



# PGS Newsletter

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

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Vol. LXIV, No. 1

Robert Botterman, Editor

September, 2011

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Wednesday, September 21, 2011

The Pittsburgh Geological Society presents

## *A Brief Tour and History of the Appalachians*

**Robert D. Hatcher, Jr., Ph.D., Tectonics and Structural Geology Research, Department of Earth and Planetary Sciences and Science Alliance Center of Excellence, University of Tennessee–Knoxville**

The Appalachians are a Paleozoic orogen that formed in a complete Wilson cycle along the eastern Laurentian margin following the breakup of supercontinent Rodinia and the coalescence of all of the continents to form supercontinent Pangea. The Appalachian Wilson cycle began by formation of a Neoproterozoic to early Paleozoic rifted margin and platform succession on the southeastern margin of Laurentia. Three orogenies ultimately produced the mountain chain: the Ordovician Taconic orogeny, which involved arc accretion; the Acadian–Neoacadian orogeny, which involved north-to-south, transpressional, zippered, Late Devonian–early Mississippian collision of the Carolina superterrane in the southern central Appalachians and the Avalon–Gander superterrane in the New England Appalachians, and Silurian collision in the Maritime Appalachians and Newfoundland; and the Alleghanian orogeny, which involved late Mississippian to Permian collision of all previously formed Appalachian components with Gondwana to form supercontinent Pangea. The Alleghanian also involved zippered, north-to-south, transpressional, then head-on collision. All orogenies were diachronous. Similar time-correlative orogenies affected western and central Europe (Variscan events), eastern Europe and western Siberia (Uralian events), and southern Britain and Ireland; only the Caledonide (Grampian–Finnmarkian; Caledonian–Scandian) events affected the rest of Britain and the Scandinavian Caledonides. These different events, coupled with the irregular rifted margin of Laurentia, produced an orogen that contains numerous contrasts and nonthroughgoing elements, but it also contains elements, such as the platform margin and peri-Gondwanan elements, that are recognizable throughout the orogen. The last event, the Alleghanian (Variscan) orogeny, formed the supercontinent of Pangea. The breakup of Pangea occurred ~200 Ma as Laurentia and Africa began to separate. The breakup involved sinistral motion of Africa with respect to Laurentia, then the two continents moved directly apart. The Mesozoic basins formed in the strike-slip environment, as Africa and Laurentia began to pull apart from south to north. The Appalachian mountain chain became a static component of eastern North America, eroding to a low, rolling piedmont plateau not unlike the present-day Piedmont in the eastern part of the Appalachians. Parts of the chain were uplifted again in the late Miocene and Pliocene producing the topography close to today's Appalachians. The Appalachian Mountains of today are thus not the “oldest mountains in the World,” but some of the youngest.

Robert D. Hatcher, Jr., Ph.D., - Professor - Tectonics and Structural Geology Research, Department of Earth and Planetary Sciences and Science Alliance Center of Excellence, University of Tennessee–Knoxville. Dr. Hatcher received his B.A. and M.S. from Vanderbilt University and his Ph.D. from University of Tennessee. Professional Employment: Geologist, Humble Oil and Refining Company (1965–66), Clemson University (1966–78, Assistant Professor to Full Professor), Florida State University (1978–80, Full Professor), University of South Carolina (1980–86, Full Professor), and University of Tennessee–Knoxville and Oak Ridge National Laboratory Distinguished Scientist (1986–2000), UT Distinguished Scientist and Professor (2000–present).

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**Social hour - 6:00 p.m.**

**Dinner - 7:00 p.m.**

**Program - 8:00 p.m.**

Dinner costs **\$25.00/person, students \$5.00**; checks preferred. **Reservations should be emailed to John F. O'Neill at: [jfgoogal@gmail.com](mailto:jfgoogal@gmail.com)**, please title the e-mail as "PGS Dinner Reservation." If you are unable to use email, call (724) 713-3491(cell), and leave your name and number of reservations needed by **noon, Monday, September 19.**

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

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## GREETINGS FROM THE PRESIDENT

Welcome to the new term of the Pittsburgh Geological Society. Together we can make it both a memorable as well as an interesting and educational experience. Our thanks for the past successes go to: Mary Ann Gross, our outgoing president; Treasurer Steve McGuire; and Danielle Deemer, Director at large. Our new officers are John O'Neil, Treasurer; Kyle Frederick and Robert Fedinetz, Directors-at-Large.

As some of you may not be familiar with my background, I thought a brief bio may be in order to illustrate where I'm coming from and how I view the future.

Before regularly attending the Pittsburgh Geological Society, I was asked to present a talk to PGS: "The Geology along the Lewis and Clark Trail (1804 – 1806)", for the December 2004 meeting. In 2007, I was encouraged to run for a director-at-large position. While serving in this capacity for two terms, I thought about ways to contribute to the society activities with another talk, "Geology, Landscapes, and John Kane's Landscape Paintings". I also helped to coordinate two PGS-sanctioned field trips in 2008, "The Geology along Forbes Road" and, in 2009 "The Geology along the Montour Trail". In 2011, David K. Brezinski and I led a Geological Society of America field trip, "Appalachian Pennsylvanian Climate Events and their Congruent Biotic Responses" for the Pittsburgh meeting. It is a possible PGS field trip theme in 2012.

My professional background is as a geologist and invertebrate paleontologist in the Section of Invertebrate Paleontology at the Carnegie Museum of Natural History - a flexible position, where I have learned to grow as a teacher, an educator of public geology field trips, conducting scientific research, working with fossils, and exploring geology. I hope these attributes will assist me in my new capacity as president.

The Pittsburgh Geological Society has been a leader and has partnered with many institutions contributing to the growth of geologic knowledge of western Pennsylvania. Examples include:

- The Pittsburgh Geological Society and The Pennsylvania Geological Survey publication of The Geology of Pennsylvania a major reference source.
- Co-organizing of the recent Sectional Geological Society of America Meeting held in Pittsburgh
- Long time affiliation with the American Association of Petroleum Geologists and the AAPG Eastern Section Meetings.

- Co-sponsoring a workshop on Stray Gas in 2009, and in offering to geology students, So You Want to be a Geologist workshop. In addition there have been numerous regional field trips covering stratigraphy, paleontology, and geohazards.

The professional and academic world is well aware of what the Pittsburgh Geological Society has to offer to the community on geology. But is that enough in a world where the public, and Pennsylvanians in particular, are bombarded with quasi-scientific information of questionable validity from all forms of media? An example where PGS responded to one of these misleading interpretations is with the Evolution statement found on our website. I believe we need to address the ongoing misinformation in the public forum today that is in question – technology and exploration for fossil fuels, particularly the Marcellus shale gas play and hydraulic fracturing. As President, I feel strongly about educating the public that geology is the reason that Pittsburgh and western Pennsylvania was once and will be again the center for fossil fuels exploration in the Appalachian region over the next century. To start the process of education through geology outreach, I have developed with many PGS officers, board, and members a five-week class at the Osher Institute of the University of Pittsburgh for early 2012, "Geology of the Marcellus Shale Gas Play". In addition several Marcellus seminars and local geology field trips have been planned including, for example, a program at Shady Side Academy.

## PRESIDENT'S CHALLENGE:

In the area of student education there is a need to stabilize the Galey Fund (a PGS fund used to assist student participation in the society's activities). I have donated \$500. to the fund with the challenge to members to similarly support the fund for the future.

As we look forward to the next major geology in Pittsburgh – the national AAPG Convention in May 2013 – I would encourage board officers and members to consider how we can again help contribute as a host to our profession, our city and region.

Albert D. Kollar  
President

## NORTH AMERICAN COALBED METHANE FORUM - NOVEMBER 8-9, 2011

The North American Coalbed Methane Forum will hold its Fall Session November 8-9, 2011 at the Hilton Garden Inn at South Pointe near Canonsburg, Pa. The Forum will consist of presentations covering technical aspects of coalbed methane development and production. Fracing and frac water disposal of Marcellus shale will also be presented.

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Ihor Havryluk at 412-445-5803,  
([Havryluk@zoominternet.net](mailto:Havryluk@zoominternet.net)),

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and/or visit our website at [www.nacbmforum.com](http://www.nacbmforum.com)

## ORIGINS OF WESTERN PA PLACE NAMES

Carmichaels, a small borough in eastern Greene County, was settled in 1768, laid out by Major James Carmichaels, for whom the town was named, and incorporated from Cumberland Township in 1855. James Carmichaels was a scout under Colonel Henry Enochs of the Second Battalion, Washington County Militia and, according to local history, originally was awarded a tract of land on Tenmile Creek in what is now the borough of Jefferson. He is supposed to have traded that tract for land on Muddy Creek. Carmichaels is the type locality of the Carmichaels Formation, a series of Pleistocene lacustrine sediments deposited by successive pondings of the Monongahela River, known collectively as Lake Monongahela, when western Pennsylvania's drainage was backed up by advancing glaciers.

## DID YOU KNOW . . . ?

- Theoretical physicists think that, if the Large Hadron Collider succeeds in producing the elusive Higgs boson, it might also produce another particle that could have the ability to travel through time.
- Based on biochemical and electron microscope studies over the past 20 years, we now know that fungi – mushrooms and their relatives – are more closely related to animals than to plants.
- Researchers from Canada and the US have found that the world's store of phosphorus may be reaching a critical low point – there is a looming shortage of minable phosphorus, and an excess in coastal and surface waters. This points to a critical need to recycle and retain the phosphorus used in agriculture.
- Scientists modeling the movement of debris from the Japanese tsunami in March expect to see some of it washing up on beaches in Hawaii next spring. The west coast from Washington to California can expect it to start washing up in 2013 or early 2014.
- Solar cycles generally last for about 11 years and are measured by counting the number and frequency of sun spots.

- Early Ordovician fossils collected in Morocco include a previously undiscovered variety of anomalocaridid that probably grew to 1 m (3.3 ft) in length. Anomalocaridids were voracious predators during the Cambrian, and apparently made it into the Ordovician as well.
- Water Alert is a new service from the US Geological Survey that sends updates about stream levels and other water measurement data via email or text messages. You can find the website at <http://water.usgs.gov/wateralert/>.
- So you want to be green and use biodegradable products, huh? Seems that they quickly release methane, a greenhouse gas, into the atmosphere when they break down in landfills.
- Japanese geologists found large amounts of rare earth elements in the floor of the Pacific Ocean, enough that mining 1 km<sup>2</sup> (0.4 m<sup>2</sup>) could provide as much as 1/5 of the world's annual consumption.
- A new paleoclimate study indicates that even the most extensive and rapid global warming trends of the past can't hold a candle to what's happening today. The current rate of CO<sub>2</sub> emissions is not growing 10 times faster than during past warming periods.
- The anthracite region in Pennsylvania was one of the earliest areas of coal mining in the United States. Originally used by blacksmiths in the Wilkes-Barre area as early as 1769, anthracite became a major energy source for home heating and industry by the early 1800s.
- Saturn's moon, Enceladus, probably has a saltwater liquid ocean beneath the icy exterior, as determined by freshly ejected plumes analyzed by the Cassini spacecraft.

## PGS Website of the Month

<http://www.prehistory.com/default.htm>

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at [rbottgeo@aol.com](mailto:rbottgeo@aol.com). Special thanks to all who contributed newsletter items this season—especially to John Harper who writes the Western PA Place Name Column.*

**News items:** To submit a news item for the PGS Newsletter, please contact Robert Botterman at (412) 780-3094, mail at 139 Brookmeade Dr., Pittsburgh, PA 15237, or email at [rbottgeo@aol.com](mailto:rbottgeo@aol.com). Be sure to also send an email address and phone number where you may be contacted.

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**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](mailto:jharper@state.pa.us). Membership information may also be found at our website: [www.pittsburghgeologicalsociety.org](http://www.pittsburghgeologicalsociety.org).

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Patrick Burkhart, Program Chair at (724) 738-2502 or email at [patrick.burkhart@sru.edu](mailto:patrick.burkhart@sru.edu).

**PGS Website:** To contact the Webmaster, Mary McGuire, with questions or suggestions, please either email [marykmcguire@comcast.net](mailto:marykmcguire@comcast.net) or use the site's "Contact Us" link at [www.pittsburghgeologicalsociety.org](http://www.pittsburghgeologicalsociety.org).

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PITTSBURGH GEOLOGICAL SOCIETY  
PO Box 58172  
Pittsburgh PA 15209



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Vol. LXIV, No. 2

Robert Botterman, Editor

October, 2011

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Wednesday, October 19, 2011

The Association of Environmental and Engineering Geologists  
and The Pittsburgh Geological Society present

## *Supercool Warm Glaciers - Whoda Thunk!"*

Edward B. Evenson, Ph.D., Glacial and Quaternary Geology, Lehigh University

Glacial till is typically (caution: but not always) a clay-to-silt-rich, cobble strewn diamicton. Its fine-grained nature exerts substantial control over surficial environmental concerns, including slope instability, drainage network development, groundwater recharge, solute transport and resource vulnerability, as well as geotechnical applications utilizing low permeability materials, such as liners and dams. Recent investigations have illuminated an age-old quandary concerning the elusive mechanism of glacial deposition, enhancing our conceptual understanding of societal concerns upon glaciated terrain.

Glaciohydraulic supercooling occurs when sub-glacial water, flowing in a distributed drainage system, flows up an adverse slope. This phenomenon results in abundant and conspicuous summer frazil ice growth at the terminus and base of the glacier, when air temperatures are constantly and significantly above freezing. At the base of the glacier, the growing ice traps silt-sized sediment. Pressure and shearing metamorphose this silt-laden ice into stratified debris-rich basal ice, which moves with the advancing glacier. This recognition helps explain one of the mysteries that has so long perplexed glaciologists – how does ice entrain and transport debris (till)? We have documented this process at Alaskan and Icelandic glaciers and argue that it is operative at all glaciers, where the conditions for supercooling are met – it's just physics! We also demonstrate that till produced by supercooling can be recognized in the geologic record.

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

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## Speaker Biography:

Edward B. Evenson earned his PhD at the University of Michigan after completing his Bachelor's and Master's degrees at the University of Wisconsin, Milwaukee. The good professor has taught at Lehigh University since 1973. He was longtime director of the Environmental Science and Resource Management Program, as well as leader of their Geology Field Camp for 30 years. Climatic, geomorphic, and stratigraphic investigations of the Quaternary record have taken him from the Great Lakes Region to the Rocky Mountains, Alaska, Iceland, Spitsbergen, and the Andes. To his credit, he has authored over 100 journal articles and garnered \$6 million+ in grants from the National Science Foundation, National Geographic Society, and the Cold Regions Research and Engineering Laboratory of the US Army. Among his confidants, he is noted for having survived a list of near-calamitous incidents in the field.

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([Kaminian@wvu.edu](mailto:Kaminian@wvu.edu))

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## ORIGINS OF WESTERN PA PLACE NAMES

Jollytown, a small village located on the banks of Dunkard Creek in Greene County about ½ mile north of the Mason-Dixon Line, is named for Titus Jolly. The area was originally settled in 1790, but Jolly purchased a tract of land from the original owner circa 1835, had it surveyed, and put 18 town lots up for sale. It was called Centerville for a while, but the town eventually was named for its founder because there was already a Centerville in Washington County. Jollytown is the type locality of the Jollytown coal, a thin coal bed at the base of the Greene Formation (Permian, Dunkard Group).

## DID YOU KNOW . . . ?

- A recent study of Late Cretaceous amber found in Canada has unearthed a full range of feather structures that demonstrates the progression of feathers from hair-like "filaments" in dinosaurs to doubly-branched feathers of modern birds.
- And speaking of dinosaurs and birds, a recent study of finger development in birds by scientists in Japan showed that birds and dinosaurs developed in the same way – one more piece of ammunition for those who are sure birds evolved from dinosaurs.
- A large circular feature found in the Democratic Republic of the Congo, about 10.5 miles in diameter, has been confirmed as a meteorite crater. The meteorite, estimated to

have been about 1.5 miles wide, slammed into what is now Africa possibly as long ago as the Neoproterozoic while traveling about 45,000 miles per hour.

- The Cape Wind Project is a proposed 130-turbine wind farm in Nantucket Sound off the coast of Massachusetts that should generate 454 megawatts of electricity, about 75 percent of Cape Cod's and Nantucket Island's energy needs.
- The average surface heat flow for the North American continent is 54.4 milliWatts per square meter (mW/m<sup>2</sup>). The average for the Earth's continents as a whole is 56.6 mW/m<sup>2</sup>.
- Four major Late Paleozoic orogenic belts border the present Atlantic Ocean, the Oachitas and Appalachians in North America, the Mauritanides in Africa, and the Hercynides in Europe.
- Commercial development of rare earths began in 1884 in Scandinavia where the incandescent lamp mantle was invented.
- Water has been found on the moon. It occurs in low concentrations in lunar glasses and in larger quantities just below the surface.
- Mt. Rainier in Washington State boasts 28 named glaciers, which contain the single largest concentration of glacial ice in the lower 48 states.
- A team of researchers found that temperature shifts in Greenland over the past 5,000 years changed several times by as much as 41oF over periods of 200 to 300 years.
- Porosity of a rock is defined as the ratio of the volume of pore space to the total bulk volume of the rock, expressed in percent.
- The Newark-Gettysburg basin, which extends from northern Virginia to southeastern New York, and the Hartford-Deerfield basin, which extends through central Connecticut and Massachusetts, are the largest of the exposed Mesozoic-age basins in the eastern US.

- The "Endless Mountains" region of the Appalachian Plateau in northeastern Pennsylvania is a geographical misnomer. The name actually refers to the mountain range that crosses Pennsylvania from southwest to northeast bordering the Cumberland Valley.
- Cross-fold joints in the central Appalachian Ridge and Valley Province were created during periods of abnormally high fluid pressure before the Alleghanian orogeny.
- Oil from the Gulf of Mexico originated from multiple petroleum systems ranging in age from Jurassic to Eocene but geographically limited occurrence, and each system produces different quality oils that are dependent on reservoir lithology and depositional setting.
- The Laurentian border of the Appalachian orogen in North America throughout its length is represented by Grenville amphibolites and granulitic gneisses. These are unconformably overlain by less deformed and less metamorphosed Cambrian strata.

### PGS Website of the Month

<http://3dparks.wr.usgs.gov/nyc/mesozoic/baltimorecanyon.htm>

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PITTSBURGH GEOLOGICAL SOCIETY  
PO Box 58172  
Pittsburgh PA 15209





# PGS Newsletter

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

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Vol. LXIV, No. 3

Robert Botterman, Editor

November, 2011

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Wednesday, November 16, 2011

The Pittsburgh Geological Society presents

## *"Carbon Capture and Storage (CCS) Research: The Road to Deployment"*

**Michael Karmis, Ph.D., is Stone Barker Professor, Department of Mining and Minerals Engineering and Director, Virginia Center for Coal and Energy Research, Virginia Tech.**

Abstract: Any reduction of greenhouse gas emissions (GHG) to meet proposed or planned climate change will require the development and deployment of CO<sub>2</sub> capture and storage (CCS) technologies. Such technologies are needed, in combination with other mitigation measures, to achieve the necessary stabilization in anthropogenic emissions. National and global efforts on CCS R&D are intensive, multi-stakeholder, and comprehensive, ranging from basic research to deployment scale demonstrations. In addition to technological developments, a number of other barriers to CCS are also addressed including: legal, regulatory and financial barriers; availability of financial incentives; and public acceptance concerns. This lecture presents a status of CCS on "The Road to Deployment."

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**Social hour - 6:00 p.m.**

**Dinner - 7:00 p.m.**

**Program - 8:00 p.m.**

Dinner costs \$25.00/person, students \$5.00; checks preferred. **Reservations should be emailed to John F. O'Neill at; [jfgoogal@gmail.com](mailto:jfgoogal@gmail.com), please title the e-mail as "PGS Dinner Reservation."** If you are unable to use email, call (724) 713-3491(cell), and leave your name and number of reservations needed by **noon, Monday, November 14.**

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

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## **HAVE YOU RENEWED YOUR MEMBERSHIP YET?**

Membership dues are due by December 31. Please renew now if you have not already done so.

## **DECEMBER MEETING - DATE**

### **CHANGE:**

Please note that the date of the December Pittsburgh Geological Society meeting has been moved to Tuesday, December 13 to accommodate the speaker, Dr. Jim Hamel. The meeting will be held at the regular time at Foster's.

### **PRESIDENT'S CHALLENGE:**

In the area of student education there is a need to stabilize the Galey Fund (a PGS fund used to assist student participation in the society's activities). I have donated \$500 to the fund with the challenge to members to similarly support the fund for the future.

As we look forward to the next major geology conference in Pittsburgh – the national AAPG Convention in May 2013 – I would encourage board officers and members to consider how we can again help contribute as a host to our profession, our city and region.

Albert D. Kollar  
President

## **NORTH AMERICAN COALBED METHANE FORUM - NOVEMBER 8-9, 2011**

The North American Coalbed Methane Forum will hold its Fall Session November 8-9, 2011 at the Hilton Garden Inn at Southpointe near Canonsburg, Pa. The Forum will consist of presentations covering technical aspects of coalbed methane development and production.

Fracing and frac water disposal of Marcellus shale will also be presented.

By attending the session you will be eligible for 6.0 professional development hours (PDH) as mandated by the law. For additional information please contact:

Ihor Havryluk at 412-445-5803,  
([Havryluk@zoominternet.net](mailto:Havryluk@zoominternet.net)),

or

Dr. Kashy Aminian at 304-293-3964

([Kaminian@wvu.edu](mailto:Kaminian@wvu.edu))

and/or visit our website at

[www.nacbmforum.com](http://www.nacbmforum.com)

## **ORIGINS OF WESTERN PA PLACE NAMES**

Warren, the county seat of Warren County in northwestern Warren, the county seat of Warren County in northwestern Pennsylvania, was laid out in 1795 and named for Major General Joseph Warren, a Revolutionary War soldier killed at the Battle of Bunker Hill. Although lumbering was the first major industry of the area, oil discovered in 1875 put the town on the map. Oil continues to be an important industry today – Warren is home to United Refining Company, the only oil refinery left in western Pennsylvania. Warren lends its name to the Warren sands – marker beds, and sometimes oil and gas reservoirs, found at the top of the Upper Devonian Bradford Group.

### **DID YOU KNOW . . . ?**

- Tectonic and magmatic arc-complex histories are difficult to decipher even during their immature stages when wide tracts of ocean fall between them.
- Studies of the Upper Devonian Antrim and New Albany shales in Michigan and Illinois

have demonstrated that the vast majority of gas resources in the shales were generated by microbial action at shallow depths.

- Subsurface brines occur both as “free” water in the pores of sedimentary rock and as moisture adsorbed on the grains of the rock. Free water occurs where the rock contains enough interconnected pore space to allow fluid movement when a pressure differential is applied.
- In 2009, Pennsylvania produced 66,849,624 tons of coal from 343 mines – 90% of that production was bituminous coal. Pennsylvania is the nation’s 4th leading coal producer, accounting for about 6.7% of the US total production.
- Scientists have discovered 3.4-billion year old sulfur eating microbes in pyrite crystals from rocks in Australia. They speculate that the pyrite is the byproduct of the microbes’ sulfur munching.
- Basement rocks in Florida and Georgia are composed of Lower Paleozoic shallow-water sedimentary rocks that are neither deformed nor metamorphosed. These lie on Late Precambrian to Cambrian volcanic and plutonic rocks.
- Just when you thought the ozone hole had gone away because the media had “been there, done that”, researchers have discovered that ozone depletion has been warming the troposphere and cooling the stratosphere, which could ultimately affect global ocean circulation and global climate.
- Fractures and faults can provide permeable pathways for fluid movement, from deep in the crust to shallow aquifers, but fracture-enhanced permeability depends on the hydraulic conductivity of the fracture and fault plane present. If they are sealed, the fluids go nowhere.

- German scientists have discovered evidence for hydrothermal vents off the Canary Islands.
- Hydraulic fracturing, that bugaboo of the media and anti-drilling crowd, is not a new technology - it has been around since 1949, and for many years used gelled oil or kerosene rather than water, as the medium carrying the sand proppant.
- The Lower Silurian Tuscarora Formation and equivalent Medina Group were deposited during two transgressive-regressive marine cycles and the transgressive phase of a third marine cycle.
- Climatologists say there is a 50/50 chance that the drought that has been affecting Texas will continue for years, leading to another dust bowl scenario similar to that of the 1930s.
- Pennsylvania had 2,232 working mineral mines in 2010.

### PGS Website of the Month

<http://www.mii.org/mineral-photos-type>

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at [rbottgeo@aol.com](mailto:rbottgeo@aol.com). Special thanks to all who contributed newsletter items this season—especially to John Harper who writes the Western PA Place Name Column.*

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| <b>Past President:</b> | Mary Ann Gross   | <b>Director-at Large:</b> | Barbara Hamel |                           |                |

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|---------------------------|------------------|-------------------|--------------|-------------------|-------------|
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| <b>Newsletter Editor:</b> | Robert Botterman |                   |              |                   |             |

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**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](mailto:jharper@state.pa.us). Membership information may also be found at our website: [www.pittsburghgeologicalsociety.org](http://www.pittsburghgeologicalsociety.org).

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Patrick Burkhart, Program Chair at (724) 738-2502 or email at [patrick.burkhart@sru.edu](mailto:patrick.burkhart@sru.edu).

**PGS Website:** To contact the Webmaster, Mary McGuire, with questions or suggestions, please either email [marykmcguire@comcast.net](mailto:marykmcguire@comcast.net) or use the site's "Contact Us" link at [www.pittsburghgeologicalsociety.org](http://www.pittsburghgeologicalsociety.org).

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# PGS Newsletter

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

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Vol. LXIV, No. 4

Robert Botterman, Editor

December, 2011

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Tuesday, December 13, 2011

The Pittsburgh Geological Society presents

## *Papua New Guinea: Walking into National Geographic*

**Jim Hamel, Consulting Engineer with Hamel Geotechnical Consultants (HGC), Monroeville, PA,  
and GTech, Inc., Pittsburgh, PA.**

The geology of Papua New Guinea is fascinating and the people are more so. My wife Betsy and I spent the last two weeks of May 2011 in PNG on a cultural tour, one of the many highlights of which was the annual Tumbuna Sing-Sing near Mt. Hagen in the Western Highlands. We also spent time along the Sepik River, in the Southern Highlands, and along the Northern Coast.

PNG occupies the eastern half of the island of New Guinea (the world's third largest island and its largest and highest tropical island) as well as several nearby archipelagos. The western half of the island, formerly called Irian Jaya and now called West Papua, is part of Indonesia. PNG is one of the most tectonically active regions in the world. It comprises several microplates and deforming zones trapped in the collision of the Australian and Pacific Plates. Geologic hazards include earthquakes, tsunamis, volcanoes, and landslides. The latter are exacerbated by heavy rainfall, up to 10 m per year in the Highlands. PNG is rich in mineral resources with active mines for gold, copper, and nickel and more mines being planned. Petroleum and natural gas have been discovered recently, so now there is also a hydrocarbon boom. Much more information on the geology of PNG is available through Google.

The people of PNG are mostly Melanesians, the ancestors of whom migrated from Southeast Asia millennia ago. The population of 6.5 million speaks approximately 860 different languages; most adults speak at least three of these languages. Hunting, fishing, and subsistence agriculture are the main activities for most people, though some now work in mining and related activities. Those in remote areas live and dress much like their Stone Age ancestors.

The first European contact with coastal people was in the early sixteenth century. People in remote Highland valleys were "discovered" by Australian gold prospectors in the early 1930's. Many Highland people first saw foreigners in the early 1960's when mineral exploration reached their areas. Some were headhunters and cannibals until the 1960's and 1970's when large scale mining began. Tribal wars (over land, pigs, and women) are still fought in the Highlands. Warriors fight with bows, arrows, spears, machetes, wooden shields, and, in some cases, homemade guns, which often explode on firing.

I will share with you some of the images and experiences that we encountered on our recent visit.

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**Social hour - 6:00 p.m.**

**Dinner - 7:00 p.m.**

**Program - 8:00 p.m.**

Dinner costs **\$25.00/person, students \$5.00**; checks preferred. **Reservations should be emailed to John F. O'Neill at; [jfgoogal@gmail.com](mailto:jfgoogal@gmail.com)**, please title the e-mail as "PGS Dinner Reservation.", or call (724) 713-3491(cell). Reservations can also be made using PayPal at our website <http://pittsburghgeologicalsociety.org>. Reservations are needed by **noon, Friday, December 9<sup>th</sup>**.

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

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## JIM HAMEL BIOGRAPHY

Jim Hamel is a Consulting Engineer with Hamel Geotechnical Consultants (HGC), Monroeville, PA, and GTech, Inc., Pittsburgh, PA. He has degrees in civil engineering from the University of Pittsburgh (B.S., 1965; Ph.D., 1970) and the Massachusetts Institute of Technology (S.M., 1966). He is a Registered Professional Engineer in eight states and a Registered Geologist in two states.

Jim was an Assistant Professor of Civil Engineering at the South Dakota School of Mines and Technology from 1969-1972 and an Adjunct Professor of Civil Engineering at the University of Pittsburgh occasionally from 1974-1994. His consulting career began with part-time work for the Missouri River Division, Corps of Engineers, Omaha, NE, from 1970-1973 and continued with General Analytics, Inc. (now GAI Consultants, Inc.), Monroeville, PA, from 1972-1973. Jim has practiced as an individual consultant full-time since 1973 with HGC and part-time since 1985 with GTech, Inc., a related company.

Over the years, Jim's consulting work has ranged from traditional civil and geotechnical engineering (foundations, retaining structures, slopes, dams) to geo-environmental engineering (waste disposal, contaminant migration, site remediation), river bank and lakeshore instability and erosion, and applied geology/geomorphology for cultural resource investigations. Since 1990, about half of his work has involved forensic investigations, expert services, and litigation support. The other half of his work since 1990 has mainly included slope stability, landslides, dams, and water supply and waste water treatment infrastructure.

Jim has been active in local, national, and international technical societies since 1972. He has published numerous technical papers, many of which were presented at national and international conferences. In 1989, he was named Pittsburgh Civil Engineer of the Year by the Pittsburgh Section, American Society of Civil Engineers. Jim received the Distinguished Practice Award from the Engineering Geology Division of the Geological Society of America in 2008.

Over the past two decades, Jim's professional interests have evolved somewhat from traditional civil and geotechnical engineering to geological engineering and engineering geology. He continues to do engineering for income but prefers to do geology for fun. Jim expects to continue practicing as a consultant in engineering and geology for another decade or two. There are still challenges and opportunities in these areas and many puzzles in field geology yet to be solved.

### **PRESIDENT'S CHALLENGE:**

In the area of student education there is a need to stabilize the Galey Fund (a PGS fund used to assist student participation in the society's activities). I have donated \$500 to the fund with the challenge to members to similarly support the fund for the future.

As we look forward to the next major geology conference in Pittsburgh – the national AAPG Convention in May 2013 – I would encourage board officers and members to consider how we can again help contribute as a host to our profession, our city and region.

Albert D. Kollar  
President

## USDOE RELEASES NEW REGIONAL CO<sub>2</sub> SEQUESTRATION STUDIES

The U.S. Department of Energy (USDOE) has approved for release to the public a set of carbon sequestration studies conducted between 2005 and 2009 by various teams of the Midwest Regional Carbon Sequestration Partnership (MRCSP). These studies were projects to evaluate storage of CO<sub>2</sub> in the nine-state MRCSP region. In addition to the Phase II Final Report, which summarizes more than five years of research activities, 16 other detailed reports, including 6 reports on geologic sequestration field tests, 4 reports on terrestrial sequestration field tests, and 6 reports on regional geologic characterization are now available as pdfs at <http://216.109.210.162/PhaseIIReports.aspx>. Also, the USDOE has issued a press release on the results that can be accessed at [http://www.fossil.energy.gov/news/techlines/2011/11057-Midwest\\_CO2\\_Storage\\_Validated.html](http://www.fossil.energy.gov/news/techlines/2011/11057-Midwest_CO2_Storage_Validated.html).

## ORIGINS OF WESTERN PA PLACE NAMES

Clearfield County, formed from parts of Lycoming and Huntingdon Counties in 1804, was named for fields that were most likely cleared by the roaming bison herds and by Native Americans growing corn. The town of Clearfield, originally called Chincleclamousche after the chief of the Cornplanter tribe of Seneca Indians, became the county seat in 1805. The county has been a major producer of lumber, coal, and natural gas.

## DID YOU KNOW . . . ?

- Gadolinite is an yttrium-rich beryllium iron silicate mineral that is relatively abundant and should be a future source of yttrium subgroup rare earths.
- Understanding the natural and man-made conditions affecting karst features such as sinkholes is important

when designing and implementing stormwater management facilities like collection systems, retention ponds, and other facilities, as well as in remediation of sinkholes.

- The southern half of the Lehigh Valley, called Limestone Valley, is the largest cement producing region in Pennsylvania. Cement produced there built the Empire State Building, Rockefeller Center, the Holland Tunnel, and the Panama Canal.
- The opening of the Iapetus Ocean during the Neoproterozoic and Cambrian was related to the closure of the Brazilide Ocean and the construction of Gondwanaland.
- It might be hard to believe today, but in the 1960s geologists were actually looking for ways to disprove the new-fangled concept of “plate tectonics”.
- Brines produced from Lower Silurian “Clinton” (Medina) wells in eastern Ohio are mixtures of Ca-rich brines that originated from deep sources and Na-rich brines that probably formed by dissolution of salt in the overlying Salina Group.
- It was only 100 years ago that anthracite coal from northeastern Pennsylvania mines was considered to be the best coal in the world, with a BTU value per ton that was higher than any other coal ever found in the world.
- During the Early Ordovician, the eastern (current cardinal direction) margin of Laurentia underwent obduction of young subduction-zone lithosphere along the length of the northern Appalachian-British Caledonian Belt.
- Ocean water at the surface exchanges gases (e.g., O<sub>2</sub> and CO<sub>2</sub>) with the atmosphere at the same time that the water cools and sinks, resulting in the efficient transfer of gases, temperature changes, and fresh water 2 to 3 miles beneath the sea surface.
- Basement consists of rocks that belonged to previous cycles of mountain building that were reactivated and incorporated into younger cycles.
- Most dinosaurs actually were about the size of a dog. Take that, T. rex!
- Faults and fractures are microscopic to regional scale planes of tensile or shear failure in brittle rocks that dominate the upper ~9 miles of the earth's crust.
- Continental flood basalts are the largest lava eruptions on Earth, some with individual lava flows of more than 480 miles<sup>3</sup>; Kilauea volcano on Hawaii, by comparison, has produced less than 1/2 miles<sup>3</sup> of lava in the last 18 years.
- Ceres, which has a diameter of 56 mi, is the only object in the asteroid belt large enough to be round.
  
- Although acid mine drainage (AMD) is considered to be a national problem, 2,500 miles of streams, or 1/3 of all the U.S. waters affected by AMD, are located in Pennsylvania.

- The Connoquenessing sandstone, the lowest member of the Pennsylvanian Pottsville Formation, is typically gray to white, coarse-grained and siliceous, thick-bedded, sometimes massive and conglomeratic, and averages about 40 feet thick where it occurs.
- Alcide d'Orbigny was a 19th-Century French naturalist who developed the idea of the stage as part of a stratigraphic succession. He named his stages after geographic localities that had good exposures bearing unique assemblage of fossils.
- Numerous sulfate minerals have been identified in the Pennsylvanian rocks of western Pennsylvania, including chalcopyrite, marcasite, pyrite, sphalerite, wurtzite, barite, epsomite, gypsum, alunogen, copiapite, coquimbite, roemerite, jarosite, pickeringite, and halotrichite.
- Although some Late Precambrian fossils superficially resemble green algae, indisputable green algae fossils are unknown from rocks earlier than the Cambrian.

### PGS Website of the Month

<http://www.pennminerals.com/museum.htm>

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at [rbottgeo@aol.com](mailto:rbottgeo@aol.com). Special thanks to all who contributed newsletter items this season—especially to John Harper who writes the Western PA Place Name Column.*

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**Other PGS Positions**

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**Historian:** Judy Neelan

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# PGS Newsletter

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

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Vol. LXIV, No. 5

Robert Botterman, Editor

January, 2012

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Wednesday, January 18, 2011

The Pittsburgh Geological Society presents

## *Recent Advances in Hydrogeophysics*

**Gregory S. Baker, Ph.D., Jones/Bibee Endowed Assoc. Professor of Geophysics,  
Department of Earth & Planetary Sciences, University of Tennessee**

Near-surface geophysics is a nexus of active advancement in many fields of Earth Science. Current near-surface geophysics research at the University Tennessee is focused in three areas: (1) Developing new instrumentation and data processing techniques; (2) Improving standard operating procedures for data collection, and; (3) Demonstrating applied examples of state-of-the-art techniques. Research over 16+ years has led to advancements in hydrology, environmental geology, archaeology, glacial geology, geomorphology, volcanology, structural geology, and tectonics. This talk, however, will focus only on recent research in near-surface geophysics related to hydrology & hydrogeology.

The relatively recent appearance of the term “hydrogeophysics” corresponds with a growing awareness by policy makers on the importance of integrating geophysics and hydrology in groundwater resource management and environmental site characterization. Workers in research labs, industry, and academe have of course been working in this field long before the arrival of the new label. However, as a result of this growing interest--and important previous work--on the fusion of the two fields, a paradigm shift is occurring in which geophysical data is no longer used strictly as supplemental qualitative information for groundwater models, but rather is a critical quantitative constraint for understanding these complex systems.

Several recent advances of techniques in near-surface geophysics as applied to hydrologic problems will be presented. These will include studies of fracture-related flow anisotropy using seismic refraction tomography, rapid azimuthal electrical resistivity analysis, and dense 3D GPR volume visualizations, as well as target discrimination (e.g., NAPL – non-aqueous phase liquid - identification) using amplitude variation with offset analysis on GPR data. The purpose of presenting these hydrogeophysics case histories is to elucidate the breadth of problems that can be tackled using near-surface geophysics and stimulate discussion relative to future directions of research.

Gregory S. Baker currently holds the *Jones/Bibee Endowed Professorship in Geophysics* in the Department of Earth & Planetary Sciences at the University of Tennessee, where he is an Associate Professor. His area of specialization is “near-surface geophysics” which deals with remotely imaging the upper 200 m of the subsurface of planets and their moons.

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**Social hour - 6:00 p.m.**

**Dinner - 7:00 p.m.**

**Program - 8:00 p.m.**

Dinner costs **\$25.00/person, students \$5.00**; checks preferred. **Reservations should be emailed to John F. O'Neill at; [jfgoogal@gmail.com](mailto:jfgoogal@gmail.com)**, please title the e-mail as "PGS Dinner Reservation.", or call (724) 713-3491(cell). Reservations can also be made using PayPal at our website <http://pittsburghgeologicalsociety.org>. Reservations are needed by **noon, Monday, January 16<sup>th</sup>**.

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

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Dr Baker received his B.S. (1992; Honors) and M.S. (1994) in geology from Lehigh University, and Ph.D. (1999; Honors) in geophysics from The University at Kansas under Dr. Don W. Steeples. He was on the faculty of the Department of Geology at the University at Buffalo (SUNY) from 1999-2005 and retains a position there as Research Associate Professor.

Since 1999, Dr. Baker has published 5 monographs and 41 refereed journal articles, presented 68 research seminars at national conferences and universities, been PI or co-PI on grants totaling over \$4M, and served as major advisor for 6 PhD students and 15 M.S. students. He has been invited to give seminars and/or short courses all over North America as well as in China, Italy, and Turkey. His research is focused in: (1) developing new geophysical instrumentation and data processing techniques; (2) improving standard operating procedures of data collection; and (3) demonstrating applied examples of state-of-the-art techniques.

Dr Baker has been an Associate Editor for the journals *Geophysics* (2001-2004) & the *Journal of Geoscience Education* (2006-2009), served on the Society of Exploration Geophysicists (SEG) Technical Program Committee in 2002, 2003, & 2004, and was the technical program chair for the Symposium on the Application of Geophysics to Engineering & Environmental Problems (SAGEEP), International meeting of the Environmental & Engineering Geophysical Society, Charleston SC, 2011.

He has been elected to several offices in the Near-Surface Geophysics Section of SEG and served as President of the Section in 2003-2004. Dr Baker has offered one- to three-day short courses for generalists and specialists through the Geological Society of America, the Society of Exploration Geophysicists, and the Incorporated Research Institutions for Seismology (IRIS).

In 2008, Dr Baker was awarded the inaugural EEGS/Geonics Early Career Award for his contributions to near-surface geophysics by the Environmental & Engineering Geophys. Society. In 2001 Dr. Baker was the recipient of the Milton Plesur Excellence in Teaching Award (University at Buffalo), and from 2001-2005 was selected to the College of Arts & Sciences Honor Roll of Top Teachers (University at Buffalo).

### **PRESIDENT'S CHALLENGE:**

In the area of student education there is a need to stabilize the Galey Fund (a PGS fund used to assist student participation in the society's activities). I have donated \$500 to the fund with the challenge to members to similarly support the fund for the future.

As we look forward to the next major geology conference in Pittsburgh – the national AAPG Convention in May 2013 – I would encourage board officers and members to

consider how we can again help contribute as a host to our profession, our city and region.

Albert D. Kollar  
President

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Students, this is an opportunity for you to compete in student presentations sponsored by the Pittsburgh Geological Society, the Association of Engineering Geologists, and the American Society of Civil Engineers-Geotechnical Division at the 10th Annual Student Night on April 18 at Foster's Restaurant, #10 Foster Plaza, Greentree. If you have been doing undergraduate or graduate research in any geologically or geotechnically related field, you have the opportunity to show off your work to members of the three societies, and receive some benefits as well.

Abstracts (250 words or less) of research findings should be emailed to [patrick.burkhart@sru.edu](mailto:patrick.burkhart@sru.edu) by March 2, 2012 for consideration.

Each society will select one student paper (graduate or undergraduate) for oral presentation. Additional abstracts may be accepted for poster presentations. All presenters will receive certificates of recognition and appreciation, as well as a complimentary dinner. The three oral presenters will each receive awards of \$100, while poster presenters will receive \$50.

Students: please consider disseminating your research at this auspicious professional venue.

Professors: please pass this information on to your students who are doing research.

## **ORIGINS OF WESTERN PA PLACE NAMES**

The name Shenango is a corruption of the Seneca Indian name, "Ochenango", which translates to "large bull thistles". The name was given to the Shenango River, which rises in Crawford County and eventually winds its way south to New Castle, Lawrence County, where it joins with the Mahoning River to form the Beaver River. I. C. White named the Mississippian-age Shenango Sandstone for exposures along the Shenango River in Mercer County. Oil and gas well drillers gave the Shenango Sandstone a plethora of names over the last 150 years when they encountered it in the subsurface, including "Buttermilk", "Gray", "Slippery Rock", and "Mountain" in northwestern Pennsylvania, and "Forty-Foot", "First", "Squaw", and "Papoose" in the southwestern counties.

## DID YOU KNOW . . . ?

- Most of the synrift basins along the Atlantic seaboard that contain Mesozoic rocks of the Newark Supergroup initially formed during the Late Triassic.
- A new study by French geochemists of minerals from the Mauna Loa volcano in Hawaii suggests parts of the volcano's magma traveled over 1,800 mi from the core/mantle boundary to the surface in as little as 500,000 years.
- The Haynesville is the deepest, hottest, and highest pressured gas shale among the four big shale plays in the US, including the Barnett, Fayetteville, and Marcellus. It is, however, also the most expensive to drill and complete.
- Galena deposits often contain significant amounts of silver as included silver sulfide mineral phases or as limited solid solution within the galena structure.
- The carbonates rocks and sediments of the Bahamas have accumulated since the Late Triassic, responding to changes in both sea level and productivity since the opening of the Atlantic Ocean during the breakup of Pangea.
- New studies suggest that Martian soils might be more hospitable to life than previously thought. Anyone for little green men?
- Carbon removed from the atmosphere by plants during photosynthesis finds its way into the soil as the plants decay; when the soil is eroded and transported to depositional sites such as streams and lakes, some of the carbon is released – apparently a lot more than was previously suspected.
- It was not theological orthodoxy that Charles Darwin had to overcome in order to promote his idea of evolution by natural selection so much as the “scientific” orthodoxy of his friend and mentor, Charles Lyell, whose belief in absolute uniformitarianism precluded acceptance of any biological change or modification throughout geological history.
- Using numerical simulation, researchers now believe that the tsunamis generated by the eruption of Krakatau volcano in 1883 were created by pyroclastic flows up to 1.2 mi<sup>3</sup> in volume and traveling at high speeds, rather than from the explosion or the caldera collapse.
- Large sauropods apparently migrated as much as 190 miles between lowland and highland environments in order to find enough food to keep their 55 ton bulks from starving.
- Most of the sand and gravel suitable for use as construction aggregate in Pennsylvania are produced from unconsolidated glacial materials and outwash.
- The largest integrated wedge of clastic sediment in the Appalachian basin was deposited by the Catskill deltaic system, a series of multiple contiguous deltas, during the Middle and Upper Devonian.

- New DNA evidence suggests the Woolly Mammoth had more than just a thick fur coat to keep it warm during extremely cold climate conditions – mammoth hemoglobin is less sensitive to temperature fluctuations than that of its modern elephant cousins, and that allowed their blood to unload oxygen more efficiently in very low temperatures.
- Global emissions of CO<sub>2</sub> increased significantly in 2010. Sources pumped an extra 564 million tons into the atmosphere, the largest single-year jump ever recorded.
- At the current rate of ocean acidification due to increased CO<sub>2</sub> emissions, shallow water organisms that build their exoskeletons with calcium carbonate, like clams and corals, could lose the ability to secrete shell material by the end of the 21st century.
- Using the Keck Telescope in Hawaii, astronomers have found evidence of two stars formed from gas containing no metal elements, indicating that they probably formed only a few billion years after the Big Bang.
- New research shows that deforestation for agriculture in the Congo River Basin can cause as much as 50% less rain in other areas of the forest. The cleared land leads to higher surface temperatures, which in turn causes decreased rain-cloud formation.
- Tools resembling those used by Homo sapiens have been found in Saudi Arabia and dated to between 100,000 and 130,000 years ago, about 65,000 years before our ancestors supposedly migrated out of Africa.
- In order to qualify as a supervolcano, a volcano has to produce more than 1.3 million cubic yards of material in a matter of hours. Mount St. Helens, by comparison, released only about 1,300 cubic yards when it erupted in 1980.

### PGS Website of the Month

<http://www.priweb.org/ed/pgws/backyard/sections/northeast/northeast1.html>

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at [rbottgeo@aol.com](mailto:rbottgeo@aol.com). Special thanks to all who contributed newsletter items this season—especially to John Harper who writes the Western PA Place Name Column.*

**News items:** To submit a news item for the PGS Newsletter, please contact Robert Botterman at (412) 780-3094, mail at 139 Brookmeade Dr., Pittsburgh, PA 15237, or email at [rbottgeo@aol.com](mailto:rbottgeo@aol.com). Be sure to also send an email address and phone number where you may be contacted.

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### PGS Board-of-Directors

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| <b><u>President:</u></b>      | Albert Kollar    | <b><u>Director-at Large:</u></b> | Bob Fedinetz  | <b><u>Director-at Large:</u></b> | Kyle Frederick |
| <b><u>Vice President:</u></b> | Patrick Burkhart | <b><u>Director-at Large:</u></b> | Maury Deul    | <b><u>Counselor:</u></b>         | John Harper    |
| <b><u>Treasurer:</u></b>      | John F. O'Neill  | <b><u>Director-at Large:</u></b> | Ray Follador  | <b><u>Counselor:</u></b>         | Mary Robison   |
| <b><u>Secretary:</u></b>      | Bill Gould       | <b><u>Director-at Large:</u></b> | Erica Love    | <b><u>Counselor:</u></b>         | Charles Shultz |
| <b><u>Past President:</u></b> | Mary Ann Gross   | <b><u>Director-at Large:</u></b> | Barbara Hamel |                                  |                |

### Other PGS Positions

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| <b><u>Newsletter Editor:</u></b> | Robert Botterman |                          |              |                          |             |

**Officer Contacts:** If you wish to contact a current PGS Officer, please call or email Albert Kollar, President, at 412.622.5513 / [KollarA@CarnegieMNH.org](mailto:KollarA@CarnegieMNH.org); Patrick Burkhart, Vice President, at 724 738-2502 / [patrick.burkhart@sru.edu](mailto:patrick.burkhart@sru.edu); John F. O'Neill, Treasurer, at 724 713-3491 (cell) / [jfgoogal@gmail.com](mailto:jfgoogal@gmail.com); William Gould, Secretary, at 412 389-2859 / [wwgould@wwgeosciences.com](mailto:wwgould@wwgeosciences.com).

**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](mailto:jharper@state.pa.us). Membership information may also be found at our website: [www.pittsburghgeologicalsociety.org](http://www.pittsburghgeologicalsociety.org).

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Patrick Burkhart, Program Chair at (724) 738-2502 or email at [patrick.burkhart@sru.edu](mailto:patrick.burkhart@sru.edu).

**PGS Website:** To contact the Webmaster, Mary McGuire, with questions or suggestions, please either email [marykmcguire@comcast.net](mailto:marykmcguire@comcast.net) or use the site's "Contact Us" link at [www.pittsburghgeologicalsociety.org](http://www.pittsburghgeologicalsociety.org).

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## **PGS CORPORATE SPONSORS**

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PITTSBURGH GEOLOGICAL SOCIETY  
PO Box 58172  
Pittsburgh PA 15209



# PGS Newsletter

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

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Vol. LXIV, No. 6

Robert Botterman, Editor

February, 2012

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Wednesday, February 15, 2012

The Pittsburgh Geological Society presents

## *Fossil Rainforests of Patagonian Fire Lakes and their Australasian Legacy*

**Dr. Peter Wilf, Associate Professor of Geosciences at Pennsylvania State University, University Park, PA 16802  
USA, Phone: (814) 865-6721. Fax: (814) 863-7823. Email: [pwilf@psu.edu](mailto:pwilf@psu.edu); [www.geosc.psu.edu/~pwilf](http://www.geosc.psu.edu/~pwilf)**

Dr. Peter Wilf, Associate Professor of Geosciences at Pennsylvania State University, has collected extensively from prolific fossil beds derived from ancient volcanic lakes in Patagonia, Argentina. The main sites date to 52- and 47-million years, a globally warm time interval, and they are located at the ancient biological crossroads of South America, Antarctica, and Australia, which all remained connected at the time.

The discoveries include hundreds of plant species along with insects, frogs, and fish. Strikingly, a majority of the plants' living relatives are large rainforest trees found not in South America but in Australasia, including the mountain rainforests of New Guinea and nearby tropical islands that are now more than 8,000 miles from the fossil sites.

Dr. Wilf will discuss these findings and what they can tell us about ancient flora and climate change.

### **MAJOR RESEARCH INTERESTS**

Dr. Peter Wilf uses fossil plants to investigate ancient ecosystems, past environmental change, and the evolution and extinction of plants and plant-insect associations. Dr. Wilf emphasizes questions with relevance for modern climate change, biodiversity, biogeography, and ecological processes. His principal field areas include Patagonia, Argentina, and the Western Interior USA.

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**Social hour - 6:00 p.m.**

**Dinner - 7:00 p.m.**

**Program - 8:00 p.m.**

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Albert D. Kollar  
President

## **CALL FOR NOMINEES**

The Society is calling on the membership for interested candidates for next years Officer and Director-at-Large positions.

There are 3 Director-at-Large positions that need to be filled. These positions are for a term of 2 years and require regular attendance at the Board meetings held 1 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 contact Ray Follador, Nominations and Elections Committee Chair, ASAP at [geodawg@comcast.net](mailto: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.

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Professors: please pass this information on to your students who are doing research.

## **ORIGINS OF WESTERN PA PLACE NAMES**

The word "kinzua", which lent its name to a creek, village, and township in Warren County, supposedly is a corruption of the Seneca "kentschuak", meaning "they gobble", a reference to the wild turkeys found in the area. The Seneca Indian village of Kinzua, located at the confluence of Kinzua Creek and the Allegheny River, was only a small part of the 10,000 acres of the Allegheny Reservation that was taken by eminent domain in 1960 to make way for Kinzua Dam, one of the largest dams in the United States east of the Mississippi River. Construction of the dam between 1960 and 1965, and subsequent filling of the Allegheny Reservoir (also called Kinzua Lake) behind it, was primarily for flood control on the Allegheny River. However, taking of the land broke the 1794 treaty with the Seneca Nation signed by President George Washington and forced the relocation of 600 Senecas. About 460 Kinzuans had to watch as their ancestors and families interred in the village burial ground were dug up and transplanted to a new location near Salamanca, New York. The village of Kinzua is now under about 100 feet of water in Pennsylvania's deepest inland lake. Long before the dam, the oil and gas industry had drilled numerous wells in the area. One of the pervasive Upper Devonian Bradford Group sandstones found in Warren and McKean counties was named Kinzua in 1885 for the area where it was first found to be productive of oil.

## **DID YOU KNOW . . . ?**

- The main oxidized products accumulating in the Earth's crust have been ferric iron and sulfate. Ferric iron accounts for about 75% of the total.
- Paleontologists working in South Africa have found 10 separate nests of the dinosaur *Massospondylus* from about 190 Ma, each containing clutches of up to 34 eggs. They suggest that the dinosaurs returned to the site repeatedly to lay their eggs in groups.
- Whenever a fault of any size ruptures, it passes its accumulated stress on to neighboring faults. As a result, the March 11, 2011 magnitude 9 earthquake in Japan transferred a large amount of stress to faults offshore and across the center of the island, activating distant, long-quiescent faults.

- Over long periods of time, the ratio of <sup>13</sup>C to <sup>12</sup>C entering the atmosphere and hydrosphere is equal to the average ratio in the Earth's crust; however, short-term deviations can be very large.
- The term "ophiolite" originated with the 19th-century French naturalist, Alexandre Brongniart, for a suite of green rocks comprising serpentine and diabase in the Alps. The term was later modified to include serpentine, pillow lava, and chert. It wasn't until the 1960s that ophiolites became associated with oceanic crust and the process of seafloor spreading.
- Grayish-red, oolitic, calcareous hematite occurs in thin, lenticular, and stratabound deposits in central and north-central Pennsylvania in the Lower Silurian Clinton Group, the Middle Devonian Mahantango Formation, and the Upper Devonian Lock Haven Formation.
- A survey of 28 climate scientists, asked how warm it will get and how ice sheets will react to that warming during this century, resulted in a mean best estimate of about 1 foot of sea level rise by the year 2100 because of the loss of ice sheets.
- The good news is that acid rain has been decreasing in the US as a result of emission regulations.
- They found *Scrat!* Paleontologists working in Late Cretaceous rocks in Argentina have discovered the fossilized skull and teeth of a fanged, shrew-like mammal. The new 8 to 9 inches-long species had a narrow snout and long fangs, likely used to hunt and eat insects (rather than acorns!).
- Aeroradioactivity surveys began after WW II when the sensitive scintillometers began to be carried in aircraft to explore for uranium.
- More than 700 planets have been catalogued outside our solar system, and researchers are finding that many of them are so strange that they have to rethink how planets form and settle into orbit.
- Thanks to some great work in China, we now know that the end-Permian extinction event occurred during a brief 200,000-year period, lasting from 252.3 to 252.1 Ma. The worst of it occurred over about 20,000 years beginning around 252.28 Ma.
- Additional work on the end-Permian extinction suggests the possibility that it might be related to massive volcanism associated with the Siberian Traps. The event that formed the traps is one of the largest of its kind and is known to have spanned the Permian-Triassic boundary.
- During the past year, new analyses of nuclear DNA of both ancient and living humans found traces of archaic DNA in living populations, suggesting that our ancestors interbred with the Neanderthals and other archaic humans that they eventually drove to extinction.
- Folks aware of Presque Isle at Erie in Erie County might be surprised that most of the shore of Lake Erie in Pennsylvania consists of narrow beaches in front of 15-170-foot high bluffs cut in Pleistocene and

early Holocene glacial and lake sediments overlying Devonian shale bedrock.

- Arctic scientists predict that the thawing of permafrost will release 45 billion metric tons of CO<sub>2</sub> and CH<sub>4</sub> into the atmosphere over the next 30 years.
- Ferroboron, an alloy of iron and boron, is a prime ingredient in neodymium-iron-boron magnets, which are high-strength magnets used in computers, guidance systems, and wind turbines.
- Most of the groundwater in western Pennsylvania resides in joints and bedding-plane separations in bedrock.
- The great American geologists, Charles Schuchert (1858-1942) was a leader in the development of paleogeography and coined the term "paleobiology". He worked for the USGS, was curator at the National Museum, and taught at Yale University, yet he had no formal high school or college education.
- Data related to now extinct isotopes the moon indicate that an "ocean" of silicate magma at least 310 miles deep developed on the surface of the moon within 50 Ma of the creation of the solar nebula.
- Tiny, billion-year-old fossils of single celled organisms found in Scotland are thought to be more evolutionarily advanced than simple bacteria because they contain nuclei. This is the first time that such fossils were found in a formation considered to have been deposited in fresh water.

## PGS Website of the Month

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

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at [rbottgeo@aol.com](mailto:rbottgeo@aol.com). Special thanks to all who contributed newsletter items this season—especially to John Harper who writes the Western PA Place Name Column.*

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**"Like us on Facebook to get the latest from PGS and our sister societies in the area."**

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### PGS Board-of-Directors

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| <b><u>President:</u></b>      | Albert Kollar    | <b><u>Director-at Large:</u></b> | Bob Fedinetz  | <b><u>Director-at Large:</u></b> | Kyle Frederick |
| <b><u>Vice President:</u></b> | Patrick Burkhart | <b><u>Director-at Large:</u></b> | Maury Deul    | <b><u>Counselor:</u></b>         | John Harper    |
| <b><u>Treasurer:</u></b>      | John F. O'Neill  | <b><u>Director-at Large:</u></b> | Ray Follador  | <b><u>Counselor:</u></b>         | Mary Robison   |
| <b><u>Secretary:</u></b>      | Bill Gould       | <b><u>Director-at Large:</u></b> | Erica Love    | <b><u>Counselor:</u></b>         | Charles Shultz |
| <b><u>Past President:</u></b> | Mary Ann Gross   | <b><u>Director-at Large:</u></b> | Barbara Hamel |                                  |                |

### Other PGS Positions

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| <b><u>AAPG Delegate:</u></b>     | Dan Billman      | <b><u>Webmaster:</u></b> | Mary McGuire | <b><u>Historian:</u></b> | Judy Neelan |
| <b><u>Newsletter Editor:</u></b> | Robert Botterman |                          |              |                          |             |

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PITTSBURGH GEOLOGICAL SOCIETY  
PO Box 58172  
Pittsburgh PA 15209





# PGS Newsletter

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

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Vol. LXIV, No. 7

Robert Botterman, Editor

March, 2012

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Wednesday, March 21, 2012

The Pittsburgh Geological Society presents

## *Basalt Geochemistry: A Powerful Tool for Understanding Volcanic Processes*

**Dr. Meagen Pollock, Assistant Professor of Geology at The College of Wooster, Wooster, OH 44691  
USA, Phone: (330) 263-2202. Fax: (330) 263-2249.**

**Email: [mpollock@wooster.edu](mailto:mpollock@wooster.edu); <http://meagenpollock.voices.wooster.edu/>**

Dr. Meagen Pollock is a geochemist who specializes in mid-ocean ridge basalts (MORB). She uses spatial variations in the compositions of dikes and lavas to understand physical volcanic processes. Dr. Pollock has worked primarily in Pacific tectonic windows, escarpments that expose large vertical sections of ocean crust. Compositional variations in these unique exposures make it possible to examine the interaction of magmatic and tectonic processes that occur on mid-ocean ridges.

Dr. Pollock's interest in mid-ocean ridges has taken her to Iceland, where she is currently using geochemistry to understand the events that occur during subglacial eruptions. Dr. Pollock will discuss MORB geochemistry and how she has applied it to understanding eruptive processes in subglacial and submarine environments.

### Biography:

Dr. Meagen Pollock, Assistant Professor of Geology at The College of Wooster, is a basalt geochemist who investigates physical volcanic processes. While she strongly prefers submarine or subglacial MORB, she has been dabbling in the Jurassic diabase of southeastern Pennsylvania (although she admits that the jump to ancient continental-rift intrusives is a big one!). She has also become the proud director of The College of Wooster X-ray lab and invites external users to run samples on her new XRF and XRD.

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**Social hour - 6:00 p.m.**

**Dinner - 7:00 p.m.**

**Program - 8:00 p.m.**

Dinner costs **\$25.00/person, students \$5.00**; checks preferred. **Reservations should be emailed to John F. O'Neill at; [jfgoogal@gmail.com](mailto:jfgoogal@gmail.com)**, please title the e-mail as "PGS Dinner Reservation.", or call (724) 713-3491(cell). Reservations can also be made using PayPal at our website <http://pittsburghgeologicalsociety.org>. Reservations are needed by **noon, Monday, March 19<sup>th</sup>**.

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

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**PRESIDENT'S CHALLENGE:**

In the area of student education there is a need to stabilize the

Galey Fund (a PGS fund used to assist student participation in the society's activities). I have donated \$500 to the fund with the challenge to members to similarly support the fund for the future.

As we look forward to the next major geology conference in Pittsburgh – the national AAPG Convention in May 2013 – I would encourage board officers and members to consider how we can again help contribute as a host to our profession, our city and region.

Albert D. Kollar  
President

## CALL FOR NOMINEES

The Society is calling on the membership for interested candidates for next year's Officer and Director-at-Large positions.

There are 3 Director-at-Large positions that need to be filled. These positions are for a term of 2 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 contact Ray Follador, Nominations and Elections Committee Chair, ASAP at [geodawg@comcast.net](mailto: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.

## STUDENT FIELD WORKSHOP FULL

All spots for the Spring 2012 PGS Student Field Workshop have been filled. We appreciate the terrific response (51 students) for this event and apologize for anyone that did not get an opportunity to register. As the date of the Workshop approaches, we may have some cancellations, so we will create a "Wait List" and fill open spots based on your position on the list. Depending on demand, we are exploring the possibility of offering another Workshop this Fall. You can place your name on the Wait List by contacting Frank Benacquista at: [fbenacquista@kuresources.com](mailto:fbenacquista@kuresources.com).

## OSHER PROGRAM PRESENTATIONS

Albert Kollar organized a theme session of talks on the Marcellus Shale Gas Play and More for the Osher Program at the University of Pittsburgh, February 2 thru March 1, 2012. Osher is part of the School of General Studies for non-traditional students, those 55 and older, and generally retired. Enrollment was 67, an all time high for an Osher science five week class.

Speakers and topics include; Albert Kollar (Overview of Fossil Fuels and Marcellus Shale in Western Pennsylvania), Tom Donohue (Pennsylvania Permits and Regulations), Ray Follador (Upper Devonian Shallow Gas Exploration of Westmoreland County), Kris Carter (Hydraulic Fracturing and Aquifers), Anthony Cialella (Applied Water Treatment and Wastewater Recycling from Shale Drilling), Fred Baldassare (Stray Gas and Isotope Geochemistry), John Harper (Geology of the Marcellus Shale and Utica Shale), Bill Flannigan (Energy Employment in Western Pennsylvania), and Lauren Fleishman (Low Carbon Electricity in Pennsylvania).

Kollar also presented Marcellus Shale talks at the North Boroughs Rotary in Ben Avon Heights and at Chatham Village on Mount Washington both had 50 and 40 in attendance respectively.

## 10<sup>th</sup> ANNUAL STUDENT NIGHT

Students, this is an opportunity for you to compete in student presentations sponsored by the Pittsburgh Geological Society, the Association of Engineering Geologists, and the American Society of Civil Engineers-Geotechnical Division at the 10th Annual Student Night on April 18 at Foster's Restaurant, #10 Foster Plaza, Green Tree. If you have been doing undergraduate or graduate research in any geologically or geotechnically related field, you have the opportunity to show off your work to members of the three societies, and receive some benefits as well.

Abstracts (250 words or less) of research findings should be emailed to [Patrick.burkhart@sru.edu](mailto:Patrick.burkhart@sru.edu) by March 2, 2012 for consideration.

Each society will select one student paper (graduate or undergraduate) for oral presentation. Additional abstracts may be accepted for poster presentations. All presenters will receive certificates of recognition and appreciation, as well as a complimentary dinner. The three oral presenters will each receive awards of \$100, while poster presenters will receive \$50.

Students: please consider disseminating your research at this auspicious professional venue.

Professors: please pass this information on to your students who are doing research.

## NORTH AMERICAN COALBED METHANE FORUM 2012 SPRING SESSION AND SHORT COURSE

The North American Coalbed Methane Forum will hold a two day meeting on Tuesday May 15 and Wednesday May 16, 2012 at the Hilton Garden Inn at Southpointe near Canonsburg, PA. On Tuesday the Forum is offering a one day short course titled "CBM Reservoir and Production Engineering." On Wednesday, the Forum spring session will consist of presentations covering technical, regulatory, and legal aspects of coalbed methane development and production. Attendees will be eligible for Professional Development Hours (PDH).

For information please contact:

Ihor Havryluk at 412-445-5803  
(E-mail [havryluk@zoominternet.net](mailto:havryluk@zoominternet.net))

or

Dr. Kashi Aminian at 304-293-7682  
(E-mail [Khashavar.aminian@mail.wvu.edu](mailto:Khashavar.aminian@mail.wvu.edu))

and/or visit our website at [www.nacbmforum.com](http://www.nacbmforum.com)

## ORIGINS OF WESTERN PA PLACE NAMES

Lawrence County was created in 1849 from portions of Beaver and Mercer counties. It was named for the battleship USS Lawrence, Admiral Perry's original flagship at the Battle of Lake Erie during the War of 1812. The USS Lawrence in turn was named for Captain James Lawrence, the naval hero best known for his famous quote, "Don't give up the ship" as he was dying of small arms fire during a battle with the British in 1813. (Star Trek fans, take note:

Lawrence commanded the USS Enterprise during the War with Tripoli in 1804!) Much of Lawrence County's economy over the past 160+ years has centered on coal, iron ore and iron smelting, limestone, sandstone, clay, and oil and natural gas. It currently is

one of the prime areas for exploration for natural gas in the Ordovician Utica Shale and Point Pleasant Formation.

## DID YOU KNOW . . . ?

- The American Geological Institute (AGI) predicts that 400,000 geoscientists will be required to meet the country's energy, mineral, water, and environmental needs in 2021, just nine years from now. If the present trend continues, there will be a workforce of only 60,000 geoscientists at that time, 340,000 fewer than will be needed.
- Geologists studying the late Permian on Ellesmere Island in the Canadian Arctic have found a horizon, associated with intensified anoxia and possible changes in phytoplankton community composition, that is equivalent to the latest Permian mass extinction in typical Tethyan shallow-marine sections. What is interesting is that this horizon is younger than the latest Permian extinction event known from the Arctic, demonstrating the diachronous nature of the global end-Permian extinction.
- Other geologists, from the Geological Survey of Canada, have found high levels of mercury in sediment cores from Axel Heiberg Island in the Canadian High Arctic, leading to speculation that mercury from the Siberian Traps volcanic eruption might have played its part in the end-Permian extinction as well.
- The Badwater Basin in Death Valley lies 282 feet below sea level, the lowest elevation in North America.
- Just when you thought the moon was unique, investigators found that tranquillityite, retrieved by the Apollo 11 astronauts in 1969, can be found in Precambrian and Cambrian sills and dikes in Western Australia. Leave it up to those luna-y Aussies!
- Tin has not been mined in the US since 1993, so all of the country's supplies of tin come from imports and recycling.
- Based on isotopic composition, the organic carbon in the Devonian black shales, such as the Marcellus, came from two sources, a terrestrial source to the east and a pelagic source within the Appalachian basin and to the west.
- The Pittsburgh coal seam was first mined at "Coal Hill" (now Mount Washington) across the Monongahela River from downtown Pittsburgh; after being extracted from drift mines, it was transported by canoe to Fort Pitt.
- Higher temperatures and lower pressures favor stabilization of metal ores as chloride complexes; then, as the complexes break down at lower temperatures, the metals become fixed as sulfides.
- Seismic reflection records show that the north coast of Puerto Rico subsided in three stages, each dominated by different physical mechanisms, from tensional thinning of hot island-arc crust and sediment loading to flexural isostasy.
- In 2011 the US became a net exporter of petroleum-based fuels and other products for the first time since 1949. The nation's petroleum industry exported 848 million barrels of fuels during the year, while importing only 750 million barrels.
- John Carll, chief geologist for the oil regions during the Second Geological Survey of Pennsylvania, performed one of the earliest systematic studies of porosity in petroleum reservoir rocks, published in his magnum opus in 1880.
- Less than 5% of the US supply of gypsum in 1990 came from synthetic gypsum, typically a byproduct of environmental

controls on coal-fired power plant emissions. By 2010, synthetic gypsum was up to nearly 40% of the nation's supply.

- It's official – geologists are now certain that the volcanic bluestones in the inner ring of Stonehenge came from an

outcrop at Rhos-y-felin in Wales, 160 miles from the world-famous site. Now all they have to do is figure out what kind of technology the ancient Britons of 5,000 years ago had in order to transport the 3- to 5-ton blocks that distance.

- One of the fundamental aspects of sedimentation is the amount of time sediment may be stored and homogenized within the transport basin before it is delivered to the ultimate depositional site.
- The Triassic-Jurassic rift system of eastern North America, called the Central Atlantic Margin system, spans more than 45° of paleolatitude and records more than 35 million years of Earth history.
- Subduction of the Nazca plate beneath the continental crust of western South America has resulted in three active volcanic zones in the north, central, and southern parts of the Andean Cordillera; the continental crust in the central volcanic zone, in southern Peru and northern Chile, is up to 45 miles thicker than in any other subduction zone on earth.
- The term "karst", originally used to define surface features derived from the solution of carbonate rocks, was used first to describe the region of Carso in northeastern Italy and western Slovenia.
- Wind-blown dust forms loess deposits occurring predominantly in mid- to high-latitude periglacial settings, but also occur around the margins of low-latitude deserts.
- In the 48 contiguous United States, it is only 100 miles from the highest point – Mount Whitney – to the lowest – Death Valley.
- Primitive high-alumina olivine tholeiite basalts occur in a wide area of Cenozoic volcanism in the northwestern US, but all known occurrences are south of a right-lateral shear zone called the Olympic-Wallowa lineament that may represent the northern limit of Basin and Range extension.

### PGS Website of the Month

[http://www.dep.state.pa.us/dep/deputate/minres/districts/homepage/california/underground/pa%20mining%20history/pennsylvania\\_mining\\_history.htm](http://www.dep.state.pa.us/dep/deputate/minres/districts/homepage/california/underground/pa%20mining%20history/pennsylvania_mining_history.htm)

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at [rbottgeo@aol.com](mailto:rbottgeo@aol.com). Special thanks to all who contributed newsletter items this season—especially to John Harper who writes the Western PA Place Name Column.*

**News items:** To submit a news item for the PGS Newsletter, please contact Robert Botterman at (412) 780-3094, mail at 139 Brookmeade Dr., Pittsburgh, PA 15237, or email at [rbottgeo@aol.com](mailto:rbottgeo@aol.com). Be sure to also send an email address and phone number where you may be contacted.

**"Like us on Facebook to get the latest from PGS and our sister societies in the area."**

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| <b><u>Vice President:</u></b> | Patrick Burkhart | <b><u>Director-at Large:</u></b> | Maury Deul    | <b><u>Counselor:</u></b>         | John Harper    |
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| <b><u>Past President:</u></b> | Mary Ann Gross   | <b><u>Director-at Large:</u></b> | Barbara Hamel |                                  |                |

### Other PGS Positions

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Vol. LXIV, No. 8

Robert Botterman, Editor

April, 2012

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Wednesday, April 18, 2012

Joint meeting with the Pittsburgh Geological Society,  
the Association of Engineering Geologists,  
and the American Society of Civil Engineers  
present the

## 10<sup>th</sup> Annual Student Night

Oral Presentation Sponsored by Pittsburgh Geological Society

### **Basin-wide Synthesis of Thermal Maturation Indices of the Paleozoic Appalachian Basin** Patrick Ryan Boyle, Indiana University of Pennsylvania

In order for organic rich rocks to generate hydrocarbons, they must become thermally mature by being buried in the subsurface of the earth for a sufficient amount of time. A basin-wide study was done on thermal maturation indices obtained from Rock-Eval pyrolysis and vitrinite reflectance measurements (%R<sub>o</sub>) of Middle and Upper Devonian samples from the Appalachian foreland. The indices were obtained from a large thermal maturity database compiled by the USGS that contains measurements from 767 subsurface samples collected from wells across the basin. A regional van Krevelen-type cross plot of the pyrolysis hydrogen index (HI) versus oxygen index (OI) shows a predominantly Type I (oil-prone) kerogen maturation path for several Devonian black shales while also revealing the expected pattern of maturation with distance from the Allegheny Front. A regional log-linear plot of %R<sub>o</sub> versus depth shows that most samples fall along a normal linear trend. Preliminary analysis suggests that over mature outliers (i.e. higher than normal %R<sub>o</sub> at a given depth) are associated with major unconformities. Results of this study provide insight towards a new regional perspective on thermal maturation indices within the Appalachian foreland.

Oral Presentation Sponsored by the Association of Engineering Geologists

### **Geological and Geotechnical Factors Responsible for Landslide Susceptibility of the Derived Colluvium of the Kope Formation in Cincinnati, Ohio** Glassmeyer, Michael P., [mglassme@kent.edu](mailto:mglassme@kent.edu), Department of Geology, Kent State University, Kent, OH 44242

The vicinity of Cincinnati, Ohio, is one of the most landslide susceptible areas in the United States. Several million dollars are spent yearly by governmental and private entities to repair landslide damage. Landslides within the Cincinnati area generally occur in colluvium derived from the Kope Formation. The Kope Formation is comprised of approximately 80% shale inter-bedded with 20% limestone and the colluvium that is formed from the weathering of the shale, is low plasticity clay. There are two main types of slope failures that occur in the Cincinnati area, rotational and translational. An inventory map was created using LiDAR data of the landslides that occurred in the colluvium that is derived from the Kope Formation.

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Social hour - 6:00 p.m.

Dinner - 7:00 p.m.

Program - 8:00 p.m.

Dinner costs \$25.00/person, students \$5.00; checks preferred. Reservations should be emailed to John F. O'Neill at; [jfgoogal@gmail.com](mailto:jfgoogal@gmail.com), please title the e-mail as "PGS Dinner Reservation.", or call (724) 713-3491(cell). Reservations can also be made using PayPal at our website <http://pittsburghgeologicalsociety.org>. Reservations are needed by noon, Monday, April 16<sup>th</sup>.

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

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From the landslide inventory map, ten landslides were chosen for detailed study from which undisturbed samples were collected for laboratory testing. Of the ten landslide sites chosen seven were rotational and three were translational landslides. One sample, representative of the slide material was collected from each rotational landslide. Two samples were collected from each translational landslide, one from the overlying colluvial soil and one from underlying bedrock. Tests were conducted to determine natural water content, Atterberg limits, shear strength parameters, dry density, grain size distribution, and slake durability. For the translational landslides the shear was determined by shearing the sample along the contact between the bedrock and the overlying colluvium. Preliminary results show that low strength parameters, human activities, steep slopes, and undercutting of streams are responsible for the landslide susceptibility of the derived colluvium of the Kope Formation.

**Oral Presentation Sponsored by the American Society of Civil Engineers**

**Relationship Between Natural Water Content and Engineering Properties of Clay Soils**  
**Saraceno, Nathan R., nsaracen@kent.edu, Department of Geology, Kent State University, Kent, OH 44242**

Shear strength parameters, compressibility, and permeability are important properties for design and analysis of engineering structures involving clay soils. It is, therefore, of value to refer to reliable relationships between natural water content and engineering properties of soils not only in the planning stages of engineering projects but also as a cost-saving measure when multiple, expensive, tests are not practical. Natural water content has been previously correlated with consolidation characteristics but definite relationships between natural water content and the aforementioned engineering properties have not been determined. To fill this gap, laboratory investigations were conducted on clay soils exhibiting a range of natural water contents from 15% to over 45%. Tests were conducted to determine natural water content, Atterberg limits, shear strength parameters, consolidation characteristics, grain size distribution, permeability, and clay mineralogy.

Samples investigated so far exhibit plasticity index values ranging from 8.1 to 63, peak cohesion values from 356 psf to 1108 psf, and compression index (Cc) values from 0.025 to 0.376. Preliminary results of seven low-plasticity clay (CL) and three high-plasticity clay (CH) samples indicate that statistically significant relationships between any one property and natural water content do not exist. This is not unexpected as engineering properties are affected by multiple factors. Further research is being conducted to determine if stronger correlations exist when results from a larger sample population are available and when natural water content is normalized with respect to clay content and clay mineralogy of the soils. The results of this study will show how natural water content influences engineering properties and whether natural water content can be used reliably to predict such properties of fine-grained soils.

**POSTER PRESENTATIONS:**

**Sponsored by Pittsburgh Geological Society**

**Understanding Recent, Rapid Landscape Evolution in the White River Badlands, South Dakota**

**Colton McDeavitt and James Stevens,  
Slippery Rock University**

The White River Badlands are an intensely sculpted landscape on the Northern Great Plains. Detritus from the eroding highlands has formed a sloping apron along the base of the cliffs within the last 4,000 years. Within the last 1,000 years, the pediments have been dissected by streams into sod tables.

The radiocarbon dated paleosols within the sod tables hold clues to environmental conditions that constrain the timing of soil formation and reveal rapid recent landscape evolution. Our original hypothesis suggested that pediments formed along the "castles" became subsequently incised by streams into sod tables, and that this sequence repeated itself several times. We now recognize a single incision event by streams between 900 and 570 RCYBP, forming the sod tables. Radiocarbon dates of reveal that intervals of soil formation occurred ca. 3600, 2400, 1800, 1200, and 900 RCYBP. Other investigators working with eolian sediments found intervals of soil formation around 3600, 2600, and 1400 RCYBP, giving strong confidence to these intervals of

landscape stability and climate favorable to soil formation. By measuring the depth of incision between sod tables, we calculated erosion rates. Vertical incision of the pediments has been progressing at 2-4 cm annually, while lateral retreat of the stream channels banks ranges between 1-2 cm/year. The question of what could be capable of causing the abrupt incision into the pediments points towards climate change. We are now examining literature for evidence reported in other settings to shed light on what triggered this event.

**Sponsored by Pittsburgh Geological Society**

**Analysis of Abandon Mine Drainage (AMD) impacts on Bear Run, Indiana County, PA during times of abnormally high precipitation in 2011**

**Heather Elizabeth McGinnis,  
Indiana University of Pennsylvania**

Bear Run, a headwater stream of the Susquehanna River, is severely impacted by abandoned mine drainage (AMD) from both surface and subsurface coal mining. Large-scale water quality improvement efforts have been ongoing since 2008 in an attempt to reduce the acidity and dissolved metal concentrations within the stream. Construction of these remediation systems is being completed in phases, with the most recent phase going online in the late summer of 2010. This project examines the stream's ability to neutralize pH, dissolved metals as well as other contaminants from a

multiple site passive remediation system during a period of record precipitation and above normal average temperatures. Monthly water sampling of four selected locations (outflows and stream channel) were conducted to better understand the system's ability to handle changes in pH, acidity and dissolved metal concentrations during 2011. After the construction of earlier remediation phases (both constructed wetlands and limestone pits), in-stream total iron concentrations dropped 50% (Clark, SRBC)McMMMml MMcginnis. We believe the impact of abnormally high precipitation hinders the residence time as the water passes through the ponds of the passive remediation system. It appears, the passive remediation systems on Bear Run perform well under normal conditions; periods of abnormally high precipitation may permit AMD contaminated water to pass through the remediation sites at increased rates of flow, preventing the systems from properly neutralizing the increased volume of water. Our preliminary findings indicate increased precipitation days prior to sampling show a stable pH with fluctuating dissolved metal levels, potentially due to increased sub-surface water levels from previous months ground water recharge.

**Sponsored by American Society of Civil Engineers**

### **Treatment Design for a Net Alkaline, Iron Rich Coal Mine Drainage**

#### **With Large Seasonal Flow Variation**

**Faith Beck, University of Pittsburgh**

This study outlines treatment plan options for abandoned underground coal mine discharge water from the Silvis Discharge. This mine drainage originates in Fayette County, Pennsylvania as part of the larger Uniontown Syncline mine pool. The pool is comprised of approximately 16,100 acres of hydrologically-connected mined area, abandoned and flooded with large seasonal variation in flow. The Silvis Discharge currently flows to Bute Run and subsequently Redstone Creek; it is an environmental concern due to its poor water quality. The Silvis Discharge averaged a 6.5 pH, an iron concentration of 48 mg/L, and a flow of 400 gallons per minute (gpm). With limited space and funding for remediation, some options for conveying the discharge include: pumping the pool down at Silvis for continuous, controlled flow, or lowering the Silvis pool level by draining the water from an adjacent hydrologically-connected discharge point (Rankin Run) and treating the water at that location. Because the water is net alkaline and has elevated iron content, treatment options include, but are not limited to: a fully passive system with an aerobic wetland; a mechanical aeration system with discharge to settling ponds, or active treatment with hydrogen peroxide followed by a series of settling ponds. Taking into account cost efficiency, space allowance, and varying treatment loads, the design was determined using AMD Treat software and site information.

**Sponsored by the Association of Engineering Geologists**

### **Geotechnical Engineering Senior Design Project Abstract**

**Erik Schuller, University of Pittsburgh**

For a Senior Design Project at the University of Pittsburgh, a fictitious company, GeoPitt, Inc., was created and hired to conduct a geotechnical site evaluation and provide a preliminary foundation design for a 25 story steel-framed office tower with 3 subsurface parking levels to be built in Downtown Pittsburgh, PA. The project team was comprised of 6 geotechnical students, 1 structural student, and 1 construction management student. The project site is currently occupied by an existing building and the design of the proposed tower is not final. Thus, GeoPitt, Inc. was given a load range of 2,000-3,200 kips per column and asked to provide a foundation recommendation for the site. The project contained 4 components; Geotechnical site evaluation, foundation design, retaining structure design, and basement floor slab design. Subsurface conditions found during the site evaluation led the group to design a deep foundation consisting of 5.5 foot diameter caissons under each column extending into bedrock. For site stability during excavation and construction, soldier-pile retaining walls were designed for 3 sides of the site. The 50 foot long steel beams were designed to be anchored using 2 tiers of steel cables and lagged with wood beams. The final part of the design, the 3.5 inch reinforced concrete basement floor slab was designed to withstand loads from a standard parking level.

| <b>STUDENT ATTENDANCE (through March)</b> |           |             |           |
|---|-----------|-------------|-----------|
| <b>CAL U</b>                              | <b>70</b> | <b>SRU</b>  | <b>62</b> |
| <b>KENT ST U</b>                          | <b>8</b>  | <b>IUP</b>  | <b>4</b>  |
| <b>WVU</b>                                | <b>4</b>  | <b>PITT</b> |           |

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at [rbottgeo@aol.com](mailto:rbottgeo@aol.com). Special thanks to all who contributed newsletter items this season—especially to John Harper who writes the Western PA Place Name Column.*

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# PGS Newsletter

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

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Vol. LXIV, No. 9

Robert Botterman, Editor

May, 2012

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Wednesday, May 16, 2012

The Pittsburgh Geological Society presents

## *The Antarctic Search for Meteorites (ANSMET)*

**Dr. Jim Karner, Senior Research Associate, Case Western Reserve University,  
Department of Geological Sciences, Cleveland, OH 44106.  
Phone: (216) 368-6523. Fax: (216) 368-3691. Email: [jmk207@case.edu](mailto:jmk207@case.edu)**

In its thirty years of existence, the Antarctic Search for Meteorites (ANSMET) program has recovered more than 20,000 meteorites from the ice in Antarctica. These rocks are the major source of the extraterrestrial material that is available for worldwide scientific investigation. Come and learn about the history of ANSMET and find out how and why we find meteorites in Antarctica today; from living in tents on the polar plateau, to meteorite concentration mechanisms in blue ice, to search techniques on snowmobile and on-foot. Find out why Antarctic meteorites are of utmost importance to planetary science and lastly, take an opportunity to examine, hold, heft and feel the oldest material in the solar system- a real meteorite!

### Biography:

Jim Karner, Ph.D., is a Senior Research Associate in the Geological Sciences department at Case Western Reserve University in Cleveland, OH. His main charge at Case is being the secondary science lead in the NSF funded Antarctic Search for Meteorites (ANSMET) program under the direction of Dr. Ralph Harvey. He is a veteran of four ANSMET teams that collected a total of over 3000 meteorites, including rare specimens from the Moon and Mars. His main research areas concentrate on comparative planetary mineralogy in basalts from Earth, Moon, Mars and the asteroid 4 Vesta, and he is author on approximately 20 peer-reviewed papers since 2003. He earned an undergraduate degree in geology from Bemidji State University, and an M.S. and Ph.D. in Earth and Planetary Sciences from the University of New Mexico.

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**Social hour - 6:00 p.m.**

**Dinner - 7:00 p.m.**

**Program - 8:00 p.m.**

Dinner costs **\$25.00/person, students \$5.00**; checks preferred. **Reservations should be emailed to John F. O'Neill at; [jfgoogal@gmail.com](mailto:jfgoogal@gmail.com)**, please title the e-mail as "PGS Dinner Reservation.", or call (724) 713-3491(cell). Reservations can also be made using PayPal at our website <http://pittsburghgeologicalsociety.org>. Reservations are needed by **noon, Monday, May 14<sup>th</sup>**.

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

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## STUDENT FIELD WORKSHOP

The PGS Field Workshop took place on Saturday April 14, 2012 and was attended by 41 students. Colleges represented at the Field Workshop included: California University, Indiana University, Robert Morris University, Slippery Rock University, University of Pittsburgh, and West Virginia University. The interest by the students and the collaboration between colleges was great to see. The Pittsburgh Geological Society would like to thank California University of Pennsylvania for hosting another successful edition of the Student Field Workshop and proved to be a worthy successor to the previous host, Slippery Rock University. Without the cooperation of these universities, the Field Workshop would not have been as successful for all these years.

We also want to express our gratitude to the professionals (and their respective employers) that assisted with presenting the information and providing a positive experience for the students:

Dr. Kyle Fredericks with CalU  
Dan Martt with A.G.E.S.  
Michael Forth with A & A Consultants  
Steve McGuire with Chester Engineering  
Michael Keeliher  
Steve Pesch with KU Resources  
Ken Krupowicz with KU Resources

Judging by the overwhelming response, another Field Workshop will be scheduled in the future. Please feel free to contact us if you have any comments or ideas regarding the Workshop. We want to ensure that we are meeting the needs of the students, as they are the future of our profession.

Frank Benacquista, P.G.

## ORIGINS OF WESTERN PA PLACE NAMES

McKean County in northwestern Pennsylvania was part of Lycoming County until 1804 when the land was separated. The county was named for Thomas McKean, the second governor of Pennsylvania. In 1843 and 1860, respectively, parts of the McKean County were separated out as Elk County and Cameron County. McKean County's original industry was lumbering because of the lush expanses of forest, and the subsequent discovery of coal, oil, and natural gas put the county squarely on the economic map of Pennsylvania's mineral resources. Ironically, the county's greatest growth, during the 20th century, accompanied a decline in economic prosperity. McKean County is home to the Zippo lighter, and to the Bradford oil field, the world's first giant oil field, which produced an astounding 681 million barrels of Penn Grade crude oil between its discovery in 1871 and 2006.

## SEG CONTINUING EDUCATION COURSES

14-15 May 2012 Pittsburgh, PA

See the webpages below for additional details and registration information:

14 May (one-day course)

Reservoir Geophysics: Applications

<http://www.seg.org/education/misc/continuing-courses/full-curriculum/reservoirgeophysics>

Instructor: William Abriel

The objective of the course is to demonstrate how and why geophysics adds value in reservoir management using examples from multiple geological environments (deepwater turbidites, onshore fluvial, near shore deltaics, carbonates). This course was the 2008 SEG/EAGE Distinguished Instructor Short Course.

14-15 May (two-day course)

Rock Physics: Seismic Reflections of Rock Properties

<http://www.seg.org/education/misc/continuing-courses/full-curriculum/rockphysicsproperties>

Instructors: Dr. Jack Dvorkin

Participants will learn the uses of rock physics in interpreting the elastic properties of earth, as sensed by seismic radiation, for lithology, fluid, and porosity determination. Presented are the basics of rock physics as well as applications of rock physics at various scales - from core to seismic. Real-time demos and exercises are given using Matlab-based applets.

14-15 May (two-day course)

Microseismic Monitoring in Oil and Gas Reservoir

[http://www.seg.org/education/misc/continuing-courses/full-curriculum/micro\\_monitoring\\_og\\_reservoir](http://www.seg.org/education/misc/continuing-courses/full-curriculum/micro_monitoring_og_reservoir)

Instructor: Leo Eisner

This course will discuss principles of microseismic monitoring. Downhole monitoring techniques will be described with detailed examples of complete process from velocity model building, through geophone orientation to microseismic event locations. Principles of surface monitoring will be also discussed with examples of velocity model calibration, location of microseismic events and source mechanism analysis.

Location: Hilton Garden Inn Pittsburgh/Southpointe

1000 Corporate Drive,  
Canonsburg, PA 15317

Course Runs 8:00 a.m. - 5:00 p.m. each day

Not an SEG member? Join and take advantage of the member rate!

<http://www.seg.org/membership/become-a-member/benefits>

Please feel free to forward this information to any colleagues who may also like to register for a course.

Email [ce@seg.org](mailto:ce@seg.org) or call +1.918.497.5589, Jill Abbott, Professional Development Administrator.

## PGS ELECTION DURING MAY MEETING

The Society is calling on the membership to vote for the candidates for next year's Officer and Director-at-Large positions during the May Meeting. Can't attend the May meeting? Send in your ballot via e-mail.

## DID YOU KNOW . . . ?

- Herbert Hoover, the 31st President of the United States, graduated from Stanford University in 1895 with a geology degree and worked as a mining engineer in Australia and China before WWI. His wife, Lou Henry Hoover, was a Latin scholar who had also studied geology in college. Together, they translated Georgius Agricola's classic *De Re Metallica* into English (which is still available in the Dover edition).
  - The current global estimate of the sulfate flux from mining activities is about 475 million tons per year.
  - The modern circulation pattern in the Atlantic Ocean was established in the Pleistocene.
  - Global mineralogical mapping of Mars shows an evolution from clay minerals generated from about 4.5 to 3.7 billion years ago to sulfate minerals generated from about 3.7 to 3.2 billion years ago, and eventually to anhydrous ferric oxide minerals generated from about 3.2 billion years ago to present. These indicate, respectively, the evolution of the Martian climate from wet and neutral, to wet and acidic, to dry.
  - Corals can build colony structures up to a mile or two wide and 1,150 feet high on shelf slopes and seamounts in water as deep as 4,900 feet.
  - America's arid southwest has long been a haven for those seeking relief from respiratory problems such as asthma, but now concerns about airborne pollutants have become so acute that NASA dedicates satellite time tracking potential dust storms and keeping public health officials alerted to their dangers.
  - More than 50 percent of the stars in our galaxy reside in binary star systems.
  - Historians believe that the ancient Phoenicians traveled to the British Isles as long as 3,500 years ago in order to mine tin from the area around Cornwall.
  - Seismic surveys across Lake Superior indicate that the crust below the lake thinned to about 1/4 of its original thickness by extension, and then was filled with volcanic and sedimentary rocks. This was followed by thickening of the lower crust by volcanic underplating.
  - Our human ancestors may have originated in Africa, but our earliest ancestors, the primitive anthropoids, were tree-dwelling creatures about the size of squirrel that probably evolved in Asia.
  - Drainage basins erode more quickly than outcrops, probably as a result of the acceleration of rock weathering rates beneath soils.
  - The Rio Grande rift is a north-trending zone of lithospheric extension that, in the upper crust, exhibits a series of north-south-trending, en-echelon, middle to late Cenozoic basins extending more than 620 miles from central Colorado into west Texas.
- If you think that terrestrial life exists only on the surface of the earth, think again – microbes are known to exist within continental and oceanic crust as deep as about 2 miles.
  - The 7.0 magnitude earthquake that shook Haiti in January 2010 may mark the beginning of a series of seismic activity that could last decades. The last such series of large earthquakes hit the region between 1701 and 1770.
  - Patagonia is becoming an interesting place to find fossils. Paleontologists recently described a small, bird-like dinosaur (*Bonapartenykus ultimus*) that died while laying her eggs.
  - And in China, paleontologists have found the oldest (so far) coelacanth (a lobe-finned fish) in rocks more than 400 million years old. Coelacanths were thought to have gone extinct early in the Mesozoic until one was caught live off the coast of Africa in 1938. They have existed for more than 400 million years largely unchanged!
  - Some geologists believe that the section of the San Andreas Fault that runs from Bakersfield through Santa Barbara, CA ruptures fairly regularly approximately every 50 to 130 years. Since the last rupture of this section was in 1857, it is long overdue.
  - In Pennsylvania, rocks of the highest metamorphic grade – the granulite facies – exist only in the eastern Piedmont.

### PGS Website of the Month

<http://ncse.com/>

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