fragment is the Colorado Rockfall Simulating Program, or, CRSP. Such estimates often form the basis for the design of protection fences, catchment trenches and cut slope geometry. Even though CRSP has been used in Pennsylvania, there is as yet no systematic validation; neither has there been a consistent procedure established for dealing with issues pertaining to local geological features. This research is aimed at addressing there two issues and, in the process, provides a starting point for a rational approach toward reliable designs.

The computer program CRSP was originally developed by Colorado where the slopes are higher and the rocks are harder, in general. The assumptions that were adopted in the CRSP and the subsequent calibration of its input parameters might not work well for the highway slopes of the area studied; therefore, a systematic way to acquire input parameters was initiated.

An extensive field work in collecting data was carried out. Subsequently, a calibration of the CRSP input parameters was performed in such a way that the field conditions as observed could be best matched by the analyses. Although some potential discrepancies might exist in the field conditions as observed could be best matched by the analyses. Although some potential discrepancies might exist in the field conditions as observed from the ones present during the analyzed rock fall events, the recommendations of the study could served as a reasonable starting point for a sound analysis using CRSP in the studied region. The results of such analysis should, however, be verified by practitioners on a case by case basis using all the available site information.

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### AEG Award Winner

## Influence of soil joints on permiability of glacial till

by Aleksandar Prvanovic, Kent State University

Although soil joints are common in the United States, they are most predominant in the loess sediments in the Great Plains and in glacial tills in the northern states, including the lake plain of Northeastern Ohio. Soil joints can significantly control the engineering and hydraulic behavior of soil masses similar to the manner in which rock joints control the behavior of rock masses. However, currently, the engineering significance of soil joints is not properly recognized. Instead, the common practice in soil engineering is to determine and use soil properties and not soil mass properties. This approach has been adopted because most of soil engineering is being practiced in loose, unconsolidated materials containing no joints. However, in regions where engineering structures are to be built on jointed glacial till or loess sediments, soil mass properties must be taken into account in addition to soil properties.

Numerous landfills are located in areas underlain by glacial till, and many are responsible for causing soil and groundwater contamination problems. Soil joints provide pathways for pollutants to infiltrate glacial till material, that has traditionally been considered as an effective barrier to water-carried contaminant transport, and reach aquifers. In order to investigate how the aspects of soil joints can affect permeability of glacial till, three study sites were selected along the Lake Erie shoreline where glacial till is well exposed in the form of jointed bluffs and field and lab investigations were conducted. Field methodology consisted of detailed line surveys of joints (orientation, spacing, aperture, roughness, type of infilling material, hydraulic activity and extent of joints were recorded), sampling, in-situ permeability tests, and in-situ dye tests. Laboratory investigations included Atterberg limit tests, grain size distribution analysis, X-ray diffraction analysis, swelling potential evaluation, consolidation tests and a variety of permeability tests. The permeability tests focused on how different aspects of joints (spacing, aperture, type of infilling material) and the properties of till itself (intact vs. disintegrated till, till with different water contents) influence its permeability.

Field data analysis showed the existence of three prominent sets of joints, one perpendicular to the bluff face, one parallel to the bluff face and one horizontal and subhorizontal set. According to the USCS, the studied glacial till falls into CL-ML category with approximately 20% gravel and sand grains, 75% silt, and up to 5% clay. The spacing and aperture were expressed as open joint area per square meter of the bluff face and was found to be 40 $cm^2 / m^2$ on average. In-situ measured water flow velocity varied from $7x10^{-2}$–8.23 cm/s. Although the lab and field tests are still ongoing, analysis of the data shows that the intact till permeability varies from $2x10^{-8} – 1.60x10^{-7}$ cm/s where the permeability of disintegrated till is within the range of $1.44x10^{-6} – 3.41x10^{-5}$ cm/s. The permeability of glacial till was found to be time dependant. In case of seepage, the permeability of jointed glacial till is strongly influenced by its water content and the type of joint infilling material, where aperture is not very significant. In the case of

turbulent water flow with large discharge, field tests indicated that the aperture of joints plays a significant role in the overall permeability of glacial till masses. Completion of this research should result in developing a methodology for estimating permeability of jointed glacial till, a frequently used property in geotechnical and hydrogeological practice. Accurate determination of permeability of jointed soil masses can be very useful in solving problems associated with slope stability, seepage of water, foundation settlement, and hydrogeological problems with infiltration of leachate from landfills and associated groundwater contamination. The study results will also be valuable in site selection and design of landfills in jointed soil masses. The research will also serve as the basis for future studies relating to jointed soil masses and contaminant transport through glacial till.

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## POSTER PRESENTATIONS

The poster presentation winners at this year's student night:

PGS Winner
**Physical and chemical characteristics of potential seal strata at sites being considered for the demonstration of geological $CO_2$ sequestration**
Craig Griffith, David Dzombak, Gregory Lowry, Yee Soong, Carnegie Mellon University

ASCE Winner
**A geotechnical characterization of the epikarst at the Clearwater Dam site, Wayne County, Missouri**
Kristen Enzweiler
Kent State University

AEG Winner
**Makili, Mali Fish Farm**
Brian Lucarelli, University of Pittsburgh

## PGS OFFICER NOMINEES

The proposed list of candidates for positions on the 2009-10 PGS Board-of-Directors include:

President: Michael Forth
Vice President: Mary Ann Gross
Treasurer: Steve McGuire
Secretary: Erica Love

There are three Directors-at-Large positions open The current candidates are Maury Deul, Albert Kollar, Jason Olczak, and Danielle Deemer. If you are an active member of PGS and wish to become a candidate, or know of a member who would be a good candidate, please inform Ray Follador, Nominations and Elections Committee Chair at geodawg@comcast.net or (724) 744-0399. All candidates will be announced at the April meeting. The election will be held at the May meeting.

## PGS SPRING FIELD TRIP

The 2009 PGS Field Trip will discuss the Geology and History along the Montour Trail in southwestern PA. The Montour Railroad was chartered in 1877 to collect coal from new mines in the Pittsburgh coal seam exposed in the hills along Montour Run. An initial track ran from Montour Junction, just east of Coraopolis, to Imperial. By 1917 the track was extended to reach West Mifflin. Three morning stops to access the exposures of the Casselman Formation, Conemaugh Group and the Pittsburgh Formation of the Monongahela Group. Three stops will be made in the afternoon, including one at Primrose where we will look at the Benwood Limestone of the Monongahela Group and remnant equipment of the McDonald Oil Fields. another at the highest point along the Montour Trail—the National Tunnel where the early Permian of the Dunkard Group is exposed. The final stop will be at Hendersonville and the Greer tunnel in Washington County where Late Pennsylvanian and early Permian rocks are exposed in the Chartiers Creek Valley.

The trip will originate at the Lowe's parking area near McDonald's at Robinson Mall at 8 a.m. Saturday, May 9 and return to the lot by 4:30 in the afternoon. The cost is $15.00 with the maximum attendees of 24. A complimentary lunch will be generously provided by Pennsylvania Drilling Company. Travel will be by van and no personal vehicles or collecting will be permitted. No hammers will be allowed, but be sure to bring your cameras.

The deadline for signing up is May 1, 2009. To reserve your place , email Albert Kollar at kollara@carnegiemnh.org no later than that. You can pay by check or cash either in person at the April 15 PGS meeting or by mailing it to: John A. Harper, Pennsylvania Geological Survey, 400 Waterfront Drive, Pittsburgh, PA 15222-4745.

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PITTSBURGH GEOLOGICAL SOCIETY
PO Box 58172
Pittsburgh PA 15209

# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

Vol. LXI, No. 9 | Robert Burger, Editor | May, 2009

**Wednesday, May 20, 2009**
**Pittsburgh Geological Society presents**

## Environmental Changes in Mongolia over the Last ~4000 Years: Evidence from Lake Sediment Cores and Horse Tooth Enamel

by Michael Rosenmeier, University of Pittsburgh

Mobile populations and pastoral economies gained prominence within the steppe environments of Central Asia beginning ~2000 B.C.E. Although more geographically limited by environmental parameters, agriculture was also evident during the third and perhaps fourth millennium B.C.E. at a number of steppe sites. Discussion of prehistoric (and modern) subsistence changes and models of the economic transitions within the Central Asian steppes have often invoked explanatory mechanisms such as climate fluctuations or environment degradation resulting from population growth. Multi-disciplinary research involving archaeology and ethnography and climatology has nonetheless been limited within the Central Asian steppes and very few studies have effectively and fully integrated the additional fields of geology and ecology.

In this presentation, three studies of past climate change within Mongolia will be presented. These include examinations of lake productivity and climate histories from high-altitude sites within the Baroon Taiga Mountains, northern Mongolia, lake sediment records of late Holocene climate change in the Khanuy Valley, north-central Mongolia, and stable isotopic analyses of horse teeth collected from Mongolian archaeological sites. Results from these multi-proxy and interdisciplinary studies contribute to the understanding of Central Asian climate change and also provide critical information on the environmental context in which the nomadic pastoral economies of the Central Asian steppes evolved.

**Social hour - 6:00 p.m.** **Dinner - 7:00 p.m.** **Program - 8:00 p.m.**

Dinner will cost **$25.00/person**, **students $5.00**; checks preferred. **Reservations should be emailed to Steve McGuire at** smcguire@chesterengineers.com, please title as "PGS Dinner Reservation." If you are unable to use email, call (412) 809-6723 and leave your name and number of reservations needed by **noon, Monday**, **May 18**.

**Meeting will be held at Foster's Restaurant, Foster Plaza Bldg 10, Green Tree.**

# Pittsburgh Geological Society

**PGS BOARD-OF-DIRECTORS ELECTION**

The Election of officers and directors for Pittsburgh Geological Society's 2009-10 season will be held at the May 20, 2009 PGS meeting. A ballot is included with this newsletter listing one candidate each for the positions of President, Vice President, Secretary, and Treasurer. Four candidates are running to fill three two-year terms for the Director-at-Large positions.

Regular members, corporate members, and honorary members are eligible and encouraged to vote; student members are ineligible. Please complete your ballots and bring them to the May meeting. If you are unable to attend, please send your completed ballots to: PGS Election Committee, P. O. Box 58172, Pittsburgh, PA 15209. Mailed ballots must be received by PGS no later than Friday, May 15.

**GALEY FUND**

In the late 1990s, in an effort to encourage student involvement in the society's activities, PGS established a fund to supplement the costs of student attendance in Society functions. The fund was named after deceased PGS honorary member John Galey, who was a strong supporter of geologic education. Since its inception, the fund has been used to supplement the fee for students' dinners at the monthly meetings and fees for students to attend the Spring field trips. In addition, contributions to the Galey fund have allowed PGS to present the annual "So You Want to be a Geologist" and "Tools of the Trade" workshops. These workshops—presented by dedicated PGS volunteers—have been invaluable sources of knowledge and are well appreciated by both students and organizations who hire entry-level geologists. The Galey Fund depends on contributions from individuals and entities who are interested in advancing the education of our next generation of geoscientists. PGS gladly accepts monetary donations to the fund in any amount. If interested, please send your contributions to Steve McGuire, PGS Treasurer, PO Box 58172, Pittsburgh PA 15209. Make checks payable to PGS. Thank you for your support.

**"OILY ODES" FROM KATHY FLAHERTY**

PGS member Kathy Flaherty recently published a collection of amusing oil field poems, accompanied by historical and recent photographs, in celebration of the 150th anniversary of the American petroleum industry. The booklet, called *Oily Odes*, is available from the Drake Well Museum gift shop for $15.00 plus tax and shipping. To order a copy, either call the Museum Store at 814-827-2799 x108 or email drakewell@verizon.net.

**ORIGINS OF WESTERN PA PLACE NAMES**

Meadville, the county seat of Crawford County in northwestern Pennsylvania, is named for David Mead, leader of a party of settlers who arrived in 1788. It is the home of Allegheny College, the second oldest college west of the Alleghenies (the University of Pittsburgh gets credit as the first). Meadville lends its name to the Meadville Shale, a formation within the Lower Mississippian-age Cuyahoga Group.

**DID YOU KNOW . . . ?**

- Olympus Mons on Mars is the largest volcano in the solar system. At almost 15 miles high, it is three times higher than Mt. Everest, and has a basal circumference of about 375 miles, which equates to a circular area with a diameter roughly equal to the distance from Pittsburgh to Lake Erie.
- If you are wondering why we don't have hydrogen-cell vehicles taking us from here to there yet, the answer lies in the laws of thermodynamics—in our current technology it takes more energy to extract hydrogen from water or methane than the resulting hydrogen will provide.
- Natural fractures can form either near the earth's surface as a result of tensile stresses or at depth where pore fluid pressures can be more important than tensile stresses.
- Pre-industrial humans lived in many marginal environments, but none that were more marginal than atolls where mean sea level was generally less than 10 feet below land surface.

- Geologists with the National Park Service are currently inventorying and assessing fossil localities in Badlands National Park in South Dakota to gain a better understanding of stratigraphy, depositional environments, preservation, and vulnerability to poachers and visitors.
- Based on topography and a requirement that a river cut through, rather than around, a mountain, the Youghiogheny River gorge at Ohiopyle is the deepest gorge in the state (relief – 2,035 feet), followed by the Pine Creek gorge in Tioga County (relief – 1,995 feet).
- Based on data from organic geochemistry, the Pacific ocean south of latitude 55$^{o}$S enjoyed a warm subtropical to tropical climate with surface temperatures of about 86 degrees during the Early Eocene.
- Some volcanoes, such as Etna and Stromboli, exhibit a behavior called open-vent degassing that includes long-term, relatively quiet times when large amounts of gas are released interrupted periodically by eruptions.
- Hydrothermal processes both above and below sea level have an important role to play in the concentration and distribution of potentially economic deposits of various minerals.
- The size and shape of a mantle plume depends on the magnitude of the viscosity variations within the unstable part of the thermal boundary layer that gave rise to it.
- The Mediterranean Sea is underlain by very thick deposits of Miocene evaporites that originated when the Strait of Gibraltar was uplifted and closed off the connection to the Atlantic Ocean.
- Researchers working in Mongolia have recognized a new $\delta^{13}C$ anomaly within Ediacaran rocks that probably indicates a thermally subsiding passive margin following rifting of the Precambrian supercontinent Rodinia.
- The three main drivers of global climate change are the El Nino-Southern Oscillation, the North Atlantic Oscillation, and the Atlantic Multidecadal Oscilation.
- Planetary scientists have found columnar jointing on Mars very similar to that in columnar basalts here on Earth, with outcrops covering an area of about 76 square miles.
- The Baltimore Mafic Complex in southeastern Pennsylvania and northeastern Maryland probably formed when parts of the ocean floor and imbedded island arcs were thrust up over the margin of Laurentia during closure of the Iapetus Ocean.

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*I extend a warm thank you to all of you who have contributed items for inclusion in the newsletter this season—especially to John Harper who writes the Did you Know…? and Western PA Place Name Columns. All the best to everyone and have a great Summer! Robert Burger (ed.)*

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**PGS Board-of Directors**

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|---|---|---|---|---|---|
| **President:** | Mike Forth | **Director-at Large:** | Bob Fedinetz | **Director-at Large:** | Mary McGuire |
| **Vice President:** | Mary Ann Gross | **Director-at Large:** | Ray Follador | **Director-at Large:** | Richard Ruffolo |
| **Treasurer:** | Steve McGuire | **Director-at Large:** | Bill Gould | **Counselor:** | John Harper |
| **Secretary:** | Erica Love | **Director-at Large:** | Barbara Hamel | **Counselor:** | Mary Robison |
| **Past President:** | Patrick Burkhart | **Director-at Large:** | Albert Kollar | **Counselor:** | Charles Shultz |

**Other PGS Positions**

| | | | | | |
|---|---|---|---|---|---|
| **AAPG Delegate:** | Dan Billman | **Webmaster:** | Mary McGuire | **Historian:** | Judy Neelan |
| **Newsletter Editor:** | Robert Burger | | | | |

**Memberships**: For information about memberships, please write PGS Membership Chair, PO Box 58172, Pittsburgh PA 15209, call John Harper at (412) 442-4230, or e-mail jharper@state.pa.us. Membership information may also be found at our website: www.pittsburghgeologicalsociety.org.

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Mary Ann Gross, Program Chairman at (412) 721-3499 or email at magrosspgs1@verizon.net.

**News items**: To submit a news item in the PGS Newsletter, please contact Robert Burger at (412) 818-5659, mail at 1885 Redcoach Road, Allison Park, PA 15101, or email at r.burger@verizon.net. Be sure to also send an email address and phone number where you may be contacted.

# BALLOT

Pittsburgh Geological Society
Board of Directors Election
May 20, 2009

Note: Eligible voters include regular Members, Honorary Members, and Corporate Members (one vote each, by representative). Student members are ineligible to vote.

___ **President:** Michael Forth

___ **Vice President:** Mary Ann Gross

___ **Secretary:** Erica Love

___ **Treasurer:** Steve McGuire

**Director-at-Large Positions** **(vote for 3)**

___ Danielle Deemer
B. S. Biology 1998, Grove City College, M. S. Geology 2003, University of Pittsburgh, Senior Geologist, CNX Gas, Member of Society since 2001.

___ Maurice Deul
B. S. Geology 1942, Union College (NY), M. S. Mineralogy, University of Colorado 1947, Retired, occasional Consultant, longtime and Honorary Member of Society.

___ Albert Kollar
B. S. Geology 1974, Southampton, M.S. Geology and Invertebrate Paleontology 1997, University of Pittsburgh, Geologist/Collection Manager, Carnegie Museum of Natural History, Section of Invertebrate Paleontology, PGS member since 2005.

___ Jason Olczak
B. S. Environmental Science 2008, Slippery Rock University, Environmental Scientist, Pennoni Associates, PGS member since 2006.

**All ballots must be cast at the May meeting or received at the Society mailing address (below) no later than Friday May 15, 2008.**

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