# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

| Vol. LXVII, No. 1 | Robert Botterman, Editor | September, 2014 |
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**Wednesday, September 17, 2014**

**The Pittsburgh Geological Society presents**

## *THE ROLE OF BASEMENT INFLUENCE ON CHANGING STRUCTURAL STYLES IN THE APPALACHIAN PLATEAU PROVINCE*

**Craig A. Eckert EQT Production Co., Pittsburgh, PA**

Structural development of folds in the Appalachian plateau province can be shown to be directly or indirectly linked to the re-activation of pre-existing faults in the Precambrian. The majority of these faults can be linked to a fabric emplaced during Proterozoic tectonism associated with early collisional events responsible for the formation and eventual destruction of Rodinia and Pangea. Some folds are the result of a single phase of basement influenced contraction, while others are result of multiple phases of activity spanning multiple orogenies. A continuum of thick to thin skin tectonics is evident for the plateau and was affected by both the presence of salt and geometric relationship between Acadian depositional strike and predominant Iapetan fault orientation. Additionally, continual reactivation of basement faults controlled the distribution of Silurian evaporates, determined where fault initiation planes were to occur, established planes of weakness, and eventually aided in the amplification and development of the fold belts as they exist today throughout the plateau province. The influence of a developing foreland basin during Acadian time created sufficient dip on the surface of the Silurian decollement, allowing for a gravity sliding event preceding Alleghenian deformation. The importance of the Silurian incompetent units on overlying structural development increases northward into Pennsylvania where it reaches a maximum, then wanes northeastward as the depositional strike of the Acadian clastic wedge and the predominant trend of the Iapetan faults diverge.

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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. **Email reservations to pgsreservations @gmail.com**; please put "PGS Dinner Reservation" in the subject line. Reservations can also be made using PayPal at our website **http://pittsburghgeologicalsociety.org;** leave your name and the number of reservations needed by **noon, Monday, September 15.**

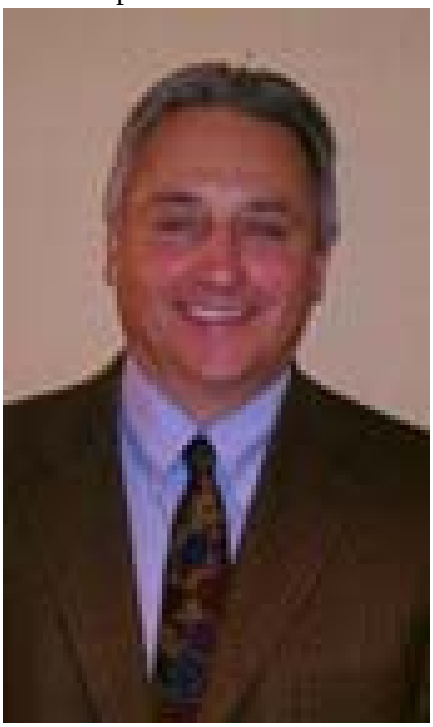
**The meeting will be held at Foster's Restaurant, Foster Plaza Bldg. 10, Green Tree.**

**CRAIG ECKERT BIO**

Craig is currently employed as an exploration geologist for EQT Production Company in Pittsburgh, PA. He has more than 30 years of seismic interpretation and prospect generation experience in the petroleum industry, having worked both domestic and international plays. Graduating with a BS in Geology from WVU in 1979, Craig began his career with Consolidated Gas in WV, and then went on to work for CNG Development Company, Ashland Exploration, and EQT, as well as several smaller independents. In his career he has drilled over 1000 wells, made significant discoveries, and was responsible for the first horizontal well ever drilled in Virginia. Presently he is involved in identifying new and overlooked plays above and below currently active resource plays in numerous North American basins. He is an active member of AAPG, AIPG, SEG, GSA, is a Certified Professional Geologist, and is a Registered Professional Geologist in KY. He is past-President of both Geophysical Society of Pittsburgh and Pittsburgh Geological Society, and is currently treasurer for Eastern Section AAPG. He is also the 2003 recipient of the Ralph L. Miller Best Paper Award, ES-AAPG.

**PGS PRESIDENT'S STATEMENT**

As we begin a new year of meetings I must express my appreciation to have been elected to serve as your president for the third time in the last 30 years. It is also an honor to follow Albert Kollar after leading this Society as its president for the last 3 years, our first and only president to ever serve 3 consecutive terms. In 2011, as Chair of the Nominations Committee, I remember asking Albert if he had any interest in being our presidential candidate after serving on the board the four previous years. My pitch was that while he was doing such a stellar job championing our science through his community outreach program (PA*l*S - Patrons And *lauradanae* Supporters) from his position at the Carnegie Museum of Natural History, he could help strengthen our Society's similar efforts. After a brief period of reflection he became a candidate and our president. What followed were three years of unprecedented community outreach by our Society. Albert encouraged and incorporated Society officers, board members, and professional members to speak, present, and educate the public about geology in several community forums. Our presence was felt at local schools in science classes, we lectured at the Osher Learning Institute, designed and delivered a seminar for the Pittsburgh Regional Center for Science Teachers, and most recent, have plans to work with the Allegheny Intermediate Unit this fall as part of their Network Connections. I hope I didn't miss anything but I'm sure I did. Kudos to Albert and everyone that was involved for a job well done and a standard to be upheld!



**Ray Follador – PGS President**

Moving forward I am very fortunate to inherit a group of officers that are all familiar with their

positions. Vice President Kyle Fredrick is beginning his 3rd year at his position and is our Program Committee Chair. He is responsible for planning and corralling all of the interesting speakers that present at our meetings. Steve McGuire, our Treasurer extraordinaire, has been at his position for 6 of the last 7 years. Steve has built all of the templates by which we track our finances. Judy Neelan returns as our Secretary to keep the minutes of all our doings. She also performs the daunting tasks of Historian and Chair of the Archives Committee. She is implementing modern order to archives that go back almost 70 years. Yes 70 years. Our wonderful Society will be celebrating our 70th anniversary in 2015 (more on that in future newsletters)!

I look forward to working with our current Board members. Counselors John Harper (also Chair of the Membership Committee), Chuck Shultz (also Chair of the Ad-hoc Constitution Committee), and Mary Robison (also Chair of our Audit Committee). All have been Board members longer than I've been associated with the Society and that's a long time. I/we are fortunate to have them. We have four returning Directors at Large. Erica Love begins yet another 2 year term and also serves as our Communication Committee Chair. Those with 1 year remaining on their terms are Bob Botterman (also our Newsletter Editor), Ken LaSota (also our Community Outreach Committee Chair), and Tamara Schiappa. I welcome Mark Barnes and Peter Michael as our two new Directors at Large as they begin their 2 year terms. Our lone departing D @ L this year is Bill Adams. Recently, Bill was awarded the Society's Honorary Member status for his years of service.

Last but not least, we have dedicated members that chair or are members of committees that take on responsibilities that are vital to our operations. It is important that we recognize Ed Girard and Mike Bikerman (Awards Committee), Frank Benacquista (Continuing Education Committee and our Hospitality Chair), Bob Burger (Audit Committee), Mary McGuire (our Webmaster), and our AAPG Delegates Dan Billman and Andrea Reynolds for their efforts.

In closing, I plan to introduce and/or highlight many of our Society's functions in upcoming Presidential Statements throughout the year. I hope to see you all on September 17th. Don't forget…it's that time to pay your membership dues again.

Ray Follador, President

**ORIGINS OF WESTERN PA PLACE NAMES**

James Campbell purchased the "Lisbon Tract" on the south side of the Conemaugh River at the western flank of Chestnut Ridge for 7 pounds "lawful money" on March 1, 1788. When a bridge was constructed across the river to the north side, he decided to build a town on his land. He named it Blairsville in honor of John Blair, a prominent Pennsylvania legislator and land owner who was president of the Huntingdon, Cambria, and Indiana Turnpike (now US Route 22). The town was settled in 1818 and incorporated in 1825. It gained prominence in 1828 when the western division of the Pennsylvania Mainline Canal reached the town and Blairsville became an important point for shipping. Over its nearly 200-year history, Blairsville has been home to various geologic resources and the industries that exploited them, including coal and fire clay mining, flagstone and limestone quarrying, and coke, brick, and glass manufacturing.

**FUN FACT HAVING NOTHING TO DO WITH GEOLOGY:**

When movie director George Lucas was mixing the soundtrack for his movie "American Graffiti", he numbered the reels of film starting with an R and numbered the dialog starting with a D. Sound designer Walter Murch asked George for Reel 2, Dialog 2 by saying "R2D2". George liked the way that sounded so much he integrated that into another project he was working on.

**DID YOU KNOW . . . ?**

*Mercuriceratops gemini*

- Scientists have discovered a new 77 Ma ceratopian dinosaur, named *Mercuriceratops gemini*, from the Judith River Formation of Montana and the Dinosaur Park Formation of Alberta, Canada. The generic name means "Mercury horned-face", referring to the wing-like ornamentation on its head that resembles the wings on the helmet of the god Mercury, whereas the specific name refers to the almost identical twin specimens found in the US and Canada. The dinosaur was about 20 feet long and weighed more than 2.2 tons. Researchers suggest the wing-like projections on the sides of the frill were used for attacting mates.
- Moldavite (also called Bouteille Stone) is an olive green tectite that is thought to have formed during an asteroid impact about 15 million years ago in what is now the Czech Republic. High-quality moldavite is often used in hand-crafted jewelry.
- Temperatures at the summit of Greenland rose above freezing in 2012 for the first time since 1889. A new analysis by the University of Colorado Boulder shows that in both cases, heat waves thousands of miles upwind in North America, higher-than-average ocean surface temperatures south of Greenland, and atmospheric rivers of warm, moist air that streamed toward Greenland's west coast were factors during both episodes.
- Annual U.S. copper consumption is 2 Mt; global consumption is 20 Mt.
- Rare earth elements are essential for national defense, with the military applying them in a variety of defense uses. Some examples: lanthanum is used in night-vision goggles; neodymium is used for laser range-finders, guidance systems, and communications; and samarium is used in precision-guided weapons and for "white noise" production in stealth technology.
- A San Francisco area company has developed a technology for producing gasoline from natural gas, rather than crude oil, for as little as $1 per gallon.
- Just when you thought that multi-stage, massive hydraulic fracturing of wells was the ultimate in current oil and gas production technology, along comes re-fracing, where wells that were drilled just a few years ago are being fraced again in order to reduce their rapid decline. This latest concept pumps water containing minuscule plastic balls, called diverting agents, at high speed into the producing formation. The diverting agents theoretically block old fractures having lower pressures (and lower production), bypassing the higher pressure fractures and boosting the overall pressure of the well so production increases.
- Huge landslides on the outskirts of Hiroshima in western Japan killed at least 40 people in August with many more missing. Dozens of homes were destroyed when with tons of mud, rocks, and debris crashed into suburban communities during recent rain storms. The slopes are colluvium composed of highly weathered granite that has decomposed to small chunks and coarse sand that, when wet, become mobile.
- Three earthquakes that occurred in Chile, Alaska, and Sumatra account for almost half of all the seismic energy released on the planet from 1906 to 2005.
- Arizona may be considered to be a desert state, but a series of storms recently dumped more than 4.5 inches of rain on the area north of Phoenix, causing flooding and large amounts of property damage, as well as requiring the rescue of several people stranded in their cars and homes.
- Government officials decided to evacuate the area north of Bardarbunga volcano in southeast Iceland, fearing an eruption would melt vast amounts of ice and cause flooding throughout the area. Bardarbunga caldera is about 6 miles in diameter and lies under Vatnajokull icecap, the largest glacier in Europe. Officials also warned airlines about the potential eruption, fearing the same kinds of flight problems that resulted from ash sprewing from Eyjafjallajokull volcano in 2010, which shut down much of Europe's airspace for six days.

Bardabunda volcano

- Hydraulic fracturing has come a long way since it's invention in the late 1940s. The oil and gas industry has used it for over 60 years to produce both the fundamental materials for gasoline, wax, medicines, plastics, etc. (i.e., crude oil) and clean-burning natural gas that many now see as the immediate future of electric generation. Now, even the geothermal energy industry is getting involved with hydraulic fracturing, calling it "enhanced geothermal systems", or EGS, essentially geothermal fracing using millions of gallons of water and chemicals injected into mostly vertical wells at relatively high pressure. A combination of injection pressure, chemistry the cold injected water coming into contact with heat, and the chemicals in the frac fluid shears the rock, creating new fracture conduits for the water. The water then is heated and returned to the surface to generate power. Conventional geothermal wells, which can cost more than $5m, have a 50% success rate. EGS supposedly will increase the success rate, the size of the geothermal field, and the lifespans of existing geothermal wells.
- Paleontologists have found dozens of specimens of a soft-bodied fish in Cambrian mudrocks older than 500 Ma in Marble Canyon, part of Canada's Kootenay National Park, that they've called *Metapriggina*. Many internal structures, such as heart, muscles, and the gut, have been preserved in the rock. Although jawless itself, the fish has the type of gill structures that eventually evolved into jawbones, which are present in 99% of all living vertebrate animals. Given the presence of these structures in the well-preserved Canadian fish, *Metaspriggina* could be the ancestor of almost all living vertebrates.

***Metaspriggina* - ancestor of the vertebrates?**

- The drought in California has provided a big advantage for the geoscience industry – it has spurred more drilling for water resources as access to surface water has decreased. Drilling companies are working around the clock to fulfill the demand for new water wells as much as 2,000 feet deep in the state's central valley. Although millions of dollars are being spent, experts warn that exploitation of the area's water resources is unsustainable and carries serious consequences for both the environment and the future.

## PGS Website of the Month

*http://www. volcanodiscovery.com/home.html*

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at rbottgeo@aol.com. Special thanks to all who contributed newsletter items this season.*

**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. Be sure to also send an email address and phone number where you may be contacted.

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| **Vice President:** | Kyle Frederick | **Director-at Large:** | Robert Botterman | **Counselor:** | Charles Shultz |
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| **Secretary:** | Judy Neelan | **Director-at Large:** | Erica Love | **Counselor:** | Mary Robison |
| **Past President:** | Mary Ann Gross | **Director-at Large:** | Ken LaSota | | |
| **Other PGS Positions** | | **AAPG Delegate:** | Dan Billman | **AAPG Delegate:** | Andrea Reynolds |
| **Webmaster:** | Mary McGuire | **Newsletter Editor:** | Robert Botterman | **Historian:** | Judy Neelan |

**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; Kyle Fredrick, Vice President, at 724 938-4463 / fredrick@calu.edu; Steve McGuire, Treasurer, at 412 809-6723 (cell), or smcguire@chesterengineers.com; Judy Neelan, Secretary, at jneelan@verizon.net.

**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.pgs@gmail.com.
Membership information may also be found at our website: www.pittsburghgeologicalsociety.org.

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Kyle Frederick, Program Chair at 724. 938-4463 or email at fredrick@calu.edu.

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

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| Vol. LXVII, No. 2 | Robert Botterman, Editor | October, 2014 |
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**Wednesday, October 15, 2014**

**The Pittsburgh Geological Society presents**

## *CONTAMINANT MOVEMENT IN KARST …. WHAT WE THINK WE KNOW.*

**Dorothy Vesper, PhD. West Virginia University, Morgantown, WV**

Dorothy Vesper is an Associate Professor of Geology at West Virginia University with broad interests in the arena of water-rock interaction. Her primary research area is the geochemistry of karst aquifers with a focus on contaminant fate and transport. She is currently working on developing innovative tracers that can be used to better understand the movement of non-aqueous phase liquids in karst settings. This research avenue stems from a large, cross-disciplinary project that is investigating links between water quality and pre-term birth in Puerto Rico (NIEH-SRP Project PROTECT). Her other research topics encompass an eclectic mix: diel cycling of metals in mine waters, selenium speciation in coal fly ash, passive detector systems, export of dissolved CO2 from terrestrial systems, travertine deposition associated with thermal waters, and protection of endangered species in karst areas. Dorothy is happiest as a geologist when she's visiting a spring.

**FUN FACT HAVING NOTHING TO DO WITH GEOLOGY:**

The microwave oven was invented by mistake when an engineer testing a magnetron tube noticed that the radiation from it melted the chocolate bar he had in his pocket.

**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 Steve McGuire at;** smcguire@chesterengineers.com, please title the e-mail as "PGS Dinner Reservation" or call (412) 809-6723(cell), Reservations can also be made using PayPal at our website http://pittsburghgeologicalsociety.org and leave your name and number of reservations needed by **noon, Monday**, **September 13.**

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

## CALL FOR CANDIDATES FOR STUDENT DELEGATE TO THE PGS BOARD OF DIRECTORS

At the September 17th PGS meeting, I announced to the attendees that the Board was entertaining the idea of adding a student delegate who would attend the monthly board meetings held 1 hour prior to the social hour. This delegate would be a non-voting member of the Board of Directors with the responsibility of communicating issues affecting PGS student members and suggesting recommendations to the voting members of the Board. At this time I have heard from seven interested candidates and hope to hear from a few more of you, since I noted several raised hands at the meeting last month expressing interest. The Board will appoint the delegate from the pool of candidates, hopefully by the October meeting. In order for this concept to work and to be effective, each university's Geology Club will also need to select a student liaison to communicate with the student delegate on issues of importance. We appreciate the student membership's interest in this idea. We, the Board, feel that the student members deserve an active role since your attendance has been rising in the most recent years.

If you would like to be considered for the position of student delegate, or school liaison, please email or call me no later than October 10. The Board will then consider all candidates and choose the student we feel will be best suited to the position. We hope to have the delegate formally invited to the October Board meeting well in advance.

Thank you for your interest.
Ray Follador, President

## KUDOS TO SOME PGS MEMBERS

PGS members Pat Imbrogno and Charlie Jones have each been given special recognition by local universities. Pat Imbrogno, a geologist with many years' experience working in Pennsylvania's oil patch, was inducted into Indiana University of Pennsylvania's Athletic Hall of Fame for being a star football player while attending IUP in the mid-1970s. IUP Hall-of-Famers are those who have reached unparalleled heights in their careers and left a timeless mark on the university and community. The David Bellet Teaching Excellence Award, which recognizes outstanding and innovative undergraduate teaching in the Kenneth P. Dietrich School of Arts & Sciences was awarded to Dr. Charles E. Jones of the Department of Geology and Planetary Sciences at the University of Pittsburgh. Charlie teaches introductory and advanced geology courses and serves as an undergraduate advisor, and is well known for his enthusiasm and passion for geology and for creating classes that encourage interactive learning both in and out of the classroom. Congratulations to both Pat and Charlie on their achievements.

## ORIGINS OF WESTERN PA PLACE NAMES

Bradys Bend, an entrenched meander on the Allegheny River in northwestern Armstrong County, is nearly six miles around the meander but is less than ½ mile across the narrow neck. This feature was named for Captain Samuel Brady, a legendary 18th century frontiersman and Indian fighter. In 1779, Brady and his men chased a raiding party of Seneca Indians who were on their way north with some prisoners abducted from Hannahstown in Westmoreland County. Brady donned Indian dress and, approaching the Senecas while they were camped just downriver from the meander, and spoke to them in their own language. They thought Brady and his men were just another Indian party. Brady's men surrounded and killed the Indians and rescued the prisoners. The Bradys Bend area is well-known for its geologic resources, including numerous underground mines in the high-calcium Vanport Limestone (Pennsylvanian, Allegheny Formation) that supplied flux to area iron furnaces. Today, the Vanport supplies lime for construction and agriculture, but the old mines are better known for underground storage and mushroom farms. One area iron furnace, the Brady's Bend Works, was the first rail mill west of the Alleghenies and the first to use coke instead of charcoal in large-scale iron manufacturing.

**DID YOU KNOW . . . ?**

- Operators drilling the Upper Cretaceous Eagle Ford Shale in southeastern Texas have begun looking at some of the other historically significant reservoir rocks in the same area, particularly the Olmos Formation and the Austin Chalk above it and the Buda Limestone, Edwards Limestone, and Pearsall Shale below it. The use of horizontal drilling and hydraulic fracturing in these rock units has been netting more than 1000 barrels of oil per day in some wells.
- Like the Eagle Ford operators, Pennsylvania operators are using single locations to drill for and produce from multiple stacked production zones, a practice that provides enormous economic savings. A single well pad in, say, Lawrence County, might produce natural gas lfrom two or more Upper Devonian formations as well as the Middle Devonian Marcellus shale and Upper Ordovician Utica and Point Pleasant formations. All of this production concentrated in the same area also makes pipelines more profitable.
- "Oceans serve as the primary respiratory and nutrient cycling machine for the entire planet." (says Joe Gryzmski, Desert Research Institute, Reno, Nevada)
- According to a study by Cornell University, the University of Arizona, and the U.S. Geological Survey, the southwestern US has at least a 50% chance of experiencing a decade long drought over the next century; the chance is 20 to 50% chance for a drought that lasts more than 30 years.
- Antarctica is the only continent that has no reptiles.
- Okay, so you believe all the hype about drilling shale-gas wells being bad for the environment and you decide to drill an eco-friendly geothermal well instead. Good news? Not if you live in Gramercy Park in New York City. A wealthy socialite couple decided to put in a 1,500-feet deep geothermal well at their midtown Manhattan townhouse – with the blessings of the New York State Department of Environmental Conservation – but the ear-splitting noise of drilling has local area residents up in arms. Well construction is expected to take about five weeks.
- Paleontologists in China have unearthed the remains of a slender, long-snouted tyrannosaur that they've nicknamed "Pinocchio rex" for its impressive snout. *Qianzhousaurus sinensis* is the formal name for this creature that represents an entirely new group of dinosaurs living at the end of the Mesozoic. The fossils, unearthed from a construction site in Ghizou Province, constitute most of an individual, including a well-preserved skull, neck, backbone and tail. The living animal would have measured up to 30 feet long.

- According to a United Nations report published in September, the hole in the Earth's ozone layer is shrinking as the layer rebuilds itself. Scientists credit the recovery to the phasing out of chlorofluorocarbon chemicals such as Freon that were used in refrigerators, air conditioners, and aerosol cans in the 20th century.
- According to researchers at Rice University and the University of Nevada, new calculations of tectonic plate movement indicate that the Pacific plate is pulling away from the North American plate at a rate of about 50 millimeters per year.
- As the quality of copper ore declines in Chile's large, older mines, about 20% will either be closed or reconverted by 2015 according to sources. Besides declining quality, sliding copper price and rising production costs are factors in this challenging future for the South American country.

- Iceland was split open between the Bardarbunga and Askja volcanoes recently, with lava and hot gas spewing from the cleft. The Holuhraun lava field, as it's called, has provided some spectacular aerial and satellite imagery. Landsat 8 satellite captured this false-color image in September. Ice and a plume of steam and $SO_2$ show up in cyan and bright blue, liquid water is navy blue, ground in shades of green or brown, and fresh lava in bright orange and red.

- Lithium is used in electric car batteries and cell phones, among other applications, so it is valuable enough to justify some interesting raw-material production techniques. In southern California, a company called Simbol Materials constructed a demonstration-scale plant to produce a few hundred tons of lithium carbonate and lithium hydroxide by extracting it from the hot water pumped to the surface at a nearby geothermal power plant. The company collects geothermal brine, purifies it, extracts the lithium, and returns the water to the geothermal plant for system reuse. Simbol Materials plans to construct a much larger commercial-scale factory that could someday produce more than 16,500 tons of lithium carbonate equivalent a year. With luck, they might also be able to extract other valuable materials such as manganese, zinc, and potassium.
- Critics of the natural gas industry who argue that hydraulic fracturing contaminates drinking water supplies by allowing natural gas and fracing fluids from the Marcellus shale to penetrate shallow aquifers got a bit of bad news for their cause recently. The National Energy Technology Laboratory (NETL) issued a report on a well in Greene County stating that hydraulic fractures in a Greene County well stopped more than 5,000 feet below the lowest potable water zone. The report also concluded that neither the hydraulic fractures nor any reservoir fluids from the Marcellus at about 8,200 feet reached even as far as the shallow (2,000 to 3,500-feet deep) Upper Devonian and Lower Mississippian oil and gas reservoirs in the area.

## PGS Website of the Month

*http://www. Bradshawfoundation.com/*

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# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

| Vol. LXVII, No. 3 | Robert Botterman, Editor | November, 2014 |
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**Wednesday, November 19, 2014**

**The Pittsburgh Geological Society presents**

## *"Lake Erie Bluffs, a Dynamic, Fragile, and Futile Environment"*

**Jake Moore, Environmental Planner, Pennsylvania Department of Environmental Protection, Coastal Resources Management Program**

Lake Erie's bluffs are dynamic environments that provide sediment for littoral drift, contain ecologically significant areas, abound with recreational opportunities, and are prime real-estate. As such they provide a unique problem in the form of bluff erosion for developers and landowners. Through observation, monitoring efforts, technical assistance services, and regulatory programs, the PA Coastal Resources Management Program works with landowners, government agencies, and many other organizations to manage Lake Erie bluff erosion. In this talk I will provide an overview of Pennsylvania's Coastal Resources Management Program as it pertains to the Lake Erie bluffs.

Bio: Jake Moore is an Environmental Planner with the PA Dept. of Environmental Protection, Coastal Resources Management Program who works in the areas of environmental permitting, grant management, technical assistance services, and outreach and education within Pennsylvania's portion of the Lake Erie watershed. His interests include the geologic history of Lake Erie, coastal processes, shoreline stabilization, and vegetation as a bluff management tool. He has been with the Dept. since 2010 and previously completed both his undergraduate and graduate degrees at Slippery Rock University with a bachelor's in Parks and Resource Management and a Master's of Science in Sustainable Systems.

**FUN FACT HAVING NOTHING TO DO WITH GEOLOGY:**
Walt Disney is the second largest purchaser of explosives in the US, after the US Department of Defense.

**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** pgsreservations@gmail.com; please title the e-mail as "PGS Dinner Reservation". Reservations can also be made using PayPal at our website http://pittsburghgeologicalsociety.org - leave your name and the number of reservations needed by **noon, Monday**, **November 17.**

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

## PITTSBURGH GEOLOGICAL SOCIETY ENDOWMENT FUND

We are pleased to announce that on May 8th, 2014 the Pittsburgh Geological Society established the PGS Endowment Fund though the Community Foundation Serving the Heart of Western Pennsylvania, formerly the Armstrong County Community Foundation. The opportunity arose to initiate the Fund when the Society received a monetary windfall through our co-sponsorship of the American Association of Petroleum Geologists Annual Meeting held in Pittsburgh in May of 2013. The Fund was created, with Board approval, by a $30,000 contribution to be managed by the Foundation through Edward Jones Investments. The Fund allows for an annual distribution not to exceed 5% of its net fair market value as of December 31 of the prior year.

In accordance with the mission of the Foundation the Fund shall be used for the charitable purpose of the support of the Society. The "charitable purpose" of the Fund may be applied, in whole or in part, to the monetary needs of students (awards, membership, student meeting subsidization), community outreach, field trips, educational seminars, monthly operations, or whatever the Society's Board defines as a given charitable need.

In essence, the Fund will provide a financial vehicle to protect the future longevity of the Society, in existence since 1945, for many years to come. Of course, as with any endowment, additional contributions are welcome and encouraged for its future growth. Contributions can be made in the form of bequests, memorials, or gifts. Gifts of cash, securities/appreciated assets, life insurance, IRAs, charitable remainder trusts, charitable lead trusts, and charitable gift annuities are all accepted. Contributions should be directed to the Pittsburgh Geological Society / Endowment Fund or directly to the Community Foundation Serving the Heart of Western Pennsylvania at 220 South Jefferson Street, Suite B, Kittanning, PA 16201.

Thank you for your interest.
Ray Follador, President

## 13th ANNUAL STUDENT NIGHT

Co-sponsored by:
***Pittsburgh Geological Society***
***Association of Engineering Geologists***
***American Society of Civil Engineers-Geotechnical Division***

Students, please consider taking advantage of an opportunity to present your research and compete in this sponsored event from PGS, AEG, and ASCE, at the 13th Annual Student Night on Wednesday, April 15 at Foster's Restaurant, #10 Foster Plaza, Green Tree. If you have been conducting undergraduate or graduate research in any geologically or geotechnically related field, here is an opportunity to show off your work to members of the three societies, and receive the benefits that go along with it. Students who present their original research grow from the experience by improving their public speaking skills, networking with professionals and experts in their fields, and even competing for a cash award!

Abstracts of 300 words or less should be emailed to Dr. Kyle Fredrick at *kyle.fredrick@calu.edu* by **Monday, March 16, 2015** for consideration.

Each of the three sponsoring societies will select one student paper (graduate or undergraduate) for oral presentation. Additional abstracts will be accepted for poster presentations. All presenters will receive certificates of recognition and appreciation, as well as complimentary dinner. The three oral presenters will each receive awards of $100, while the three top poster presenters will each 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 town of Altoona was founded in 1849 by the Pennsylvania Railroad as the site of their maintenance complex. John A. Wright laid out the property in building lots, and it became a city in 1867. The name Altoona has been attributed to several sources, including the Latin *altus*, meaning "high". Yet, even though Altoona's nickname is The Mountain City, this seems highly unlikely since Altoona is actually in a valley. Some believe

it comes from Low German *all to na* meaning "all too near". That one makes no sense, either. An alternate explanation is that Altoona was named for Altona, an urban borough in Hamburg, Germany that is an important railway and manufacturing area. But the most popular explanation came from the man who laid out the town and named it. According to Wright, he had spent time in the Cherokee country in Georgia and had been attracted by the beauty of their language. One of his favorite Cherokee words was *allatoona*, which he said meant "the high lands of great worth". There is a Cherokee word *eladuni*, which means "high lands," or "where it is high", and it is easy to believe that the Anglicization of *eladuni* might be Allatoona, or Altoona.

**PGS STUDENT MEMBER FEATURE**

Our student member this month is Christy Miller, who was recently named Student Delegate to the PGS Board of Directors.

Look for the same treatment for additional members in the coming months.

1. **Name, email:**
   Christy Miller
   Christy.miller1221@gmail.com

2. **Education (school, degree, expected graduation date):**
   Slippery Rock University
   Major: Geology
   Minors: Environmental Studies/Geography and Spanish, May 2015

3. **How long have you been a member or PGS?**
   3 years.

4. **Any ideas on student related activities that you wish PGS would do?**
   (I have a few ideas; I will be presenting them to the board at the next meeting).

5. **Are you working on any research topics, please list title, describe?**
   Last year I conducted research using conodont coloration changes to determine thermal maturation boundaries of four different Pennsylvanian aged limestones, and then confirmed the data with vitrinite reflectance values of bituminous coal in the area.

   Hopefully in the next few months a research project involving the comparison of a specific Bahamas environment and Vanport Limestone will happen, or discussing the stratigraphy and sedimentology of an outcrop located near 279 will happen.

6. **What's your favorite subject/area of study?**
   Carbonates.

7. **What are your plans following graduation? (Continuing with your education, academia, or into the job market)?**
   Currently I am looking into graduate schools, but at the same time I am keeping my options open and also looking for a potential job.

8. **What are your plans if money was not an issue?**
   I would go to graduate school, and then move to an island and research about that place.

9. **What is your dream geology job?**
   I would love to do something with coastal processes and coral reefs, preferably in a place that I would be able to use my Spanish skills.

10. **What is the most exciting place you have been geologically or one play you wish you could visit?**
    I would really like to visit the Grand Tetons and Ireland.

11. **What is your favorite or least favorite "Bad" geology movie and why?**
    Jurassic Park, because even though the proper dinosaurs may not be represented

for the title I still really enjoy the movie.

12. **What's your favorite rock, mineral, or fossil?**
    Rock: biotite schist
    Mineral: amazonite
    Fossil: trilobite

13. **What is one of your favorite quotes (geology related or not)?**
    Geology: "That's third thoughts for you. When a huge rock is going to land on your head, they're the thoughts that think: is that an igneous rock, such as granite, or is it sandstone?" – Terry Pratchett

    Nongeology: "I think perhaps love thrives on unlikely circumstances and chance: life thrives on these principles, and is life not love? And love not life?" – Brandon Boyd

## GRIPE OF THE MONTH

More than once we have seen or heard media reports stating something like, "a drilling technique called hydraulic fracturing, commonly called fracking". Fracing (the CORRECT spelling of the short form of hydraulic fracturing) is NOT a drilling technique. In fact, it has NOTHING to do with drilling. It is a method of stimulating a low-porosity, low-permeability reservoir in order to get the oil and/or gas out in an efficient manner. It occurs AFTER drilling has ceased. If you know of any way to pound this information into the heads of journalists, editors, and publishers, please let us know.

## DID YOU KNOW . . . ?

- If you are concerned about rising ocean levels from global warming, remember this: dozens of land areas of the Earth already sit below sea level. A total of 33 countries have land below sea level. About a third of the Netherlands is below sea level, as are the Jordan River, New Orleans, Bangkok, the Enriquillo-Cul de Sac Depression in Hispaniola, the Chott Melrhir Depression in Algeria, Sebkhet Shunayn and Sabkhat Ghuzayyil in Libya, Shatt al Gharsah in Tunisia, Lammefjord in Denmark, Sebkha Tah in Morocco, Hachiro-gata in Japan, Sariqarnish Kuli in Uzbekistan, The Fens in the United Kingdom, and Lake Eyre in Australia. Most of the world's major depressions are associated with tectonic plate boundaries, occurring where converging plates deform or where spreading centers open; some are volcanic in origin. Most of these depressions occur in the northern hemisphere because that is where most of the land is and where most of the plate boundaries occur. Many depressions are found near where the African, Arabian, and Eurasian plates meet. Most are found in hot desert regions where high evaporation rates prevent them from filling with water. Only a few are found in temperate climates.
- Although many mountain ranges where plates converge are flanked by foreland sedimentary basins, flexing of the lithosphere under the weight of sediments and thrust sheets may not be the reason the basin forms. In some places, the depth of the basin cannot weight of basin sediments and neighboring mountains, implying that this model is too simple and/or that additional forces must affect subsidence.
- There will be 30 new seismometers installed in Washington, D. C. this winter as a direct result of the 2011 earthquake in Virginia. There was a surprising amount of structural damage in the city as a result of the earthquake, despite the epicenter being almost 90 miles away and the magnitude being only 5.8.
- West Virginia, in an effort to stabilize its coffers, has opened bids for oil and gas leasing under 14 miles of the northern section of the Ohio River, and suggested that other river tracts and a wildlife management area are under consideration.
- Royal Dutch Shell is testing a new device that uses lasers to help identify shale gas reservoirs. When the device is lowered into a well bore, it shoots lasers at the rock and measures the frequency at which that light is reflected. That information can help companies identify both what types of hydrocarbons occur in the rock and where they are located.
- International Brent crude oil prices fell to their lowest benchmark in four years, hitting $82/barrel, and West Texas Intermediate crude oil prices also dipped below $80/barrel for the first time in more than two years.

**DID YOU KNOW . . . ?** (continued)

- Using data from the federal Bureau of Labor Statistics, multiple American Geoscience Institute (AGI) member societies, and AGI's Directory of Geoscience Departments, the *Status of the Workforce Report 2014* predicts a future geoscientist workforce shortage. Based on these data, 296,963 geoscientists were employed in 2012. It is estimated that 339,797 geoscientists will be needed by 2022, but future geoscience graduates are projected to be only about 51,000. Combined with estimated attrition rates, this leaves the geoscience workforce with a shortage of 135,000 by 2022.
- Certain types of corals seem to have found a way to survive some of their most destructive threats, including climate change, increased solar radiation, and ocean acidification, by attaching to and growing under mangrove roots. Scientists with the USGS found a refuge for more than 30 species of reef-building corals in mangrove swamps of St. John in the U.S. Virgin Islands. The corals were found growing on the network of prop roots that extend down toward the seafloor
- Mauna Loa in Hawaii is Earth's largest active volcano, and geologists believe it is "taking a nap". It last erupted in 1984, 30 years ago, and no one is quite sure when it will reawaken. According to historical records, Mauna Loa has erupted 33 times since 1843, for an average one eruption every 5 years. Over the last 3,000 years, it has erupted about once every 6 years. So, it is well overdue. Odds are that it will erupt within the next couple of decades — and that it will be spectacular.

- During the Paleocene–Eocene Thermal Maximum about 56 million years ago, global sea-surface temperatures rose significantly, apparently as a result of a rapid rise in the of greenhouse gas concentrations in the atmosphere. Researchers recently used $\delta^{18}O$ measurements from well-preserved foraminiferans in Tanzania to estimate the temperature change. After accounting for changes in seawater chemistry and pH, they estimated that sea-surface temperatures rose by more than 37°F at that time, and may have exceeded 104°F. They noted that calcareous plankton like foraminiferans don't occur in a large part of Tanzania's record during the Paleocene-Eocene Thermal Maximum, probably as a result of extreme environmental changes.
- A newly discovered fossil fish, found in China, is the largest vertebrate known in the Silurian fossil record. Named *Megamastax amblyodus*, it was a primitive lobe-finned fish. While most known Silurian fish were small, Megamastax probably measured more than 3 feet long and had jaws that were almost 7 inches long – a veritable Silurian Jaws. The discovery of *Megamastax* refutes the long-held conviction that large predatory fish did not evolve until much later (during the Devonian).

- Canada currently produces an estimated 14.2% of the world's diamonds in value (8.7% in carat volume). Two new mines that are set to begin production in the next few years will probably boost Canada's global market share to 25.2% in value and 15.1% in carat volume, producing the highest compound annual growth rate of production among the 8 largest diamond producing nations over the next 4 years.
- The Dust Bowl drought of the 1930s was not just the region's worst dry spell in modern memory – it was the worst in North America over the last 1,000 years, according to researchers from the NASA Goddard Institute for Space Studies. The drought was named from a period in 1934 when winds blew dust from the Great Plains eastward to North Carolina and southward to Florida. Using tree-ring chronologies, the researchers found that the 1934 drought covered more than 70% of western North America and was 30% more intense than the second worst drought in the region that occurred in 1580. The cause of the Dust Bowl drought apparently was the result of a high-pressure ridge centered over the west coast of North America during the autumn and winter of 1933–1934 that blocked wet weather from California and the Northwest. Such atmospheric patterns preceded some of the worst west coast dry spells in recent history. In addition, airborne dust particles caused by poor farming practices amplified the 1934 drought by blocking the Sun's energy, which reduced evaporation, cloud formation, and rainfall over the region.

- The Barberton greenstone belt in South Africa includes eight known layers containing spherical particles (spherules) that condensed from rock vapor clouds formed by the impact of large meteorites or asteroids over 3,200 million years ago.

## PGS Website of the Month

*http://statedclearly.com/about/*

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at rbottgeo@aol.com. Special thanks to all who contributed newsletter items this season.*

**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. 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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| **President:** | Ray Follador | **Director-at Large:** | Tamra Schiappa | **Director-at Large:** | Peter Michael |
| **Vice President:** | Kyle Fredrick | **Director-at Large:** | Robert Botterman | **Counselor:** | Charles Shultz |
| **Treasurer:** | | **Director-at Large:** | Mark Barnes | **Counselor:** | John Harper |
| **Secretary:** | Judy Neelan | **Director-at Large:** | Erica Love | **Counselor:** | Mary Robison |
| **Past President:** | Albert Kollar | **Director-at Large:** | Ken LaSota | | |
| **Other PGS Positions** | | **AAPG Delegate:** | Dan Billman | **AAPG Delegate:** | Andrea Reynolds |
| **Webmaster:** | Mary McGuire | **Newsletter Editor:** | Robert Botterman | **Historian:** | Judy Neelan |

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**Officer Contacts**: If you wish to contact a current PGS Officer, please call or email Ray Follador, President, at 724-744-0399 / Geodawg@comcast.net; Kyle Fredrick, Vice President, at 724-938-4463 / fredrick@calu.edu; Judy Neelan, Secretary, at jneelan@verizon.net.

**Memberships**: For information about memberships, please e-mail John Harper at jharper.pgs@gmail.com, or write to PGS Membership Chair, PO Box 58172, Pittsburgh PA 15209.

Membership information may also be found at our website: www.pittsburghgeologicalsociety.org.

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Kyle Frederick, Program Chair at 724-938-4463 or email at fredrick@calu.edu.

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

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This fault in the Pine Creek marine zone (the dark shale sandwiching the thin limestone), formerly thought to be the Brush Creek interval, and the overlying Lower Saltsburg sandstone is a classic example of a listric normal fault. It was formed by slumping, a type of landsliding, that probably occurred as the result of a river bank failure that occurred penecontemporaneously with deposition of the sandstone.

The fault occurs in a long, high roadcut along PA Route 51 near the south end of the Sewickley Bridge over the Ohio River, Moon Township, Allegheny County, PA. Rockfalls in this area have helped to obscure much of the outcrop and led the township to post "no trespassing" signs along the road to protect public safety.

# PGS THANKS OUR CORPORATE SPONSORS

**ABARTA Oil & Gas Co., Inc.**
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**American Geosciences, Inc.**
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**Pennsylvania Soil and Rock, Inc.**
**Range Resources Appalachia LLC**
**Rosebud Mining Co.**
**THG Geophysics, Ltd.**

# *ANNOUNCEMENT*

# Pittsburgh Geological Society
# Spring 2015 Student Field Workshop

## Saturday April 4, 2015 California University of Pennsylvania
## Time: 9 AM to Late Afternoon

The Pittsburgh Geological Society once again invites students of geology & engineering geology to attend the 11th installment of the "Student Field Workshop."

Have you wondered what you might be doing on that first job? Chances are, at some point, you'll be involved with drilling operations of some sort. This is your chance to learn about this process. You will have the opportunity to work alongside an experienced drilling contractor and field-wise professionals. The Workshop will be supervised by professionals in the industry, so not only is this an excellent learning opportunity, it is your chance to ask all those questions regarding life after college. Brush up on those networking skills and get your questions ready!

What will you learn?

Soil sampling using a drill rig
Soil & Rock descriptions
Basic sampling techniques
Well installation basics
Basic monitoring equipment
Designing a drilling program

The cost to you?

Due to rising fuel costs we need to charge a nominal fee, but lunch is included:

•PGS Student Members: $ 20.00

•Non-PGS Members: $25.00

Payment instructions will be provided upon registration.

PLEASE CONTACT US TO SAVE YOUR PLACE!!!

As with all field work, this will be a *RAIN* or *SHINE* event. So watch the weather forecast carefully and prepare yourself. The drilling process can be dusty, wet, and muddy -- so leave the designer jeans and open-toed shoes behind.

We do ask that you be an active student – please no corporate trainees.

**Registration is limited – so sign up ASAP.**

**To Register - Contact: Frank Benacquista, PG at: fbenacquista@kuresources.com**

# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

| Vol. LXVII, No. 4 | Robert Botterman, Editor | December, 2014 |
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**Wednesday, December 10, 2014**

**The Pittsburgh Geological Society presents**

## *Turkey: Where Europe meets Asia*

**Tamra A. Schiappa, Associate Professor, Geography, Geology and the Environment, Slippery Rock University**

Turkey lies between the continents of Europe, Asia, and Africa and is surrounded by the Mediterranean, Aegean, and Black seas. Because of its geographic position Turkey is the birthplace of many civilizations and the center of commerce in the region. Throughout recorded history, people have moved between Europe and Asia leaving behind monuments of ancient civilizations. The ancient city of Ephesus is one of these relics, initially built by the Greeks dating back to the 10th century BC. As a port city, the city of Ephesus supported a thriving population. During the 1st century AD, the Romans took over Ephesus, turning it into the center of trade along the Aegean coast supplying goods and services to civilizations to the north such as Istanbul and to the west into Greece and Europe. Istanbul, the largest city in Turkey, straddles Europe and Asia by the Bosphorus strait and has served as a cultural center throughout history. Istanbul, named Constantinople by the Roman and Byzantine empires, was the capital for the Roman, Byzantine, and Ottoman empires. Constantinople remained an important trade center during the Roman and Byzantine Empires, but fell to the Ottoman Turks in 1423 when they renamed the city to Istanbul. The Ottoman Turks ruled the city until the end of WWI and the Republic of Turkey was formed. I traveled through the ancient ruins of Ephesus to the cultural center of Istanbul during a brief visit to Turkey. My presentation will take us on a journey through the western region of the Izmir Provence and into heart of Istanbul.

Dr. Schiappa received a B.S. in geology from SUNY Plattsburgh, an MS in Earth Science from Boise State Univ. and Ph.D. in Geology from Univ. of Idaho. Her research involves teaching excellence and Upper Paleozoic conodont and ammonoid biostratigraphy of northern Pangaea; development of the Cisuralian time scale; Pennslvanian litho-stratigraphy, and carbonate sedimentology. She has been actively involved in an international effort to build the Permian time scale and to foster an understanding of the development of the western margin of North America and the assembly of Pangaea.

**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 pgsreservations@gmail.com.** Please put "PGS Dinner Reservation" in the subject line. Reservations can also be made using PayPal at our website **http://pittsburghgeologicalsociety.org**; leave your name and number of reservations needed by **noon, Monday**, **December 8.**

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

## PRESIDENTS STATEMENT – DECEMBER 2014

The Pittsburgh Geological Society, founded in 1945, has provided a forum for geologists in multiple disciplines, from traditional extractive industries such as coal, oil, and natural gas, to geotechnical and environmental companies, to academics and general interest. The Society has a great balance of professional, student, honorary, and corporate members with a Board composed entirely of volunteers from the membership who work hard to make the Society a welcoming and educational place for students and professionals alike. Our corporate membership play a vital role in making this happen. Our corporate sponsors continued investment in the Society provides the opportunity for our members to meet and network on a regular basis, to discuss varied topics, and to reach out to our future geological community – the students. Without our sponsors the Society would not be able to secure top speakers for our meetings, provide continuing education credits to professional geologists, provide networking and training opportunities to students, supply judges to science and engineering fairs for budding scientists, collaborate with earth science teachers through community-minded outreach and provide annual field trips for our membership. So, during a time of year when giving thanks is most appropriate, the Society would like to acknowledge our 2014 corporate sponsors listed on the back of this newsletter for their support as well as the following new and renewing corporate sponsors that have already committed their support to our 2015 initiatives; ACA Engineering, Inc., American Geotechnical & Environmental Services, ARK Resources, Inc., AWK Consulting Engineers, Inc., Billman Geologic Consultants, Inc., Enviro-Equipment, Inc., HDR Engineering, Inc., Insite Group, Inc., Key Environmental, Inc., Natural Energy Development Corporation, Pennsylvania Drilling Company, THG Geophysics, Ltd, Vista Resources, Inc., and Wrightstone Energy Consulting.

Thank you for your interest.
Ray Follador, President

## FUN FACT HAVING NOTHING TO DO WITH GEOLOGY:

On October 17, 1814, a brewery tank in London containing 3,500 barrels of beer exploded when one of the 500-pound steel bands around the tank split. The ensuing flood of beer destroyed one of the brewery's walls and two houses, and killed nine people.

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## PGS PROFESSIONAL MEMBER FEATURE

Our Professional member volunteer is Irene Wallrich. Look for the same treatment for additional members in the coming months.

1. **Name/certifications:**
   Irene Wallrich

2. **Company, title or role, years with company:**
   Non-Geology Job: Utah Clean Cities Coalition, Grant Writer, 3.5 yrs. (in various positions)

3. **How long have you been a member or PGS?**
   3 mo.

4. **Have you held any officer positions?**
   No

5. **Education:**
   University of Utah, May 2011
   Masters of Science and Technology, Environmental Science

   State University of New York College at Geneseo, May 2008
   Bachelor of Arts, Geological Sciences (minor in Sociology)

1. **What are some of your day-to-day responsibilities in your current role?**
   In my current position, I am responsible for developing and submitting grant proposals that persuasively communicate Utah Clean Cities Coalition's mission and programs to potential funders, foundations and other grant-making organizations. In addition to grant applications, I assist with reporting, both at the federal and state level, as well as grant administration. I also assist remotely with coalition projects as they arise (website upkeep, communications, event coordination, coalition documentation development, project management, etc.)

2. **What is the best and worst thing about your current job?**
   Best: I work at home (no commute! Especially on snowy/icy days)
   Worst: I am not working in a geology/environmental science field.

3. **What is your favorite PA geology site/fun fact/phenomenon, etc.?**
   Pine Creek Gorge.

4. **What is one class you wish you would have taken in college? (doesn't have to be a geology class)**
   I had taken five years of Spanish by the time I graduated from High School. I wish I would have taken language courses in college to keep up that particular skill. Now, my Spanish speaking ability is pretty sad.

5. **What is the most exciting place you have been geologically?**

On our honeymoon, my husband and I went on a lava hike on the big island of Hawaii. We were able to see several flows. It was amazing!

Yellowstone is a very close second.

6. **What is your favorite or least favorite "Bad" geology movie and why?**

The Monolith Monsters (1957) – Fun to watch with other geologist to see who can find the most "geology related errors."

7. **What's your favorite rock, mineral, or fossil?**

Wonderstone: http://geology.utah.gov/utahgeo/rockmineral/collecting/hpwndrst.htm

8. **What's the #1 most played song on your iPod?**

Sail - Awolnation

9. **What is one of your favorite quotes?**

This is a tough one, I collect quotes like I collect rocks (and ironically, books).

"A room without books is like a body without a soul." ― Cicero

10. **If you could meet any geologist, living or dead, who would you meet?**

Marie Tharp - American geologist and oceanographic cartographer who, in partnership with Bruce Heezen, created the first scientific map of the entire ocean floor. Tharp's work revealed the presence of the Mid-Atlantic Ridge, causing a paradigm shift in earth science that led to the acceptance of theories of plate tectonics and continental drift.

## DONATIONS NEEDED

Thank you to all who brought donations to the November meeting. Erica Love will be collecting the donations again at the December Meeting for the Outdoor Classroom PA (http://www.theoutdoorclassroompa.org/) for their preschool geology program. The need rocks, minerals, and fossil samples to help foster a love of geology in these little future geologist!!! Please look through your collections (driveways, yards, boxes in the garage/basement) and find a sample or two to donate. If you remember what the rock is and where you got it that would be even better. The class is for small children so nothing fragile or valuable but colorful, textural, layered. Julie Travaglini, the Senior Program Facilitator for Team Tadpole describes the program (still in the planning stages) as follows: "The lessons will be VERY basic at this age!!....We're going to look at rock colors and textures. Some rocks are hard (sandstone and limestone) while others are soft (coal and shale). Where do rocks come from (enter volcanic rock and layered rock)? What can we sometimes find in rocks? (fossils!) I'm going to place some of the fossils in sensory bins for the kids to explore. Some will be covered in sand and kids will be given plastic tools and paintbrushes to unearth their fossils from the sand! Others will be scattered in a bin of rocks and kids will explore to find the fossils. As a craft, we will probably do some fossil or rock rubbings. We may also do some sort of matching game where kids match the fossil to a photo of the actual creature."

## FOSTER PLAZA FOOD DRIVE

Foster Plaza is holding an Annual Holiday Food Drive to support the Greater Pittsburgh Area Community Food Bank so please bringing non-perishable foods (no glass), toiletries & household items, and paper products to the meeting with you to donate. See attached list of 'Most Wanted Items'.

**ORIGINS OF WESTERN PA PLACE NAMES**

The town of Kane in McKean County was founded in 1863 by Major General Thomas L. Kane, the leader of Pennsylvania's Bucktail Regiment during the Civil War, and his wife Elizabeth, a physician. Among his other accomplishments, the general is credited with single-handedly helping to avert a major war in the late 1800s between the Mormons and the US government. A long-time friend and legal advisor to Brigham Young, General Kane was offered the Utah Territorial Governorship, but insisted that it should go to Young instead. In recognition for his efforts, there is a county in Utah named for him, and a full-size statue stands in a central position in the rotunda of the Utah State Capital building in Salt Lake City. The town of Kane, situated 2,210 feet above sea level, has an average snowfall of 105 inches per year and extremely low winter temperatures, so it is often referred to as the "Icebox of Pennsylvania". It is also known as the Black Cherry Capital of the World. Kane was once home to the toy company that manufactured the wooden trolley for Mister Rogers' Neighborhood. The town also lends its name to the large Kane oilfield and the Kane sand, the lowest reservoir in the Upper Devonian Bradford Group.

**DID YOU KNOW . . . ?**

- Paleontologists at the University of Bonn in Germany may have finally found the answer to the question of why some dinosaurs had feathers millions of years before the first reptiles took to the air. Previous hypotheses involved an adaptation related to flight or to warm-bloodedness, but, after analyzing the genetic similarities between dinosaurs and modern-day reptiles and birds, the German team hypothesized that dinosaurs had tetrachromatic vision, i.e., they had photo receptors to detect ultraviolet light as well as blue, green, and red. If valid, it means that dinosaurs probably used visual signals to communicate with each other, and large, sheet-like feathers in a variety of colors and patterns would facilitate intra-species communication and mate selection.
- Researchers have shown that erosion and sedimentation may trigger shallow earthquakes (less than three miles deep) and favor the rupture of large, deep earthquakes up to the surface. Although plate tectonics was generally thought to be the only persistent mechanism able to influence fault activity, it appears that surface processes also increase stresses on active faults, such as those in Taiwan, one of the world's most seismic regions.
- An international group of paleontologists has discovered a horse-like animal that lived in what is now India during Eocene epoch, about 55 million years ago. The discovery of Cambaytherium thewissi fills in a major gap in understanding of the evolution of Perissodactyla, the major group of mammals that includes horses, tapirs, and rhinoceroses.

- Scientists have long had little understanding of how carbon behaved deep below Earth's surface, but geochemists from Johns Hopkins University and the Carnegie Institution of Washington recently calculated the amount and types of carbon that exist in fluids at 100 miles below Earth's surface at temperatures up to 2,100 degrees F. In addition to the carbon dioxide and methane already documented deep in subduction zones, a rich variety of organic carbon species exists that could spark the formation of diamonds and perhaps even become food for microbial life. It is possible that the deep fluids might have transported the building blocks of life into the shallow Earth, thus contributing to the origin of life itself.
- An international team led by a University of South Florida geologist report that a geological phenomenon called "slow slip events", identified just 15 years ago, is a useful tool in identifying the precursors to major earthquakes and their resulting tsunamis. The team used high-precision GPS to measure slight shifts on a fault line in Costa Rica, and found that better monitoring of such small events can lead to better understanding of maximum earthquake size and tsunami risk. The team, which has been making GPS measurements in Costa Rica since 1988, found that slow slip events

have some similarities to earthquakes, but release their energy slowly, over weeks or months, and cannot be felt or even recorded by conventional seismographs. High-precision GPS recorded numerous slow slip events in the decade leading up to the September 5, 2012 earthquake on the Costa Rica subduction plate boundary. The 7.6-magnitude quake was one of the strongest earthquakes ever to hit Costa Rica, and it unleased more than 1,600 aftershocks. A tsunami warning was issued after the quake, but only a small tsunami occurred. The team's findings suggest that slow slip events in the offshore region in the decade leading up to the earthquake may have released much of the stress and strain that would normally occur on the offshore fault.

- There has been a controversy for half a century about the existence of a kind of diamond that is supposed to be associated with meteorite and asteroid impacts. About 50 years ago, scientists reported that the meteorite that formed the Canyon Diablo Crater in northern Arizona contained a form of diamond with a hexagonal structure, which they named lonsdaleite after a famous crystallographer. Now, a group of scientists based mostly at Arizona State University have shown that lonsdaleite is, in fact, a regular cubic form of diamond that is simply "full of defects" that occur as a result of shock metamorphism, plastic deformation, or unequilibrated crystal growth.
- The Sudbury Basin located in Ontario, Canada is one of the largest known impact craters on Earth, as well as one of the oldest due to its formation more than 1.8 billion years ago. Researchers who took samples from the site and subjected them to a detailed geochemical analysis say that a comet may have hit the area to create the crater.
- In the 1960s, paleontologists found the fossilized bones of two 8-feet-long dinosaur forearms that ended in three large claws, but nothing else of the animal. For 50 years researchers have speculated about what kind of dinosaur they belonged to. Recently, two nearly complete skeletons were discovered in Mongolia – and the beast is even more bizarre than originally thought. Named Deinocheirus mirificus for its horrible hands, it measured 36 feet long and weighed more than 6½ tons. It had an elongated head with a duck-like beak, a large humped sail on its back, short, stumpy legs, and large, hooved feet that would have prevented it from sinking into the wetlands where it lived. It was most likely slow moving, probably using its long forearms and claws to dig for and gather freshwater plants and fish.

- German researchers are examining long-term records of temperature measurements in groundwater flows, which have been largely uninfluenced by humans, collected by operators of local waterworks around Cologne and Karlsruhe. Based on the readings, the researchers were able to demonstrate that the groundwater is warming up, reflecting the warming stages observed in the atmosphere, although it lagged behind atmospheric warming. The data reveal that the groundwater down to a depth of about 200 feet has warmed up statistically significantly over the last forty years. This water heating follows the warming pattern of the local and regional climate, which the researchers claim mirrors that of global warming. Since the early 20th century, the global atmospheric temperature has increased about 1.4 °F, with about two-thirds of the increase occurring since 1980.

**PGS Website of the Month**

*http:/ www.bbc.co.uk/nature/extinction_events*

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at rbottgeo@aol.com. Special thanks to all who contributed newsletter items this season*

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**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. Be sure to also send an email address and phone number where you may be contacted.

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**Officer Contacts**: If you wish to contact a current PGS Officer, please call or email Ray Follador, President, at 724 744-0399 / Geodawg@comcast.net; Kyle Fredrick, Vice President, at 724 938-4463 / fredrick@calu.edu; Judy Neelan, Secretary, at jneelan@verizon.net.

**Memberships**: For information about memberships, please write PGS Membership Chair, PO Box 58172, Pittsburgh PA 15209, or email John Harper at jharper.pgs@gmail.com.
Membership information may also be found at our website: www.pittsburghgeologicalsociety.org.

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Kyle Frederick, Program Chair at 724. 938-4463 or email at fredrick@calu.edu.

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

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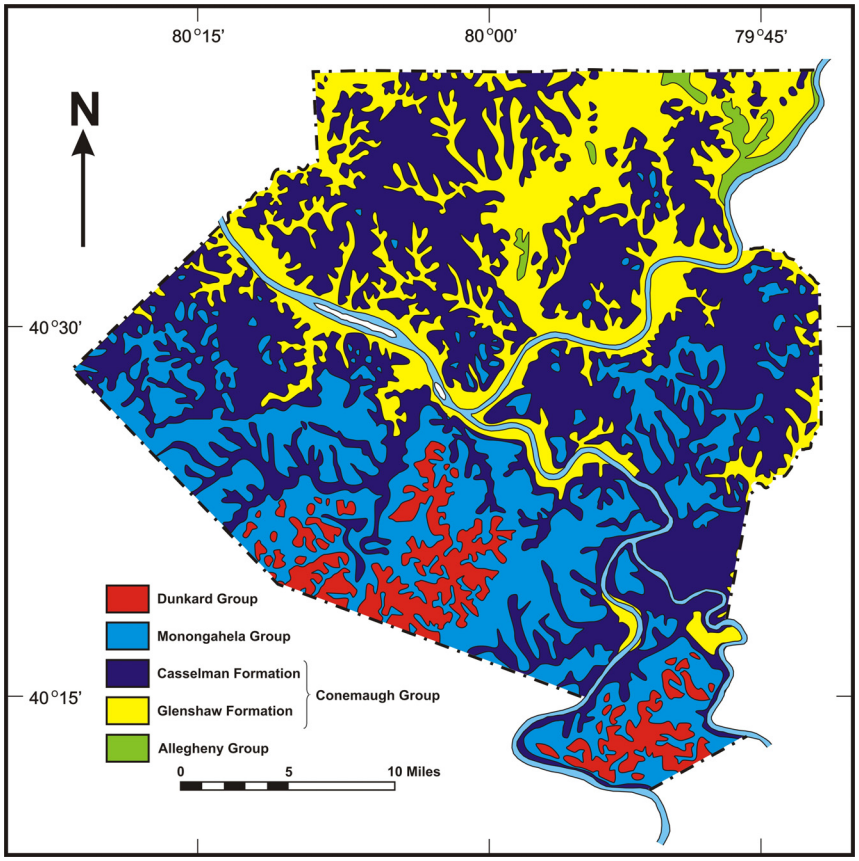


**Generalized geologic map of Allegheny County, PA**

# *ANNOUNCEMENT*

# Pittsburgh Geological Society
# Spring 2015 Student Field Workshop

## Saturday April 4, 2015 California University of Pennsylvania
## Time: 9 AM to Late Afternoon

The Pittsburgh Geological Society once again invites students of geology & engineering geology to attend the 11th installment of the "Student Field Workshop."

Have you wondered what you might be doing on that first job? Chances are, at some point, you'll be involved with drilling operations of some sort. This is your chance to learn about this process. You will have the opportunity to work alongside an experienced drilling contractor and field-wise professionals. The Workshop will be supervised by professionals in the industry, so not only is this an excellent learning opportunity, it is your chance to ask all those questions regarding life after college. Brush up on those networking skills and get your questions ready!

What will you learn?

Soil sampling using a drill rig
Soil & Rock descriptions
Basic sampling techniques
Well installation basics
Basic monitoring equipment
Designing a drilling program

The cost to you?

Due to rising fuel costs we need to charge a nominal fee, but lunch is included:

•PGS Student Members: $ 20.00

•Non-PGS Members: $25.00

Payment instructions will be provided upon registration.

PLEASE CONTACT US TO SAVE YOUR PLACE!!!

As with all field work, this will be a *RAIN* or *SHINE* event. So watch the weather forecast carefully and prepare yourself. The drilling process can be dusty, wet, and muddy -- so leave the designer jeans and open-toed shoes behind.

We do ask that you be an active student – please no corporate trainees.

**Registration is limited – so sign up ASAP.**

**To Register - Contact: Frank Benacquista, PG at: fbenacquista@kuresources.com**

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# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

| Vol. LXVII, No. 5 | Robert Botterman, Editor | January, 2015 |
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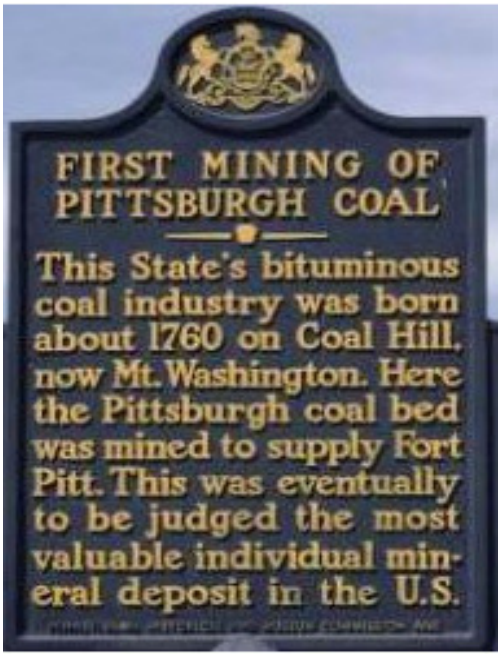
**Wednesday, January 21, 2015**

**The Pittsburgh Geological Society presents**

## *Impacts of Mining on Structures in Western Pennsylvania*

**Presented By: Richard E. Gray, P.G., Principal, DiGioia, Gray & Associates, LLC**




Shortly after General Forbes captured Fort Duquesne in 1758, British soldiers began mining the Pittsburgh Coal from Coal Hill (Now Mt. Washington) across the Monongahela River from Fort Pitt. Coal mining has been widespread in western Pennsylvania and has to be considered in any site investigation in the region. In areas of shallow cover over old mines, sinkholes are common. Trough subsidence can occur where the cover is greater above both abandoned and active mines. Subsidence related to active mining is reasonably understood, permitting us to predict the time and amount of movement and surface strains. Above abandoned mines there are no means available as yet to predict exactly when or where subsidence might take place; and so subsidence must generally be expected anywhere unless it can be proved that the area has not been mined, that long term pillar support has been provided, or that the mine voids are fully collapsed. Recent recognition of non-conventional surface ground behavior induced by underground mining necessitates consideration of possible damage to structures positioned as struts across valleys.

**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** pgsreservations@gmail.com. Please title the e-mail as "PGS Dinner Reservation". Reservations can also be made using PayPal at our website http://pittsburghgeologicalsociety.org be sure to leave your name and the number of reservations needed by **noon, Monday**, **January 19.**

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

**PRESIDENTS STATEMENT – JANUARY 2015**

Happy New Year! I hope all of our members enjoyed the holiday season surrounded by family and friends in full health and happiness. As we begin the 70th year as a professional society it is important to note that our Society has *continuously* served our membership and community without interruption from the beginning. I'm sure that in 1945 our first president, George Grow of the Peoples Natural Gas Company, never envisioned that the Society would have almost 340 members 70 years later.

I would like to begin 2015 by expressing my appreciation to the Awards Committee and the Board for honoring me as the 14th recipient of the Walt Skinner Award at last month's meeting. This award, established in 1987 to "honor those members who have provided exceptional service to the Society and geologic community at large" is a great honor. As a young geologist, I was fortunate to meet Walt Skinner at one of my first Society meetings in 1982. At the time he was retired as a Professor in the Department of Physics at Duquesne University and had been a petroleum geologist for the Sun Oil Company earlier in his career. He was quick to note that he was a long time member and past officer of the Society and believed that his involvement in all professional societies enriched his career. Little did I know.

Speaking of paying it forward . . . We also begin 2015 with two long time Society members taking the podium as guest speakers. At this month's meeting we are honored to have Richard Gray as our speaker. Dick, an internationally respected geotechnical engineer and engineering geologist was Society president in 1965 and a Walt Skinner Award recipient (1994), and is a long-time Honorary Member and Corporate Sponsor. Peter Hutchinson will be our speaker at the February meeting. Pete, an internationally respected environmental/ petroleum geologist, geochemist, and geophysicist was Society President in 1994 and is also a long-time Corporate Sponsor. Lastly, Honorary Member Maury Deul, has made a generous monetary donation to the Society to establish an award to be given to the best student paper/presentation associated with coal geology. The Society plans to enact this award, if applicable, at the April Student Night this year.

In closing, I would like to acknowledge the following, most recent, new and renewing Corporate Sponsors that have committed their support to our 2015 initiatives in the past month; American Geosciences, Inc., Ammonite Resources, The Baron Group, DC Energy Consultants, DiGioia Gray & Associates, Field Environmental Instruments, Inc., Geo-Environmental Drilling Company, Inc., Groundwater & Environmental Services, Inc., Hayward Natural Resources, Inc., Highpointe Oil & Gas, LLC, Huntley & Huntley Energy Exploration, LLC, Northeast Energy Consultants, Inc., Oil & Gas Management, Inc., Rosebud Mining Company, URS Corporation, and Woodard & Curran, Inc. (Cummings Riter).

Ray Follador, President

**THANK YOU:**

I want to thank the Pittsburgh Geological Society and President Ray Follador for the recognition of my service as President 2011 – 2014, with the lithograph of John Kane's landscape painting of Panther Hollow, Pittsburgh, c. 1930 – 1934. This came as a complete surprise as Pittsburgher John Kane is one of my favorite landscape artists. For those who don't remember, I presented a December Spouse and Significant Other talk on John Kane landscapes many years ago. For sure I will cherish this gift more and more as the years roll by.

Albert D Kollar, Past President.

**13th ANNUAL STUDENT NIGHT**

Co-sponsored by:
***Pittsburgh Geological Society***
***Association of Engineering Geologists***
***American Society of Civil Engineers-Geotechnical Division***

Students, please consider taking advantage of an opportunity to present your research and compete in this sponsored event from PGS, AEG, and ASCE, at the 13th Annual Student Night on Wednesday, April 15 at Foster's Restaurant, #10 Foster Plaza, Greentree. If you have been conducting undergraduate or graduate research in

any geologically or geotechnically related field, here is an opportunity to show off your work to members of the three societies, and receive the benefits that go along with it. Students who present their original research grow from the experience by improving their public speaking skills, networking with professionals and experts in their fields, and even a cash award!

Abstracts of 300 words or less should be emailed to Dr. Kyle Fredrick at *kyle.fredrick@calu.edu* by **Monday, March 16, 2015** for consideration.

Each of the three sponsoring societies will select one student paper (graduate or undergraduate) for oral presentation. Additional abstracts will be accepted for poster presentations. All presenters will receive certificates of recognition and appreciation, as well as complimentary dinner. The three oral presenters will each receive awards of $100, while the three top poster presenters will each 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 "Ohiopyle" is derived from the Lenape phrase *ahi opihele* which means "it turns very white", referring to the froth churned up by waterfalls and rapids on the Youghiogheny River. Although the first people known to live in the area around this Fayette County town was a group of Native Americans called the Monongahela, various other tribes lived there from about the time Europeans began settling North America until they were forced out after the French and Indian War. The earliest Europeans in the Ohiopyle area were farmers, hunters, and trappers. With the building of the National Road (US Route 40) nearby in 1811, the population of the area expanded and access to the area opened to the lumbering and mining industries. Construction of the Baltimore and Ohio Railroad and the Western Maryland Railroad accelerated the progress of these operations and also brought tourists who flocked to the area to see the white water and stay at resorts that sprouted up along the river. In 1936, world-renowned architect Frank Lloyd Wright's masterpiece, Fallingwater, opened and attracted even more tourists. In the 1960s, the Western Pennsylvania Conservancy acquired the land and sold it to the Commonwealth of Pennsylvania as a state park. Whitewater rafting became a commercial success and as they say, the rest is history.

## FUN FACT HAVING NOTHING TO DO WITH GEOLOGY:

The banana and the telephone were introduced to North America at the same time, at the 1876 Philadelphia Centennial Exposition

## DID YOU KNOW . . . ?

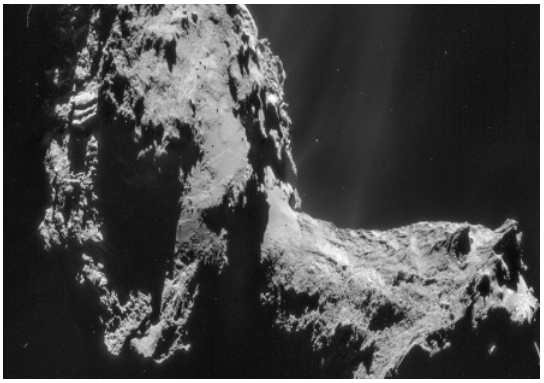
- A team of scientists has mapped the location of hydrogen-rich waters found trapped miles beneath the Earth's surface in rock fractures in Canada, South Africa, and Scandinavia. These ancient waters are found Precambrian shield rocks, the oldest on Earth, and have a chemistry similar to that found near deep sea vents. This suggests that the waters can support microbes living in isolation from the surface. The study included data from 19 different mine sites.
- When the last Ice Age ended around 14,700 years ago, major changes occurred to the Atlantic Ocean in a period known as the Bolling-Allerod interval. During this period, as glaciers melted and Earth warmed, the currents of the Atlantic Ocean at its deepest levels changed direction. Now researchers have analyzed the chemistry of 24 fossil corals from the North Atlantic to learn more about the circulation of its waters during the last Ice Age. They found that the corals recorded a high variability in the ocean currents at mid-depths – about 1.25 miles (2 kilometers) below the surface – up to 1,000 years prior to the Bolling-Allerod interval. They suggest that these changes may have been an early warning signal that the world was poised to switch from its glacial state to the warmer world we know today, and that the changes happened first at mid-depths.
- Gas flares in the Eagle Ford Shale in Texas burned more than 20 billion cubic feet of natural gas and released tons of pollutants into the air in the first seven months of 2014

**DID YOU KNOW . . . ?**


- A tiny Cretaceous dinosaur about the size of a house cat was recently discovered in South Korea. The fossilized remains are only about 11 inches (28 cm) long, but scientists speculated that it was probably about 20 inches (51 cm) long when it was alive. The tiny dinosaur would have been about the size of a house cat. It has been classified as a theropod, a group of carnivorous dinosaurs that includes *Tyrannosaurus rex*, which means it had sharp teeth and claws, but a lot smaller. It may also have had four wings.
- A new gold-copper mine to be developed by Seabridge Gold in British Columbia has been approved by Canada's environment minister. The mine has been rated the world's largest undeveloped gold-copper project in terms of reserves, with an estimated 38.2 million ounces of gold, 9.9 billion pounds of copper, 191 million ounces of silver and 213 million pounds of molybdenum proven and probable. Seabridge Gold expects to process 130,000 tonnes of ore per day throughout the mine's life expectancy of 52 years.
- A surprise magnitude-6.0 earthquake hit the Napa Valley in California in August, 2014 that took geologists by surprise. The earthquake resulted from the rupture of previously unmapped faults. In one neighborhood, a section of the fault cracked through homes, splitting foundations and damaging some houses so severely that they were evacuated. The California Geological Survey is studying the possible fault strands and is working on a regulatory map.
- Although Southeast Asia is accustomed to monsoons, a particularly harsh "northeast monsoon" gripped Malaysia, Indonesia and southern Thailand causing flooding and landslides in December. Neighborhoods turned into islands surrounded by murky brown waters. Streets became rivers, and cars were toppled or swept away. The flooding has forced more than 132,000 people to evacuate in Malaysia alone, while strong currents and interrupted power supply added to the chaos
- Scientists have used computer modeling to examine how magma-heated pools in Yellowstone National Park most likely appeared before we humans arrived to marvel at their glory – and mess them up. It turns out that coins, rocks, and trash that have been thrown into the pools over the last 200 years have partially blocked the vent, resulting in lower water temperatures than they had originally. This has also altered the original color of the pools, which probably was blue. The colors we see today are caused primarily by microbial mats that thrive in the hot (140$^{o}$ to 194$^{o}$F) water, with different microbe species providing different colors. Because the different species prefer different temperatures, their arrangements within the pools causes the concentric patterns of yellows, greens, browns and oranges that dominate the pools' color schemes today.

- Algeria has called on OPEC to cut oil production and raise oil prices to forestall a pending economic crisis. Algeria has some $200 billion in foreign reserves, enough to cover imports for the next several years, but it is heavily dependent on oil revenues for its economy. About 97% of its hard currency income and 60% of its budget come from the production and sale of oil.
- Meanwhile, researchers have discovered a previously unknown geochemical pathway by which Earth can sequester water in its interior for billions of years and still release small amounts to the surface via plate tectonics, feeding our oceans from within. This finding suggests that enough water is buried in the deep earth right now to fill the Pacific Ocean.
- An ancient meteorite and high-energy X-rays have helped scientists conclude a half century of effort to find, identify and characterize a mineral.

- The first big science results have been announced by the European science team working with the Rosetta probe orbiting the 67P/Churyumov–Gerasimenko comet. For many years, scientists have suggested that Earth's abundance of water originated from space, resulting from collisions with icy comets. Direct measurements made by the Rosetta probe, however, indicate that 67/P has three times as much deuterium per hydrogen atom as Earth, meaning that such comets are an unlikely source of our water. To date, remote measurements of other comets have found only one with ice having the same deuterium/hydrogen ratio as Earth's water, so the question of where our planet's water originated is still open.



- A team of scientists at the Argonne National Laboratory has recently clarified the definition of the Earth's most abundant mineral, a high-density form of magnesium iron silicate that makes up 38 percent of the Earth. Now called Bridgmanite, the mineral was named for 1946 Nobel laureate and pioneer of high-pressure research Percy Bridgman.
- Along with carbon dioxide and methane, nitrous oxide ($N_2O$) is an important greenhouse gas but it doesn't get quite as much press or bad publicity as the others. A new study by an international team of scientists, however, confirms that atmospheric levels of $N_2O$ rose significantly as the Earth came out of the last ice age. The team analyzed air extracted from bubbles in ancient polar ice from Antarctica, documenting a 30% increase in atmospheric $N_2O$ concentrations from 16,000 years ago to 10,000 years ago. The team speculated that this rise in $N_2O$ was caused by changes in environmental conditions in the ocean and on land, and that it contributed to the warming at the end of the ice age and the melting of large ice sheets that then existed.

## PGS Website of the Month

*http://www.mindat.org/*



**Officer Contacts**: If you wish to contact a current PGS Officer, please call or email Ray Follador, President, at 724 744-0399 / Geodawg@comcast.net; Kyle Fredrick, Vice President, at 724 938-4463 / fredrick@calu.edu; Judy Neelan, Secretary, at jneelan@verizon.net.

**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.pgs@gmail.com.
Membership information may also be found at our website: www.pittsburghgeologicalsociety.org.

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**Moody and Associates, Inc.**

**Natural Energy Development Corp.**

**Northeastern Energy Consulting, Inc.**

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**Range Resources Appalachia LLC**

**Rosebud Mining Co.**

**Seneca Resources Corporation**

**THG Geophysics, Ltd.**

**URS Corporation**

**Vista Resources, Inc.**

**Wrightstone Energy Consulting**

# *ANNOUNCEMENT*

# Pittsburgh Geological Society
# Spring 2015 Student Field Workshop

## Saturday April 4, 2015 California University of Pennsylvania
## Time: 9 AM to Late Afternoon

The Pittsburgh Geological Society once again invites students of geology & engineering geology to attend the 11th installment of the "Student Field Workshop."

Have you wondered what you might be doing on that first job? Chances are, at some point, you'll be involved with drilling operations of some sort. This is your chance to learn about this process. You will have the opportunity to work alongside an experienced drilling contractor and field-wise professionals. The Workshop will be supervised by professionals in the industry, so not only is this an excellent learning opportunity, it is your chance to ask all those questions regarding life after college. Brush up on those networking skills and get your questions ready!

What will you learn?

Soil sampling using a drill rig
Soil & Rock descriptions
Basic sampling techniques
Well installation basics
Basic monitoring equipment
Designing a drilling program

The cost to you?

Due to rising fuel costs we need to charge a nominal fee, but lunch is included:

- PGS Student Members: $ 20.00
- Non-PGS Members: $25.00

Payment instructions will be provided upon registration.

PLEASE CONTACT US TO SAVE YOUR PLACE!!!

As with all field work, this will be a *RAIN* or *SHINE* event. So watch the weather forecast carefully and prepare yourself. The drilling process can be dusty, wet, and muddy -- so leave the designer jeans and open-toed shoes behind.

We do ask that you be an active student – please no corporate trainees.

**Registration is limited – so sign up ASAP.**

**To Register - Contact: Frank Benacquista, PG at: fbenacquista@kuresources.com**

# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

| Vol. LXVII, No. 6 | Robert Botterman, Editor | February, 2015 |
|---|---|---|

**Wednesday, February 18, 2015**

**The Pittsburgh Geological Society presents**

## *An Accounting and Update of the Deep Water Horizon Disaster Through the Eyes of the Chief Council's Report, 2011*

**Presented By: Peter Hutchinson, P.G., Ph.D. THG Geophysics, LTD**

If anything can go wrong, it will (Murphy's First Law)

On the 20th of April 2010, while drilling at the Macondo Prospect, an explosion on the Deepwater Horizon rig caused by a blowout killed 11 crewmen and ignited a fireball visible from 40 miles (64 km) away. The resulting blaze could not be extinguished and, on the 22nd of April 2010, Deepwater Horizon sank, leaving the well gushing at the seabed and causing the largest offshore oil spill in U.S. history.

The Macondo Prospect, named after the fictional village in Garcia Marquez's novel "One Hundred Years of Solitude", was a proposed single well field at a water depth of over a mile with the total depth of the prospect of 20,600 ft. below Kelly bushing (bkb). This analysis is based upon the "National Commission on the Deepwater Horizon Oil Spill and Offshore Drilling" Chief Council's Report, 2011 (Report).

The primary target for the Macondo prospect is a low-relief channel-levee system of Middle Miocene age (~13 MYA). The channel system trends northwest to southeast over an elongated 4-way ridge oriented northeast to southwest. The field as mapped is a structural-stratigraphic field where structural closure exists on 3 sides and the sand pinches out on the 4th side (i.e., northeast).

The interval from 17,157 to 18,280 ft. bkb contains a series of stacked sand packages. Some of these sands are hydrocarbon rich and others are water saturated. The sand packages are designated, from the shallowest to the deepest, as M57A, M57B, M57C, M56A, M56B, M56C, M56D, M56E, and M56F.

The minimum size of the field based upon the 62 ft. of pay in the M56E sand is approximately 1,400 acres and

**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** pgsreservations@gmail.com. Please put "PGS Dinner Reservation" in the subject line. Reservations can also be made using PayPal at our website, http://pittsburghgeologicalsociety.org. Remember to include your name and the number of reservations needed by **noon, Monday**, **February 16.**

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

the maximum size is approximately 2,700 acres. The minimum case for reserve volume for the M56E sand is 35 million stock tank barrels (M stb) with the potential for 40M stb. The interpretation from the Report is that the total potential of the field is 110M stb.

The prospect was spudded with the Marianas rig October 6, 2009. On November 9, 2009, the Marianas was damaged by Hurricane Ida. The Deep Water Horizon arrived January 31st and resumed drilling February 10, 2010. By March 8, 2010, the well kicked at a depth of 13,305 ft. bkb and was shut in. The down-hole drilling assembly was frozen in place and was severed off about 9,000ft bkb. The well was sidetracked and the cost to the operator was $13M in rig time and the lost downhole assembly.

Due to kicks, ballooning and lost circulation issues drilling ended on April 9th. The well was completed with rat hole at 18,360 ft. bkb, far short of proposed total depth. The well was logged with a complete set of geophysical logs and after much discussion (and the desire to save $7 to $10M) the engineers decided to cement in a long string instead of a liner. Eleven days later 11 men were dead and the rig sank to the seabed with oil leaking to the Gulf of Mexico for 87 days.

The cause of the disaster can be attributed ultimately to cost-based decisions, a lack of communication, and poor company training. While the well was completed and logged, a lack of preparation led to cement failure. The use of a long string and light-weight (nitrogen-based) cement that ultimately did not pass the stress test coupled with too little cement used for the job; the use of 6 centralizers instead of the recommended 20; and temporary abandonment procedures severely underbalanced the well and placed great stress on the cement job, which failed. Finally the blow-out preventer failed as it did during testing.

To date the operators have paid out $13,000,000,000. The maximum amount the Clean Water Act fines for oil spills is $4,300/stb, so with a release of 2,450,000 stb to potentially 5,000,000 stb to the Gulf yields a staggering $10,000,000,000 to $21,000,000,000 fine that has not been resolved, yet. Still, no amount will ever cover the tragic loss of 11 human lives.

**BIO:** Dr. Hutchinson is president and principal scientist for THG Geophysics, Inc. in Murrysville, Pennsylvania and is an Adjunct professor of geology at the University of Pittsburgh. He earned a Ph.D. in geology from the University of Pittsburgh and is a registered professional geologist in 7 states. He has more than 35 years of experience in seismic hazard assessment, ground motion specification, soil-structure interaction, and other geophysical studies.

His knowledge of drilling, hydraulic fracturing, injection and extraction are a result of his past experience as senior geologist for Exxon Company, U.S.A. in Corpus Christi, TX (1980-1983) where he participated in the first trial of fluid and sand injection into the Austin Chalk and monitored fracture growth through a series of inclinometers. As senior exploration geologist for Primary Fuels, Inc. (1984-1989), he was responsible for interpreting geologic and geophysical data for oil and gas prospects in the Gulf of Mexico. More recently, he was the manager of geology for Chambers Development Company, Inc. (1989-1992) in Pittsburgh, PA where he was responsible for landfill installations, geochemical analyses, environmental compliance, and managing various drilling and geophysical programs.

Dr. Hutchinson has authored 60 publications on geophysics, environmental geology, and petroleum geology and has conducted peer reviews for several geology and geophysics books. He is former VP and President of Pittsburgh Geological Society.

## PRESIDENT'S STATEMENT – February 2015

I would like to begin my statement this month with words of apology to all those professional and student members that were turned away from last month's meeting. The Society has never had to "close our doors" to members in our history for any reason. The root cause of this "good" problem was that the meeting was held jointly with the American Society of Civil Engineers and we had a popular speaker, Richard Gray. Exceeding the occupancy capacity of our venue was a first and caught us all off guard. In the future the Board will consider a secondary venue when conducting joint meetings. If we have learned anything from our increasing attendance numbers this year, it is not to procrastinate when making your reservations.

This month our speaker is a Past President of the Society, Peter Hutchinson. He will be presenting the geology of the offshore Macondo Prospect and the operational mistakes that led to the tragic blowout that occurred in 2010 on the Deepwater Horizon rig where 11 lives were lost. It is a unique review of offshore Gulf geology, deep-water drilling technology, and the dangers of cost-based decisions. Make your reservations because this talk will be of interest to many local geological societies. In March we are happy to have Dave Brezinski of the Maryland Geologic Survey return as our speaker. He will be presenting his work on the karst terrain in Frederick and Hagerstown Counties, Maryland.

At this time I would like to call out to our membership to consider participating in the outreach efforts of the

Society. Our Community Outreach Committee, chaired by Ken LaSota, has been very active on many fronts, participating in local educational conferences for K-12 educators and visiting local schools as well as career fairs. From time to time we get small requests via our website from schools, Cub Scout den leaders, etc., that could easily be covered by a member that may live in the community of the request. In such an instance we will send out an email to our membership to increase our pool of participants and reduce the burden and travel time for a willing member that may live a county away. Please consider participating and helping in our efforts to educate the public. You can contact me or any Board member if you want more information.

In closing, I would like to acknowledge the following, most recent, renewing corporate sponsors that have committed their support to our 2015 initiatives in the past month; DORSO LP and Pennsylvania Soil and Rock, Inc. Thank you.

Ray Follador, President

## 13th ANNUAL STUDENT NIGHT

Co-sponsored by:

***Pittsburgh Geological Society***
***Association of Engineering Geologists***
***American Society of Civil Engineers-Geotechnical Division***

Students, please consider taking advantage of an opportunity to present your research and compete in this sponsored event from PGS, AEG, and ASCE, at the 13th Annual Student Night on Wednesday, April 15 at Foster's Restaurant, #10 Foster Plaza, Greentree. If you have been conducting undergraduate or graduate research in any geologically or geotechnically related field, here is an opportunity to show off your work to members of the three societies, and receive the benefits that go along with it. Students who present their original research grow from the experience by improving their public speaking skills, networking with professionals and experts in their fields, and even a cash award!

Abstracts of 300 words or less should be emailed to Dr. Kyle Fredrick at *kyle.fredrick@calu.edu* by **Monday, March 16, 2015** for consideration.

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

## STUDENT WORKSHOP

On Saturday, March 28, PGS is again hosting the "So You Want to be a Geologist" workshop. The workshop is geared to all students who will someday be working in a geological or geologically-related field and will focus on various subjects that are important to students. Among the subjects to be discussed are: a) academic needs; b) professional sectors; c) licensing and ethics; d) advice for job seekers; and e) advice for new professionals.

The workshop will be held on Washington's Landing on the north shore of Pittsburgh from 9:00 AM to 4:00 PM. Dress is casual and there is no charge for the workshop. Lunch will be provided by PGS.

The workshop will be limited to the first 25 students to sign up by emailing jneelan@verizon.net. Please indicate your full name, school, and year in school, e.g., junior, senior. Although any current student is eligible to attend, preference will be given to those preparing to graduate should the interest exceed the limit.

Once the list of attendees is established, more information will be provided.

## ORIGINS OF WESTERN PA PLACE NAMES

Girard, PA, is a borough in west-central Erie County adjacent to Lake Erie. Originally settled around 1800, Girard Township, as it was first known, was formed from parts of Springfield, Fairview, and Elk townships and settled in 1814. After the Erie Extension Canal was completed in 1842, Girard grew and became incorporated as the Borough of Girard in 1846. The town is named in honor of Stephen Girard, a Philadelphia banking tycoon of the late 1700s and early 1800s. Although he was a resident of Philadelphia, Girard owned much of the land in Springfield Township and was greatly admired by local residents. Also, following his death in 1831, the area was supposed to become the site of Girard College, but Girard's family decided to establish a boarding school in Philadelphia instead. Girard lends its name to the Girard Shale, an Upper Devonian unit that crops out in local streams and along the shore of Lake Erie.

**DID YOU KNOW . . . ?**

- A study of 95 volcanos in the period of 2000-2014 shows that Hawaii's Kilauea volcano ranks hottest in terms of total energy.
- In terms of total energy radiated, the hottest volcano on Earth is Kilauea on the Big Island of Hawaii. Kilauea has been in eruption for more than 30 years and spilled lava continuously throughout the study period of 2000-2014. It began erupting in January 1983 and is still going strong. Kilauea also ranks as having the largest outpouring in the past five centuries.
- Nyiragongo volcano in the Democratic Republic of Congo came in a close second after Kilauea, thanks to its lava lake. But Africa's most active volcano, Nyamuragira, came in third for overall energy radiated.
- Iceland's Holuhraun eruption radiated the most heat for a single event, which is still going on. As of late 2014, Holuhraun had radiated about 1/3 more thermal energy than the 2012-2013 eruption of Tolbachik, Russia's which itself radiated about 50 percent more energy than the 2011-2012 eruption of Nyamuragira.
- The volcanoes emitting the most heat do not necessarily emit it explosively. In fact, most of the top heat producers were shield volcanoes that released their lava slowly.
- American rare earth exploration company RioSol recently announced that they have discovered a significant rare earth element (REE) and poly-metallic discovery about 60 miles northwest of Cusco, Peru, apparently the largest in the country. Further exploration should be able to delineate its actual size and scale. The discovery supposedly contains both light REEs and heavy REEs, as well as copper, zinc, aluminum, and other base metals.
- Neanderthals (*Homo neanderthalensis*) and modern humans (*Homo sapiens*) diverged from a common ancestor about 500,000 years ago. At its greatest, the Neanderthal population numbered about 70,000 individuals, but the species slowly dwindled and went extinct between 35,000 and 41,000 years ago. Some scientists have proposed that *Homo sapiens* killed off the rival Neanderthals, while others say Neanderthals interbred with modern humans until the group was completely absorbed.
- Environmental changes have reduced the world's reef building corals by more than half. As a measure of the percentage of the seafloor covered by living coral, the coral cover is currently 10-20 percent worldwide. The Great Barrier Reef, for example, has lost half of its coral cover in only the last 27 years. Overfishing, coastal pollution, and an increase in ocean temperatures and acidification, as well as other human impacts, are all affecting the delicate balance maintained in coral reef ecosystems. Scientists have determined that a change in ocean temperature of only 1 or 2$^{o}$C could lead the Great Barrier Reef's coral cover to decline to less than 10%.
- A new study of the genomes of the major bird groups indicates that modern birds evolved over a 5-10-million year interval at the end of the Cretaceous period and the extinction of non-avian dinosaurs. Based on the new data, only a few bird lineages survived the end-Cretaceous mass extinction.
- Scientists have concluded that magma that has a high water content moves faster than low-water magma. Using a three-dimensional seismic image of the mantle beneath the Lau Basin in the South Pacific, they discovered what seemed like too little magma where they expected to find the most. So they concluded that what magma was initially there was flushed so rapidly that it wasn't showing up in their images.
- Paleontologists in Scotland have discovered a previously unknown species of swimming reptile that lived in the oceans about 170 million years ago, during the time of dinosaurs. It has been named *Dearcmhara* [pronounced "jark vara"] *shawcrossi*. *Dearcmhara* is the Scottish Gaelic word for marine lizard. And before you ask – no, this is not the Loch Ness Monster. The fossils were found on the Isle of Skye. Stephen Brusatte, the paleontologist in charge of the dig, said anyone can go to the Isle of Skye to hunt fossils. Also, he said, there's a great whiskey distillery on the island. "Have a nice whiskey tasting," he advises. "Get some smoky, peaty whiskey in the afternoon, and then go find fossils afterward. Or maybe do it in the reverse order."

- On Jan. 26, 1700, around 9:00 PM, a magnitude-9 earthquake that struck the Pacific coast of North America in British Columbia, Canada, caused violent shaking for several minutes that was felt as far away as the Manitoba border about 1,300 miles away. The earthquake created a tsunami that, according to legend, sucked everybody and everything along the outer coast into the ocean. Approximately 9 hours later, a tsunami about 40 feet high hit the Japanese coast and destroyed everything in its path.

- Finally, some folks are coming to their senses. New research is negating the hypothesis that a bolide impact caused the extinction of dinosaurs, along with causing global firestorms, at the end of the Cretaceous. British scientists studying the concept simulated the immense energy released from an extra-terrestrial collision with Earth in the laboratory and found that the intense but short-lived (<1 minute) heat near the impact site at Chixalub, Mexico, could not have ignited live plants, and so could not have created global firestorm. One of the scientists involved, Dr. Claire Belcher from the Earth System Science group in Geography at the University of Exeter was quoted as saying, "By combining computer simulations of the impact with methods from engineering we have been able to recreate the enormous heat of the impact in the laboratory. This has shown us that the heat was more likely to severely affect ecosystems a long distance away, such that forests in New Zealand would have had more chance of suffering major wildfires than forests in North America that were close to the impact. This flips our understanding of the effects of the impact on its head and means that paleontologists may need to look for new clues from fossils found a long way from the impact to better understand the mass extinction event."
- A recent University of Kent in Canterbury, England, study compared the internal structure of hand bones from modern people, chimps, apes, Neanderthals, and early human species. The researchers report that the pattern of spongy bone in ape hands doesn't show signs of humanlike tool uses such as pinching or hammer holding, but the hand bones of *Australopithecus africanus* do. Instead of the kinds of bone structures for knuckle-walking or tree climbing exhibited by chimps and gorillas, the hands of the early humans had anchor bones under the palms consistent with forceful opposition of the thumb and fingers typically adopted during tool use. This pushes the first use of tools by hominids back about 500,000 years, to around 2.5 million years ago.
- Gasoline prices spiked after Hurricane Katrina in 2005, and as a result the US Congress and the public demanded a federal probe of price manipulation by the oil industry. In 2008, just before the economic collapse of the "Great Recession", oil prices rose to $145 per barrel and gasoline prices topped $4 per gallon in some areas of the country and once again Congress and the public demanded action. Prices currently are falling, declining by more than $50 per barrel over the last six months. So . . . where's the outrage? Virtually no one is demanding an investigation of industry practices. So much for the politics of market economics!

## PGS Website of the Month

*http://www.mindat.org/*

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at rbottgeo@aol.com. Special thanks to all who contributed newsletter items this season.*

**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. Be sure to also send an email address and phone number where you may be contacted.

**PGS Board-of-Directors**

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|---|---|---|---|---|---|
| **President:** | Ray Follador | **Director-at Large:** | Tamra Schiappa | **Director-at Large:** | Peter Michael |
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| **Treasurer:** | | **Director-at Large:** | Mark Barnes | **Counselor:** | John Harper |
| **Secretary:** | Judy Neelan | **Director-at Large:** | Erica Love | **Counselor:** | Mary Robison |
| **Past President:** | Albert Kollar | **Director-at Large:** | Ken LaSota | | |
| **Other PGS Positions** | | **AAPG Delegate:** | Dan Billman | **AAPG Delegate:** | Andrea Reynolds |
| **Webmaster:** | Mary McGuire | **Newsletter Editor:** | Robert Botterman | **Historian:** | Judy Neelan |

**Officer Contacts**: If you wish to contact a current PGS Officer, please call or email Ray Follador, President, at 724 744-0399 / Geodawg@comcast.net; Kyle Fredrick, Vice President, at 724 938-4463 / fredrick@calu.edu; Judy Neelan, Secretary, at jneelan@verizon.net.

**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.pgs@gmail.com.
Membership information may also be found at our website: www.pittsburghgeologicalsociety.org.

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Kyle Frederick, Program Chair at 724. 938-4463 or email at fredrick@calu.edu.

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

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What will you learn?

Soil sampling using a drill rig
Soil & Rock descriptions
Basic sampling techniques
Well installation basics
Basic monitoring equipment
Designing a drilling program

The cost to you?

Due to rising fuel costs we need to charge a nominal fee, but lunch is included:

- PGS Student Members: $ 20.00
- Non-PGS Members: $25.00

Payment instructions will be provided upon registration.

PLEASE CONTACT US TO SAVE YOUR PLACE!!!

As with all field work, this will be a *RAIN* or *SHINE* event. So watch the weather forecast carefully and prepare yourself. The drilling process can be dusty, wet, and muddy -- so leave the designer jeans and open-toed shoes behind.

We do ask that you be an active student – please no corporate trainees.

**Registration is limited – so sign up ASAP.**

**To Register - Contact: Frank Benacquista, PG at: fbenacquista@kuresources.com**

# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

| Vol. LXVII, No. 7 | Robert Botterman, Editor | March, 2015 |
|---|---|---|

**Wednesday, March 18, 2015**

**The Pittsburgh Geological Society presents**

## *Factors controlling karst development in the Great Valley of Maryland.*

**Presented By: David K. Brezinski Ph.D., Appalachian Stratigrapher/Paleontologist**
**Maryland Geologic Survey**

Karst development within the Frederick Valley of Maryland is controlled largely by stratigraphic susceptibility and anthropogenic activity. In contrast, karst feature distribution within the Great Valley can be tied to a variety of geologic factors. Stratigraphy plays a key role in the development of karst features within the Great Valley. The Stonehenge, Row Park, and New Market limestones are highly susceptible to karst feature origination. Fracture orientation also plays a significant part in the geometry and distribution of active sinkholes and dolines. Fault traces show notable incidences of springs and active sinkhole alignment, while fold axes can be the location of intense karst feature proliferation. Relief and concurrent hydrologic gradient exhibit high levels of doline and active sinkhole origination. In addition to geologic factors, the activity of humans can be shown locally to impact the karst systems.

**Bio:**
David K. Brezinski is the Appalachian stratigrapher and paleontologist for the Maryland Geological Survey, a position he has held for more than 30 years. He research interests include Appalachian Cambrian stratigraphy, late Paleozoic climatic oscillations, and Carboniferous trilobite paleobiology. He has been awarded the 2001 Ambassador for Science Award from the U.S.G.S., and the 2007 GSA John C Frye award for Environmental Geology. Over his career with the Survey he has published more than 250 research papers, maps, and educational circulars.

**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** pgsreservations@gmail.com, please title the e-mail as "PGS Dinner Reservation". Reservations can also be made using PayPal at our website http://pittsburghgeologicalsociety.org. Remember to leave your name and the number of reservations needed by **noon, Monday**, **March 16.**

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

## PRESIDENTS STATEMENT – March 2015

We had another full house at the February meeting at which our attendance breached the century mark yet again with Peter Hutchinson presenting his overview of the geology and tragedy of the 2010 Macondo Deep Water Horizon blowout. I wish to remind all of our members that Pete and his employees at THG Geophysics Ltd are offering a workshop on Monday March 30th on "Optimizing the Use of Geophysical Data". The seminar will be held at the Comfort Inn Conference Center in Monroeville, PA from 8:30 to 4:30 PM. Contact Kate McKinley (ksm@geo-image.com) at (724) 325-3996 for registration information. You can earn 8 Professional Development hours if you attend.

This month's speaker, Dave Brzezinski of the Maryland Geologic Survey, returns to present his work on the karst terrain in Frederick and Hagerstown Counties, Maryland. Dave has presented multiple talks to the Society over the years as well as led field trips to observe carbonate environments in the outcrop. We are glad to have him back, especially for our student members to see him present for their first time.

Speaking of our student members . . . please take the time to respond to the student survey you recently received. Over 80% of the responders so far are students from only two universities. We have numerous student members attending other universities and we want representation from all.

The Society's upcoming April meeting is the annual "Student Night", co-sponsored with the Association of Engineering Geologists and the American Society of Civil Engineers. Each organization will support one student speaker award and one poster award. I would like to remind the student members that there will also be an award presented to the best coal geology paper/presentation thanks to a generous donation from Honorary Member Maury Deul.

Since we are on the topic of Honorary Members I would like to announce that the Awards Committee, with the support of the Board, has selected Wendell Barner as the 39th recipient of Honorary Membership status in the Society. Wendell, a past officer and Board member, received the Walt Skinner Award in 2008 and was a catalyst in creating our April Student Night when he served as Program Chair not so many years ago. Congratulations!

In closing, I would like remind any potential Corporate Sponsors that has not responded to this year's request to please consider continuing your support of our 2015 initiatives. Thank you.

Ray Follador, President

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***American Society of Civil Engineers-Geotechnical Division***

Students, please consider taking advantage of an opportunity to present your research and compete in this sponsored event from PGS, AEG, and ASCE, at the 13th Annual Student Night on Wednesday, April 15 at Foster's Restaurant, #10 Foster Plaza, Green Tree. If you have been conducting undergraduate or graduate research in any geologically or geotechnically related field, here is an opportunity to show off your work to members of the three societies, and receive the benefits that go along with it. Students that present their original research grow from the experience by improving their public speaking skills, networking with professionals and experts in their fields, and even a cash award!

Abstracts of 300 words or less should be emailed to Dr. Kyle Fredrick at *kyle.fredrick@calu.edu* by **Monday, March 16, 2015** for consideration.

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

## STUDENT WORKSHOP

On Saturday, March 28, PGS is again hosting the "So You Want to be a Geologist" workshop. The workshop is geared to all students who will someday be working in a geological or geologically-related field and will focus on various subjects that are important to students. Among the subjects discussed are a) academic needs, b) professional sectors, c) licensing and ethics, d) advice for job seekers, and e) advice for new professionals.

The workshop will be held on Washington's Landing on the north shore of Pittsburgh from 9:00 to 4:00. Dress is casual and there is no charge for the workshop. Lunch will be provided by PGS.

The workshop will be limited to the first 25 students to sign up by emailing jneelan@verizon.net. Please indicate your full name, school, and year in school e.g. junior, senior. Although any current student is eligible to attend, preference will be given to those preparing to graduate should the interest exceed the limit.

Once the list of attendees is established, more information will be provided.

## NOMINATIONS & ELECTIONS

Since this is March, it is a good time to consider becoming more involved in the Pittsburgh Geological Society. Over the next several weeks the Nominations and Elections Committee will be approaching some of you non-student members who regularly, or semi-regularly, join us at our Wednesday meetings to consider a position on our Board or as an officer. We are looking to fill a ballot with qualified and energetic members by the April meeting prior to our May election.

If you have no previous experience in participating in the governing a professional society then you may want to consider vying for one of the 3 **Director at Large** positions that are filled every year by the Society. In this position you will assist the officers and committee chairs in the monthly functions of the Society. It is a great way to contribute to your Society while getting acclimated in its functions. Membership on the Board does groom our future officers. The Director at Large position is a 2 year commitment and requires regular attendance at the Board meetings held 1 hour prior to the social hour of each monthly meeting.

If you are a past officer/board member we want you to know you are always welcome to return. Previous experience is very useful at our Board meetings whether you want to come back as an officer or take the gradual approach as a board member.

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 or (724) 744-0399. A list of all candidates will be announced at the April meeting with the election to be held at the May meeting.

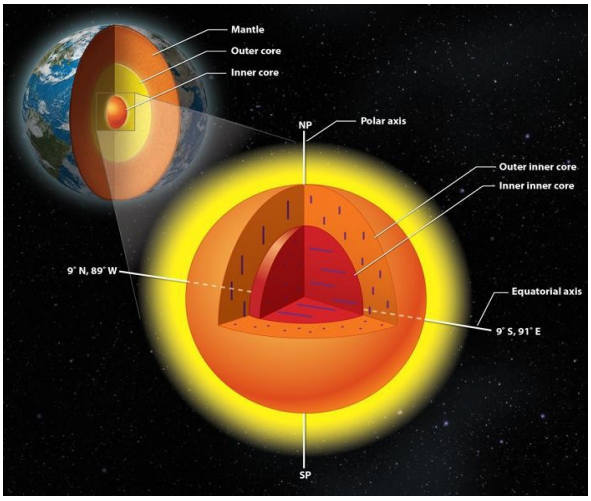
## ORIGINS OF WESTERN PA PLACE NAMES

Irwin House on Brush Hill

Irwin, in Westmoreland County, was founded in 1773 by Col. John Irwin, an Irish soldier who arrived in America in 1762 and became the commissary officer of the British Army stationed at Fort Pitt. He married the daughter of the British Commander and began buying land in 1769. One of the parcels he purchased is called Brush Hill, and the stone house he built on it still stands. He and his son John led the construction of what is now US Route 30, the Lincoln Highway, through Irwin. John the younger named the town after his father died, and it eventually was incorporated as a borough in 1864. Along the way, it became a major station on the Pennsylvania Railroad, completed in 1852, and soon became the residential center of the regional coal industry. Although the coal mining industry departed in the 1930s, construction of the Pennsylvania Turnpike brought new prosperity to Irwin, which was the original western terminus of the nation's first superhighway. Even though businesses that were located along US Route 30 no longer thrived, Irwin survived because of the Turnpike interchange.

**DID YOU KNOW . . . ?**

- A multinational research team has published an analysis of new records showing that, during the Pliocene when the global temperature was about 2ºC warmer than it is today, atmospheric $CO_2$ levels were around 350-400 ppm, similar to the levels reached in recent years. A study of the relationship between $CO_2$ levels and climate change during a warm period in Earth's history has allowed the team the ability to estimate how the climate will respond to increasing levels of $CO_2$ (called climate sensitivity). Gavin Foster, a University of Southampton (England) author of the study, said, "Our estimates of climate sensitivity lie well within the range of 1.5 to 4.5ºC increase per $CO_2$ doubling summarized in the latest IPCC report. This suggests that the research community has a sound understanding of what the climate will be like as we move toward a Pliocene-like warmer future caused by human greenhouse gas emissions." The new records also revealed that at around 2.8 million years ago, $CO_2$ levels dropped rapidly to values of about 280 ppm, supposedly causing global cooling that initiated the ice-age cycles that have dominated Earth's climate ever since.
- New research suggests that the Earth's path around and through the Milky Way Galaxy's disc may have a direct effect on geological and biological phenomena by disturbing the orbits of comets and leading to additional heating in the Earth's core, both of which could be connected with mass extinction events.
- Although a lightning bolt, some interstellar dust, a comet impact, or even an underwater volcano could have triggered the very first life on Earth, no one is sure what would have happened next. We know life can exist without oxygen, but nitrogen is essential for building genetic material, without which there would be no viruses, bacteria, or any other organisms. We used to believe the ability to use atmospheric nitrogen to support life appeared roughly 2 billion years ago, but new research looking at some of the oldest rocks on earth finds evidence that life was already pulling nitrogen out of the air and converting it into a form that could support communities 3.2 billion years ago.
- Although most of the worry about greenhouse gases in the Earth's atmosphere center around $CO_2$, methane ($CH_4$) could be a greater problem. While the lifetime of $CH_4$ in the atmosphere is much shorter than that of $CO_2$, its impact on climate change is more than 20 times greater than $CO_2$ over a 100-year period.
- An international research team of geophysicists from Illinois and China used seismic information from earthquakes to reveal that the Earth's core has a smaller core of its own. The core, which was thought to be a solid ball of iron, has some complex structural properties, including a distinct inner core about half the diameter of the core. And where the iron crystals in the outer layer of the core are aligned N-S, in the inner core they are aligned E-W. These inner-layer iron crystals also behave differently from their counterparts in the outer core layer, suggesting that the inner core might be composed of a different type or phase of crystal. Neither Jules Verne nor Edgar Rice Burroughs could have predicted these developments.



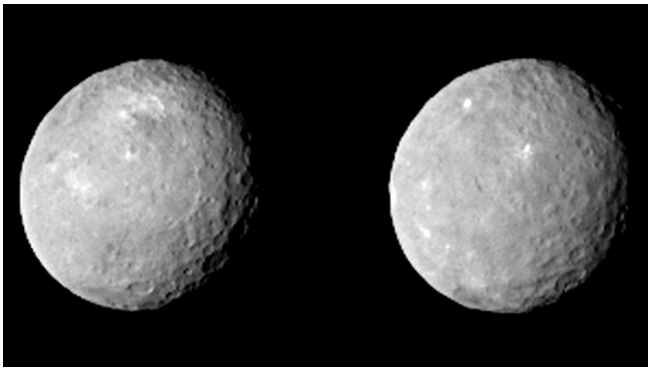

**At The Earth's Core**

- About 60% $CH_4$ in the atmosphere is emitted by human activity, but as a natural gas, billions of tons of $CH_4$ is trapped under the ocean floor in the Arctic. It's leaking, but what might not be generally known is that it has been leaking for a lot longer time than we humans have been around. In fact, $CH_4$ has been leaking for at least 2.7 million years. The Vestnesa Ridge in Fram Strait, over 0.6 miles beneath the surface of the Arctic Ocean near Svalbard, has gas flares that rise from the seabed the height of the Burj Khalifa in Dubai, the tallest manmade structure in the world.

- The production of rough diamonds is expected to hit over 135 million carats in 2015 worldwide, an increase of 3% over the 2014 production of 131 million carats, but the expected price in 2015 will be $103 per carat, about a 2% decrease from 2014.
- The eruption of Colima volcano, which is also known as Volcan del Fuego (Volcano of Fire), began in November, 2014 and has produced its first pyroclastic flows, possibly signaling the start of the volcano's most dangerous period since its catastrophic eruption in 1913. Although volcanic activity might continue in "fits and starts", the summit of the volcano is weak and, combined with the weight of newly emerging lava, could create extremely unstable conditions in two nearby villages, which have been evacuated.

**Colima Volcano**

- Penn State is looking for "citizen scientists" to help find abandoned oil and gas wells across Pennsylvania. There are thousands of abandoned oil wells scattered throughout the western half of the state that have not been properly plugged. Such wells can be a source of contamination in freshwater aquifers, contribute greenhouse gases to the atmosphere, and/or cause oil and gas reservoir problems. Finding these wells won't be easy. Volunteers will do extensive research of county and municipal documents, historical societies, and online resources to determine which areas might have been drilled, then do fieldwork looking for common signs of historic oil and gas development like abandoned pipes, tanks, pumping jacks, and metal debris. Once a well is found, volunteers will record the latitude, longitude, and elevation of the well, take photos, and record other observations. The resulting data will be reported to the PA DEP's Abandoned and Orphan Well Program. If you're interested in helping with this project, email Terry Noll at Penn State at tmg3@psu.edu, or call 814-865-6598.
- According to USGS provisional data, estimated 2014 worldwide gold production was 2.1% higher than 2013, about 3,153 tons. Of the top 10 gold producing countries, China, Australia, Russia, Canada, and Uzbekistan increased their gold output, while the U.S., South Africa, Peru, and Mexico decreased production, and Ghana stayed the same as in 2013.
- The USGS also placed an estimated value for mineral production in the U.S. in 2014 at $77.6 billion, an increase of 4.6% over the 2013 value of $74.2 billion. This was in spite of a decline in price for most precious metals. U.S. economic growth supported the domestic primary metals industry and industrial minerals industry, but weak global economic growth and the strong U.S. dollar limited U.S. processed mineral exports, which decreased to $108 billion in 2014 from $129 billion in 2013. Meanwhile, low-priced metal imports increased during most of 2014.
- New images of Ceres from NASA's Dawn spacecraft reveal craters and bright spots on the dwarf planet's surface. The images were taken February 12, 2015, from a distance of 52,000 miles above the planet and have a resolution of 4.9 miles per pixel, the sharpest views of Ceres so far. Although they beguiled Jet Propulsion Laboratory scientists, the images left them none the wiser. Chris Russell, principal investigator of the Dawn mission, said, "We expected to be surprised; we did not expect to be this puzzled." Dawn was expected to enter into orbit around Ceres on March 6. As the spacecraft delivers better images and other data, the science team will be investigating the nature and composition of the dwarf planet, including the nature of the craters and bright spots that are coming into focus.



**Two Views of Ceres**

- The oil industry is examining about 50,000 existing wells in the U.S. that might make good candidates for fracing using techniques that didn't exist when they were first drilled. New wells can cost upwards of $8 million, whereas fracing or re-fracing costs about $2 million. Although still a high price, this represents

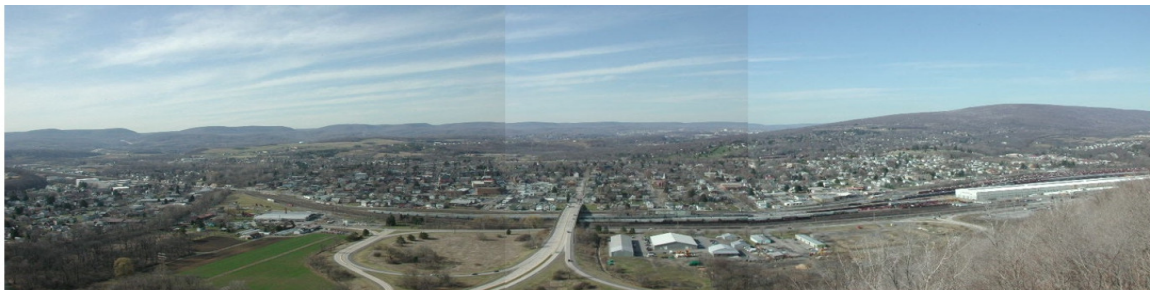
significant savings when the price of crude is around $50 per barrel. Although re-fracing led to mixed results in the past, the latest oil "bust" is forcing companies to look at using newer technologies to produce oil more cheaply from older wells. This requires looking at and analyzing data from those older wells in order to identify the best candidates for re-fracing, rather than simply picking them randomly. Now you would think hiring a bunch of geologists and engineers to go over the data would be a good idea, but unfortunately all we've been hearing about lately is the number of people being laid off because of low oil prices!!!

- On Valentine's Day this year, the Rosetta spacecraft traveled to less than 5.6 miles from the surface of comet 67P/Churyumov-Gerasimenko to get extremely high-resolution photos using the lower-resolution NAVCAM instrument. Since the comet is only 2.7 miles long and shaped like a rubber ducky that's been sitting in the sun for 4 billion years, this was a pretty low and gutsy pass.

**FUN FACT HAVING NOTHING TO DO WITH GEOLOGY:**
Old Amish trick of the trade: If you want to keep rabbits out of your garden, sprinkle baby powder on the plants. It doesn't hurt the plants, but rabbits hate the smell, and it will wash off easily.

## PGS Website of the Month

*http://www.jpl.nasa.gov/*



**View of Allegheny Mountain, the Allegheny topographic front, from above Hollidaysburg, Blair County**

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at rbottgeo@aol.com. Special thanks to all who contributed newsletter items this season*

**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. Be sure to also send an email address and phone number where you may be contacted.

**PGS Board-of-Directors**

| | | | | | |
|---|---|---|---|---|---|
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| **Other PGS Positions** | | **AAPG Delegate:** | Dan Billman | **AAPG Delegate:** | Andrea Reynolds |
| **Webmaster:** | Mary McGuire | **Newsletter Editor:** | Robert Botterman | **Historian:** | Judy Neelan |

**Officer Contacts**: If you wish to contact a current PGS Officer, please call or email Ray Follador, President, at 724 744-0399 / Geodawg@comcast.net; Kyle Fredrick, Vice President, at 724 938-4463 / fredrick@calu.edu; Judy Neelan, Secretary, at jneelan@verizon.net.

**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.pgs@gmail.com.
Membership information may also be found at our website: www.pittsburghgeologicalsociety.org.

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Kyle Frederick, Program Chair at 724. 938-4463 or email at fredrick@calu.edu.

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

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# *ANNOUNCEMENT*

# Pittsburgh Geological Society
# Spring 2015 Student Field Workshop

## Saturday April 4, 2015 California University of Pennsylvania
## Time: 9 AM to Late Afternoon

The Pittsburgh Geological Society once again invites students of geology & engineering geology to attend the 11th installment of the "Student Field Workshop."

Have you wondered what you might be doing on that first job? Chances are, at some point, you'll be involved with drilling operations of some sort. This is your chance to learn about this process. You will have the opportunity to work alongside an experienced drilling contractor and field-wise professionals. The Workshop will be supervised by professionals in the industry, so not only is this an excellent learning opportunity, it is your chance to ask all those questions regarding life after college. Brush up on those networking skills and get your questions ready!

What will you learn?

Soil sampling using a drill rig
Soil & Rock descriptions
Basic sampling techniques
Well installation basics
Basic monitoring equipment
Designing a drilling program

The cost to you?

Due to rising fuel costs we need to charge a nominal fee, but lunch is included:

- PGS Student Members: $ 20.00
- Non-PGS Members: $25.00

Payment instructions will be provided upon registration.

PLEASE CONTACT US TO SAVE YOUR PLACE!!!

As with all field work, this will be a *RAIN* or *SHINE* event. So watch the weather forecast carefully and prepare yourself. The drilling process can be dusty, wet, and muddy -- so leave the designer jeans and open-toed shoes behind.

We do ask that you be an active student – please no corporate trainees.

**Registration is limited – so sign up ASAP.**

**To Register - Contact: Frank Benacquista, PG at: fbenacquista@kuresources.com**

# PGS Newsletter

http://www.pittsburghgeologicalsociety.org/

| Vol. LXVII, No. 8 | Robert Botterman, Editor | April, 2015 |
|---|---|---|

**Wednesday, April 15, 2015**

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

# 13th ANNUAL

# STUDENT NIGHT

**Oral Presentation Sponsored by Pittsburgh Geological Society**

## Using Sequential Kinematic and Thermochronometric Modeling to Temporally and Spatially Link Thrust Belt Exhumation With Basin Development in The Bolivian Fold-Thrust-Belt-Foreland Basin System.

***Adam Rak, University of Pittsburgh***

Applying isostasy and erosion to sequentially deformed balanced cross sections links the growth of hinterland structures to the developing foreland basins (FB) adjacent to fold-thrust belts (FTB), adding geologic constraints to modeled exhumation pathways. We sequentially deform the Rio Beni cross section in northern Bolivia (McQuarrie et al., 2008) with kinematic modeling software Move. In our model, topography evolves and basins develop for each model step as deformation, erosion, and isostasy are applied; and are a direct function of the geometry and kinematics of the cross section. The model is constrained by the depth of the foreland and hinterland basins, geology present at the surface, the depth and angle of the decollement, and the shape of the modern observed topography. Topography develops as thrusting occurs and loads the crust, producing a flexural wave and creating accommodation space in adjacent basins. Erosion of material above a newly generated topographic profile unloads the section while basin space is filled. Once the model sufficiently duplicates geologic constraints, a 0.5 km X 0.5 km grid of unique points is deformed with the model and used to determine displacement vectors for each 10 km shortening step. These displacement vectors, in conjunction with a prescribed time interval for each step, determine a velocity field that can be used in a modified version of the advection diffusion modeling software Pecube. Cooling ages predicted using this method are based on deformation rates, geometry, topography, and thermal parameters, and offer insight into possible rates of deformation, erosion, and deposition throughout FTB and FB development. Incorporating erosion, deposition, and isostasy in sequentially deformed balanced cross sections highlights the spatiotemporal aspects of sedimentary wedge propagation, identifies necessary external negative buoyancy affects, and provides additional geologic constraints to modeled exhumation pathways.

**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** pgsreservations@gmail.com, and please title the e-mail "PGS Dinner Reservation". Reservations can also be made using PayPal at our website http://pittsburghgeologicalsociety.org and leave your name and number of reservations needed by **noon, Monday**, **April 13. Meeting will be held at Foster's Restaurant, Foster Plaza Bldg 10, Green Tree.**

**Oral Presentation Sponsored by the Association of Engineering Geologists**

## Landslide Inventory and Susceptibility Mapping of Driftcreek Watershed, Lincoln County, Oregon, Using LiDAR Data

**Sebastian Dirringer, Kent State University**

Excessive sedimentation, turbid waters, and stream warming of the Driftcreek Watershed, Lincoln County, Oregon is of concern to the Oregon Department of Environmental Quality (DEQ). Several state and federal agencies collected light detection and ranging (LiDAR) elevation data in 2011 in order to map impaired areas for landslides and their susceptibility to future landslide hazards. A total of 473 landslides have been located in the Driftcreek Watershed, through applications of the geographic information system (GIS), including digital elevation models (DEM) derived from LiDAR data and planimetric maps. Each mapped landslide was characterized by the type of movement, head scarp height, slope, failure depth, relative age, and direction. A portion of the total landslides mapped using LiDAR data were field checked to ensure mapping accuracy. Rock and soils samples were taken to the lab to quantify the engineering properties of the region's geologic formations. The results of this study include a detailed landslide inventory map and a susceptibility map, which identifies areas of potential future landslides. Effects of timber harvesting practices are profound in this study area, impairing both hydrological and ecological regimes. Logging roads are in most cases not engineered to prevent erosion, cutting across toes of landslides and applying large live loads to crests of slopes. This study found that in this watershed, landslides directly impair 22% of streams and 14% of roads. All of the streams in the study area flow into the Alsea River, which ultimately discharges into the Pacific Ocean. The Alsea River Bay area is a major salmon spawning area, which has greatly suffered from increased logging activity over the past century.

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

## Impacts to Water Quality, Tenmile Creek, Washington County, PA

**Dominic Decesaris, California University of Pennsylvania**

Washington County, located in Southwestern Pennsylvania, is characterized by steep-walled stream valleys and rolling ridgelines. The region has active agriculture and has seen significant development, but is especially known for the recent boom in shale gas extraction as well as legacy coal mining. Beginning in 2011, the Washington County Watershed Alliance, in collaboration with California University of Pennsylvania and other county stakeholders, began monitoring streams in the county to ascertain current water quality and identify emerging and potential threats to water resources. Twenty-two dataloggers were installed throughout the area in streams of varying sizes. Tenmile Creek, which is mostly in the southeastern portion of the county and forms part of the southern county boundary, is host to four of these loggers. Two were placed in the main stem and one each in two separate tributary streams. The dataloggers measure conductivity and water levels in fifteen-minute intervals. Results from continuous readings over the past three years show that stream conductivity data vary predictably in response to precipitation. During the period of observation, conductivity readings decreased immediately following significant rainfall events, but quickly rebounded to levels higher than those before the rainfall. This was followed by a slow decline and then a steady rise until the next precipitation event. Legacy surface and underground mining is likely contributing saline water as these areas are flushed when underground spaces fill. However, evidence suggests that flushing of nearby land surfaces may be the more important contributing factor, as salts are carried by overland flow to the stream. The greatest increases in conductivity are seen at the site with NO mining in the immediate area, but with active farming and shale gas activity, and legacy quarries. This suggests that overland flushing of disturbed lands may play a larger role in water quality. These saline pulses are cause for concern since many of the county's streams are above suggested values for healthy streams (150-500 µs/cm). These spikes can drive conductivity values as high as 800-900 (µs/cm) for up to a few days at a time.

## POSTER PRESENTATIONS:

**Sponsored by Pittsburgh Geological Society**

### Kinematic Indicators of Shear and the Role of Volcanic Pressurization at the Heart Mountain Detachment

*Matthew V. Magill, Indiana University of Pennsylvania*

The Heart Mountain Detachment (HMD) is an enigmatic feature of the northwestern Wyoming landscape. An allochthon encompassing 3400km$^2$ slid 40-50km in a southeast direction across the land surface that dipped <3$^o$. Failure was initiated in the Ordovician Bighorn Dolomite and a method of emplacement is still in question. Previous work suggests movement was coeval with Absaroksa (Eocene) Volcanism causing volcanic pressurization at the detachment surface. This mechanism demonstrates that gravity rather than tectonic influences are responsible for reducing the normal stresses allowing for frictional sliding of the allochthon. My work aims to address volcanic pressurization and how evidence for this is observed in the structural fabrics at the HMD. Thin section and SEM-EDS backscatter analyses indicate a carbonate rich matrix with numerous diopside phenocrysts, fragments of volcanic glass, opagues, and some muscovite. Pearl white, <1cm, sub-angular to sub-rounded grains are believed to be a dolomitic marble that formed from thermal metamorphism as a result of volcanic pressurization. Further analysis is aimed at defining kinematics and structural geometries for the shear zone. Other observations may include authigenic pyrite being formed and fabrics that display similarly sized grains accreting to become either larger sized grains or very fine microbreccia matrix.

### Influence of Salt Tectonics on Seafloor Morphology from Algeria to Sardinia

*Julia Yeakley, Kent State University*

Central Mediterranean salt distribution is not accurately nor precisely mapped. Examination of previously collected marine geophysical data, from the proposed Galsi pipeline route, allows detailed analysis of salt distribution and associated seafloor deformation. The southern section of the route crosses continental shelves and slopes of Algeria and Sardinia, as well as the Balearic abyssal plain of the Western Mediterranean. Geologically, the route crosses the convergent African/Nubian–European plate boundary, along the edge of the Algerian continental shelf, as well as areas of deeply buried Messinian- age salt. With salt's unpredictability, inability to compress and tendency to flow, stresses forming diapiric structures are not well defined. Performed analyses determined the distribution and influence of salt tectonics (halokinesis) on seafloor morphology and the nature of associated diapiric structures developed in compressive plate boundary as well as passive margin environments.

Seismic reflection sub-bottom interpretations with age-dated core samples quantified sediment displacement rates caused by salt movement along the seafloor. Influence of salt domes on seafloor morphology and slope stability correlated tectonic identification of faults, folds, domes, depressions and seafloor features such as pockmarks and failure deposits. Interpretations of seismic profiles, generated using SeiSee, identified geometry, distribution and associated features of salt-related structures.

Identification and quantification included amount, timing and style of deformation related to salt tectonics. Deep and shallow seismic profiles depicted faulting and evidence of mass wasting events that appear to be associated with underlying salt movement. Digital elevation maps combined with Surfer correlated high and ultrahigh seismic lines and locations of salt-related structures. Age-dated core samples provided amount of deposition within given amount of time, determining sedimentation rates. Measured and plotted offsets from seismic profile against predicted sediment age at depth of offset, projected rate of movement (estimated as low as 2 cm per thousand years near the Cagliari Slope).

**Sponsored by the Association of Engineering Geologists**

### Rock Mass Characterization and Stability Evaluation of Mount Rushmore National Memorial, Keystone, South Dakota

*S. Lindsay Poluga, Kent State University*

The stability of Mount Rushmore National Memorial (MORU) is of great importance. The National Park Service is interested in the effect of vibrations on the sculptures associated with July 4th fireworks. The impact of vibrations on the sculptures will depend on the response of discontinuities traversing the memorial. This research focuses on the following at MORU: (1) rock mass characterization using both the Rock Mass Rating (RMR) and Q-systems, (2) determining the engineering properties of the rock, (3) evaluating the potential modes of slope failure, and (4) conducting a preliminary evaluation of any displacements along the discontinuities caused by fireworks.

Discontinuity data regarding geometry, continuity, spacing, surface irregularities, aperture, infilling material, water, and degree of weathering were

collected at MORU. Two schist and four granite rock blocks from MORU were cored and tested for unconfined compressive strength, tensile strength, absorption, specific gravity, density, and friction angle. The average compressive and tensile strength values (psi) are 4,839 and 344 for granite, and 8,403 and 722 for schist. Average values of absorption, bulk specific gravity, density, and friction angle are 0.9%, 2.58, 162.9 lb/ft3, and 41° for granite, and 1.1%, 2.66, 172.4 lb/ft3, and 40° for schist. Phase relations were used to determine the following porosity and void ratio values: 2.3% and 0.023 for granite, and 3%, and 0.031 for schist.

Discontinuity data was used to determine the principal joint sets and the RMR's. Granite has two principal joint sets (A: 83°/322°, B: 78°/254°), whereas schist has four principal joint sets (A: 79°/317°, B: 65°/261°, C: 36°/075°, D: 78°/290°). The RMR for granite ranges from 60–65 (good rock), and from 57–70 (fair to good rock) for schist. Work in progress includes a kinematic analysis for MORU, determining the principal joint sets of the sculptures using LiDAR, and an evaluation of the global stability of the rock mass at MORU.

## Landslide Inventory and Susceptibility of West Prong Little Pigeon River Watershed, Great Smoky Mountains National Park

***Matthew Marinelli, Kent State University***

This study was undertaken to assess landslide susceptibility of the West Prong Little Pigeon River (WPLPR) watershed of Great Smoky Mountains National Park (GSMNP). The WPLPR watershed is one of the most visited areas of the park, and covers an area of 35 square miles that includes Newfound Gap, Mt. LeConte, and Route 441. The WPLPR watershed, is known for rainfall-induced debris flows. The specific objective of this study was to produce maps identifying potential landslide-prone areas in the WPLPR watershed. The study was performed by first creating a landslide inventory map consisting of landslide crests as points and landslide pathways as polylines, using Geographic Information System (GIS) and Light Detection and Ranging-based interpretation, aerial photograph analysis, field observations, and literature. The landslide inventory map was then used as a calibration tool for a logistic regression model to predict landslide susceptibility, based on geologic, hydrologic, and structural factors of the watershed obtained from the Integration of Resource Management Applications website for both the presence of landslide crests and pathways. This model reduced the 23 total individual factors to those with the highest correlation, which included eight for landslide crests (aspect, distance to basin, geology, liquid limit, plastic limit, distance to pour points, rain, and distance to streams) and seven for landslide pathways (depth to bedrock, geology, K saturation value, land use, liquid limit, plastic limit, and distance to streams). The landslide susceptibility maps contain areas of very low, low, medium, high, and very high landslide susceptibility. This study will provide a better awareness of the risk associated with landslide occurrence and susceptibility in GSMNP, thereby aiding visitors, helping park staff, and providing a basis for future research. These maps will also serve as a template from which further maps can be made of the entire GSMNP.

**Sponsored by American Society of Civil Engineers**

## A Geotechnical Investigation of the 2013 Fatal Rockfall in Rockville, Utah

***Carl J. Jacklitch, Kent State University***

In December 2013, a rockfall occurred in Rockville, Utah, where an estimated 2700 tons of material, released from a slope, fell on a house, resulting in two fatalities. The main objective of this study was to assess the hazard potential of the slope throughout the city and identify the sections that were most susceptible to rockfalls as well as other modes of slope failure. This was accomplished through detailed field and laboratory investigations of four sites along the slope, which extends through the town of Rockville. The geology of the slopes was investigated and the discontinuities of the resistant rock units were mapped with respect to the seven aspects of discontinuities. Random and window methods were used for the mapping of the discontinuities. The investigation of the geology involved the identification of the potential pathways that future rockfall debris may follow and an assessment of the site stratigraphy. Samples were collected and brought back to the laboratory for determining Atterberg Limits, bulk dry density, weathering potential through the slake durability test, and internal angle of friction using the Stimpson method. A Stereonet analysis was conducted to determine the principle joint sets within the resistant units for use in the kinematic analysis with the Dips Software. The Rocfall Software was used to determine the maximum rollout distance for various size blocks for the re-evaluation of the current hazard map. The results of the kinematic analysis and field observations indicated that wedge, planar and toppling failures are possible at the field site. The current hazard map appears to be on the conservative side based on preliminary results of the Rockfall analysis. The best remedial measures may include wire mesh nets and rock bolts/anchors, and avoidance of the hazardous slopes.

## Glacial Till Prospecting in Southwest Ohio: Implications for Improved Sampling

*Dylan J. McKevitt, Cedarville University*

Glacial till (drift) prospecting has served a major role in corporate mineral exploration, especially for gold and diamond during the past 30 years. It involves analyzing heavy indicator minerals from bulk sampling of various glacial deposits in order to track up ice flow direction to the potential orebody (such as a kimberlite pipe or Cu-Ni deposit), a technique commonly used in Canada but not in the U.S. Heavy minerals including diamond, gold, and native copper have been found in Ohio glacial till; the provenance of these heavy minerals is the Precambrian bedrock north of Ohio. This study utilized standard procedures in sample collection and analysis (sieving, concentration by gold-panning, heavy liquid separation with lithium metatungstate, carbonate dissolution, magnetic separation and microscopy) with seven samples from a kame of the Late Wisconsinan glaciation in northeastern Greene County, southwest Ohio. Coarse to very coarse sand (2 - 0.5 mm) and fine to medium sand (0.5 - 0.125 mm) fractions from each bulk sample were analyzed for heavy minerals and felsic (quartz and feldspars) concentration. The goal was to determine variability in heavy minerals and felsic component concentrations across samples and between grain-size fractions, in order to suggest improved sampling and analysis techniques.

Heavy indicator minerals found include garnet species, pyrite, zircon, rutile, ilmenite, and an assortment of scarcer minerals. A probable provenance is the Precambrian metalliferous conglomerates of the Huronian Supergroup (north shore of Lake Huron) along with other Canadian Precambrian strata. Comparison of heavy minerals between grains sizes and statistical analysis of the felsic component across samples and grain-sizes suggests improved till sampling procedures.

**Each Society has agreed to award the oral speaker a $100 prize and each poster presenter will receive $50 from the associated society.**

## Additional Poster Presentations

## Bank Erosion and Stability Monitoring of Pike Run and its Tributaries, Washington County, PA

*Steven Hensel (CalU)*

Pike Run is a small stream in southwestern Pennsylvania, draining into the Monongahela River from Washington County to the west. Though flows in the stream are typically low and calm, the watershed responds quickly to rainfall events and rapid snowmelt. Steep valley walls, thin, clay-rich soils, and shale-rich bedrock cause Pike Run and many streams of the region to rise rapidly during and after storms. The result of these flashy discharge events is excessive erosion, especially along meandering segments. High-intensity, short-duration flow conditions, such as those resulting from rapid snowmelt or extreme precipitation events, result in a greater volume of eroded material, exacerbating natural migration of stream meanders, compromising existing land use and infrastructure. Landslides and compromised bridges, retaining walls, and culverts are common in the watershed as a result of focused erosion in the stream. The intent of this research is to test the use of erosion pins as a viable method for quantifying sediment loss. Once the threaded steel rods were inserted into the selected meander bank, they were monitored weekly to gauge the loss of soil from the bank. The observed loss will then be compared to a prediction calculated using BSTEM. After comparison, both the observed and modeled loss amounts were considered reasonable, thus both the erosion pin method and BSTEM should be considered as a viable means to help predict, quantify, and ultimately reduce soil loss from stream banks.

## The Effect of Water Content and Density on Strength and Deformation Behavior of Clay Soils

*John Malizia (Kent)*

Clays are used widely in sanitary landfills, embankment dams, highway embankments, hydraulic barriers, and foundations. In most of these applications, clays are compacted at maximum dry density (MDD) and optimum water content (OWC). Density and water content have a profound effect on the strength and deformation behavior of compacted clays. However, this effect has not been quantified in detail, especially the water content at which transition from brittle to plastic behavior occurs for low, medium, and high plasticity clays. The objective of this research was to find the transition water content and investigate the effect of varying water content and density on the strength and deformation behavior. Six samples each of low, medium, and high plasticity clay were compacted, three on the dry side and three on the wet side of OWC, to establish their compaction curves. The compacted samples were failed axially under unconfined compression and were visually inspected to determine the water content at which transition occurred between brittle and plastic deformation. Additionally, three samples of each type of clay were compacted at different water contents and failed using the direct shear test. The stressstrain curves from this

test were also used to determine the transition between brittle and plastic behaviors. The MDD values for low, medium, and high plasticity clays were 103pcf, 94pcf, and 89pcf, with the corresponding OWC values of 21%, 26%, and 27%, respectively. The compressive strength for the low, medium, and high plasticity clays were 50psi, 60psi, and 59psi, respectively. The unconfined compressive strength first increased with increasing water content and then decreased within 3% of OWC for each type of clay. The high plasticity clay had the highest cohesion while the low plasticity clay had the highest friction angle. The transition between brittle and plastic behavior for the low, medium, and high plasticity clays occurred between 19-20%, 29-30%, and 30-32% water content, respectively.

## Determining Provenance of Glacial Material in Southwestern Ohio

***Jorie Krob (Cedarville Univ.)***

During the last glacial maximum, ice moved south from Canada to cover much of the northern United States. This included the northern and western portions of Ohio. As the ice migrated it picked up Canadian bedrock which it transported and then left in Ohio when the ice retreated. The goal of this project was to determine the provenance (the source of origin) of the glacial material that is located in Greene, Clark, and Champaign Counties in Ohio. To determine where in southern Canada the material in these counties came from, this project included literature review into the glacial history of both Ohio and southeastern Canada and review on the stratigraphy of southeastern Canada. Pebble, cobble, and boulder sized fragments were evaluated from two surface mines, one kame (glacial deposit), and several glacial erratics in the three counties. Combining the stratigraphy of southeastern Canada found though the literature review and the sample analysis results, a map showing the source of the glacial material, direction of ice flow, and material destination has been created in ArcGIS.

## 2014-15 Assessment of Lake Depth in Cedar Lake: A Comparison to the 2012 Study

***Samuel Rice (Cedarville University)***

In the fall of 2012 the Cedarville University Environmental Geology class conducted an exercise which produced a bathymetry map of Cedar Lake. The methods of data collection were crude, yet the end result was a map that depicted a reasonable lake-bottom configuration. Two years later during the fall of 2014 a second set of data was collected using the same methods that were utilized in 2012. Changes in lake volume and differences in contour configuration from 2012 to 2014 were determined using the Surfer 8 software package. For any lake, significant changes in volume can be an indicator that there has been is a steady influx of sediment which is accumulating on the lake bottom. According to the data collected in 2014 at Cedar Lake, as compared to that from 2012, there was a small drop in lake volume which is possibly due to some sediment accumulation. Considering that there was no known earth disturbance near the lake or in the source-water area which could have contributed to a sediment influx, the likelihood of lake-volume reduction due to infilling is considered small. Other possible reasons for the difference in volume were examined. Ideally this lake-depth assessment would be repeated every two years for a minimum of ten years to observe potential long term sediment influx. Rate of infilling is a condition that needs to be understood in order to address both the short and long term health of the lake. The economic consequences may be minor or significant depending on the findings.

## Seasonal Conductivity Changes in the Washington Formation Aquifer in Washington, Pennsylvania

***Trevor Dujmic (CalU)***

Conductivity values (µS/cm) are a commonly measured parameter in any potable water supply in order to ensure proper water quality. In Washington County, Pennsylvania 63 residential wells were monitored daily for a wide variety of bulk parameters including conductivity, as well as many specific ones. Conductivity values were averaged per week and results show an increase during summer months, May through August. Conductivity values changed an average of 60 µS/cm to 80 µS/cm throughout the year. Interpolated maps of the county showed a clear trend in temporal changes at the monitored sites. Known surface-to-screened interval distance within the wells was used to determine from which aquifer these wells were drawing. Maps of screen depths and lengths suggest the Washington Formation Aquifer is the utilized aquifer, verified by its suitable characteristics for residential use. The seasonal changes in conductivity are likely caused by increased water use from residential and municipal wells in the warmer months relative to the reduced use in the colder months. Several factors contribute to increased water use in the summer, including irrigation for agriculture, lawn- and landscape watering, and a variety of other residential demands.

## Buildup and Infill Rates of Sediment Behind Cedarcliff Falls Dam

***Tyler Dix (Cedarville University)***

Cedarcliff Falls Dam is a small man-made masonry dam that was constructed around 1869. The dam impounds a pool of water that is a half-mile long on

Massie's Creek near Cedarville, Ohio. This project's goal was to ascertain the infill rate and character of the sediment that had built up since 1869. The field work involved the measurement of water depth through the length of the pool in order to create a bottom-contour map. In addition, the sediment type was examined throughout the pool. This work was accomplished by use of a boat, stadia rod, handheld GPS unit, and a Ponar grab sampler. The contour map was created, and the volume of water in the pool was calculated, using Surfer 8 software. Sediment type was determined by "feel" with the stadia rod and by collecting samples with the Ponar grab sampler. Historical information is lacking for determining sediment influx from significant past hydrologic events. Potential sediment sources feeding the pool include agricultural and construction derived materials, and normal-natural and flood-natural materials. The bottom of the pool has an undulating character along its course and varying sediment types. The deepest area found was twenty-three feet and the shallowest was five feet. The upstream lithology is predominantly dolomite, but the entire area is overlain by glacial drift. The irregular distribution of sediment types seems to be associated with the nature of the creek bank at any particular location. Depth variation within the pool appears to be associated with the width of the channel, with depth being inversely correlated to width. Results from this study could affect land use planning around the creek and could also influence the assessment of the long-term viability of the dam.

## Relationship of Surrounding Geology to Well Recovery Properties for Selected Cedarville University Water Supply Wells

***Kaitlyn E. Sturm (Cedarville University)***

This study was conducted to ascertain the relationship between geology and the recovery rate of three selected Cedarville University water supply wells. An analysis of the rate of recovery of the wells in the well field will allow for a better understanding of the well's overall performance. It will add to the existing data base of well information for Cedarville University. The three selected wells were individually pumped down and then water level measurements were taken in order to determine the rate of recovery. The collected data was analyzed and compared to the drillers' well logs and tests that were conducted at the time the wells were drilled. Analysis of the data was conducted with the use of an illustrator program in conjunction with the information from the drillers' logs and the recovery data collected. I have created a visual representation of the connection between the recovery and the geology. Three illustrations have been created using this method, providing a correlation assessment for all three wells. The drillers' logs were provided by the university. In addition, other published geologic information for the area were utilized and provided further information as to the relationship of the surrounding geology and the recovery rate.

## Comparison and Resolution of Differences in Stream Discharge Values at NWIS Sites in the Upper Little Miami River Basin, Ohio

***Matthew Cheney (Cedarville University)***

Flow measurement in a small to moderate size stream for the purpose of determining a flow velocity to calculate discharge at a particular site can be done using very simple to very sophisticated techniques and equipment. However, the simpler techniques leave a lot to be desired in terms of accuracy because the materials to be used have never been standardized. The simplest method of determining a stream's velocity involves measuring how long it takes a floating object to move a measured distance down a particular reach of the stream. The problem is that all floating objects do not behave the same in the same stretch of a stream. A standardized floating object that can yield reproducible flow velocities for calculating discharges which accurately match the discharge numbers reported from USGS gaging sites would be a noteworthy advancement for both educational and practical purposes. This project attempted to find that ideal floating object by comparing calculated discharges on Massie's Creek and Little Miami River in southwestern Ohio to the reported discharges coming from USGS stream gaging sites on those two streams. The likelihood of finding that perfect floating object is slim, thus a correction factor can be applied to the floating object velocities or calculated discharges in order to match the discharges as reported by the USGS. The "best" object is the one that is not affected by surface or subsurface environmental conditions (entrained leaves, wind, etc.) and that provides consistent results as determined by multiple trial runs. This study found such an object.

## PRESIDENT'S STATEMENT – APRIL 2015

The current Society year has been a high water mark for student attendance and participation so it is of no surprise that we have had a record number of students submit abstracts for our April Student Night. For over a decade the Student Night has been a joint meeting co-hosted by the American Society of Civil Engineers (ASCE), the Association of Engineering Geologists (AEG), and the Pittsburgh Geological Society (PGS) with each organization selecting a "top" student presentation that best fits their society's geologic purpose. These three students receive a monetary award and, more importantly,

are given a spot at the podium to provide an oral presentation of their research. Each organization also selects its own second and third place presenters who also receive monetary awards as poster presentations. At this time I would like to congratulate all of the winners and recognize all 17 students, and their universities, who put forth the effort to participate this year. They are as follows; Matthew Cheney (Cedarville University), Dominic Decesaris (California University of PA – 1st Place ASCE), Sebastian Dirringer (Kent State University – 1st Place AEG), Tyler Dix (Cedarville), Trevor Dujmic (CalU), Steven Hensel (CalU), Carl Jacklitch (Kent – 2nd Place ASCE), Jorie Krob (Cedarville), Matthew Magill (Indiana University of PA – 2nd Place PGS), John Malizia (Kent), Matthew Marinelli (Kent – 3rd Place AEG), Dylan McKevitt (Cedarville – 3rd Place ASCE), S. Lindsay Poluga (Kent – 2nd Place AEG), Adam Rak (University of Pittsburgh – 1st Place PGS), Samuel Rice (Cedarville), Kaitlyn Sturm (Cedarville), and Julia Yeakley (Kent – 3rd Place PGS). I encourage ALL of the students to display their poster presentations at this month's meeting so all of our attending membership can engage with your research.

In closing, I would like to recognize and thank Range Resources–Appalachia LLC as our most recent returning corporate sponsor. The Society truly appreciates all of our corporate members. Without their backing we could never accomplish all of the initiatives of the Society.

Ray Follador, President

## CARNEGIE SCIENCE CENTER 76th PITTSBURGH REGIONAL SCIENCE AND ENGINEERING FAIR, MARCH 27, 2015 PGS AWARD WINNERS

The Pittsburgh Geological Society is pleased to announce the winners of our awards at the Carnegie Science Center Pittsburgh Regional Science Fair held on March 27, 2015 at Heinz Field. The PGS has been a long time sponsor of awards at the Science Fair. The PGS sponsored two formal Science Fair awards. This year, both award winners were in the 6th Grade Junior High Division. In evaluating student projects, the PGS judges considered the relevance of the project to the core scientific disciplines represented in the PGS, the manner in which the student followed the scientific method in the experimental design, conduct, evaluation of the results, and overall knowledge of the subject. The PGS judge was Steve McGuire. This year there was a happy dilemma where all Divisions had multiple excellent projects that directly addressed geology, geochemistry, the geologic basis of environmental problems, and earth materials.

A Junior Division award was presented to Annabelle Butts from Brackenridge, PA who is in the 6th grade at Our Lady of the Most Blessed Sacrament in Natrona Heights. The title of Annabelle's project was "Why Did Pangea Break Apart". During the interview, Annabelle started off by describing the work of Alfred Wegner and his theory of continental drift (now more correctly known as plate tectonics). The purpose of Annabelle's project was to demonstrate how the continents moved through time from the original Pangea configuration to the present. This was done by constructing a model board with peg holes to position wood-block cut-outs of the continental shapes. For her presentation, she positioned the continents appropriate for each succeeding geologic period. Particularly impressive for 6th grade was her knowledge of the various concepts involved with her presentation. Annabelle's teacher-mentor was Lisa Slough.

A Junior Division award was presented to Meghna Behari of Franklin Park, PA. Meghna attends 6th grade at Marshall Middle School in the North Allegheny School District. The title of Meghna's project was "Environmental Impacts of Gas Drilling in Pennsylvania". For her study, Meghna selected two gas well discharge locations on Blacklick Creek and Ten Mile Creek. The objective was to compare water and sediment quality at one site upstream and two sites downstream of each discharge location. Samples were submitted to TestAmerica and University of Pittsburgh for analysis. Pennsylvania DEP provided project mentoring assistance. Meghna's project display board and presentation was excellent, worthy of a Senior Division project. The project notebook was neat and detailed. Meghna was able to speak confidently about all aspects of her project and findings. Her teacher-mentor was Dan Williams.

## FUN FACT HAVING NOTHING TO DO WITH GEOLOGY:

If you think YOU are paying the IRS too much on April 15, just consider this: Warren G. Harding, the first U.S. president to file an income tax return, paid $17,990 on his "executive salary" of $75,000 in 1923, a whopping 24% tax.

## PGS Website of the Month

*http://www.livescience.com/45214-east-coast-youngest-volcanoes-virginia.html*

*If you have news items you would like included in the PGS newsletter, please send them to Bob Botterman at rbottgeo@aol.com. Special thanks to all who contributed newsletter items this season.*

**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. Be sure to also send an email address and phone number where you may be contacted.

## ORIGINS OF WESTERN PA PLACE NAMES


**Old post card view of Tunungwant Creek in Bradford, PA during the early years of the drilling boom in Bradford oil field**

Tunungwant Creek (pronounced *tune-an-gwant*), which the locals call Tuna Creek, rises out of McKean County south of Bradford, and runs north through Bradford and into the Allegheny River near Carrollton, Cattaraugus County, NY. The commonly accepted origin of the name Tunungwant is from the Senecan language meaning "crooked creek". But according to Leeson's 1890 History of the Counties of McKean, Elk and Forest, Pennsylvania (Chapter 1), an early unpublished manuscript on the origin of creek names claims the name derives from the Senecan *tunuau,* meaning "big", and *gnant,* meaning "frog". Chapter 10 in the same volume, however, states that the creek derives its name from the eddy where the Tuna runs into the Allegheny, which the Senecas called *Ichunuagwant*, meaning "Big Cove with Large Mouth". Whatever its name means, Tuna Creek is important in the history of oil because much of the early drilling and production in the world's first giant oil field, Bradford oil field, took place in the creek valley.

## DID YOU KNOW . . . ?

- An ambitious experiment called EarthScope has produced a scan of North America that is giving researchers a sharp view of all sorts of geological structures beneath the surface of the U.S. Launched in 2004, EarthScope uses hundreds of portable seismometers to scan the country from California to Maine (it will eventually scan Alaska as well). Researchers have used the collected data to build a detailed, 3-D map of the Earth's upper mantle, which is both a force that influences what happens at the surface and a time capsule that preserves the history of tectonic plates movements and collisions. So far, EarthScope has revealed new details about the geology of the western and central U.S., such as the shape of the magma plume beneath Yellowstone National Park. Researchers hope to use EarthScope to solve numerous mysteries, such as why there are a handful of Eocene volcanoes in Virginia, when no other volcanic features had formed on the east coast of North America since the Late Triassic/Early Jurassic. It turns out that the mantle beneath the east coast isn't as cold and dense as one might expect on a passive plate margin. There are alternating zones within the mantle where earthquake waves change from fast-moving to slow-moving speeds and back, quite different from the more uniform mantle under the old and tectonically stable central U.S. Researchers discovered that two of the sites where seismic waves suddenly slow down match up with geological features on the Earth's surface: 1) the central Appalachians, centered directly below the Virginia volcanoes; and 2) a location in the northern Appalachians that lines up with a feature called the Great Meteor hotspot track in Canada, a chain of progressively younger volcanoes that starts in Canada and stretches out into the Atlantic Ocean.

**Trimble volcano, one of the youngest volcanoes on the east coast of North America**

- Although science has long suspected that the hippopotamus and the whale had a common ancestor, large gaps in the fossil record kept them from confirming that evolutionary connection with any degree of conviction. Whales have a long and well-established fossil record, but fossils of recognizable hippos go back only 20 million years or so when what we now recognize as a hippopotamus evolved. Only DNA analyses could confirm the relationship between the two groups of mammals. A new study, however, reports the discovery of a new species from the Miocene of Kenya, called *Epirigenys lokonensis,* whose molars establish it as an ancestral hippopotamus. The team that discovered the new critter used the molars to imagine what a hippo ancestor might look like, and then went searching for the remains based on that. The results of their findings confirm that hippos and whales are related.
- The year 1610 seems to have been the time in geologic history when humans began to dominate the planet by changing the landscape, atmosphere, and oceans according to a new study by researchers at the University College of London. 1610 supposedly was the year atmospheric $CO_2$ stopped declining following the Ice Age. It was also

when the exchange of floral and faunal species, from crops and cattle to ornamentals and rabbits, brought about an irreversible change in the biosphere through European colonization of most of the world's continents.

- A "supertide" turned France's famed Mont Saint-Michel into an island one day in March, then retreated to the delight of thousands of visitors who came to see the rare phenomenon. The so-called "tide of the century", which actually happens every 18 years, rushes in and out along the whole northern French coast, it's especially dramatic at Mont Saint-Michel, an ancient abbey normally linked to the mainland only by a narrow causeway at high tide. While the supertide, which rises at the pace of a horse's gallop, turned the Mont briefly into an island, the low tide that day allowed people to walk on what otherwise would have been the expansive flat seabed.

**Mont Saint-Michel, France, at supertide.**

- It has long been known that cosmic dust, falling like rain on Earth, has had a profound influence on the planet and its life. For example, debris from comet tails, meteorites, and the collision of asteroids effect our atmosphere by helping form clouds. Such cosmic dust also helps fertilize the oceans, leading to algal blooms. A new study by a team of scientists from the U.S. and Great Britain estimates that about 60 tons of cosmic dust falls to earth every day. The effects of this "invasion" are only beginning to be understood.
- When sea water freezes, most of the salt is contained in pockets of liquid that do not freeze. Sea ice, therefore, contains between 1/10 and 1/100 as much salt as sea water, and it can be melted and drunk like fresh water.
- Lord Rutherford, the physicist who discovered protons, once said, "The energy produced by the breaking down of the atom is a very poor kind of thing. Anyone who looks for a source of power in the transformation of the atom is talking moonshine." Ironically, Rutherford's discovery of protons opened the way to nuclear weapons and power stations!
- The weight of ice on Antarctica has depressed it to the point where most of the continent lies below sea level. The lowest point in Antarctica, Bentley Trench, is 8,325 feet below sea level. At the same time, Antarctica is the world's highest continent, with the ice surface averaging 6,700 feet above sea level.
- Researchers at Sandia National Laboratories may have helped resolve two long-standing astrophysics mysteries: 1) why is iron from the asteroids, ranging from several meters to hundreds of kilometers in diameter, that struck Earth during its formative stages found scattered throughout Earth's mantle, when it seems more logical that the iron would have blasted directly through to the Earth's core; and 2) since the moon must have undergone the same extraterrestrial bombardment as the Earth, why does it have proportionately much less iron in its mantle than does Earth? The answer to both these questions appears to involve the theoretical value of the vaporization point of iron under high pressure. If vaporization occurred at lower pressures than previously assumed, a solid piece of iron after impact might disperse into an iron vapor that would blanket the forming Earth, rather than punching through it to the core. The resulting iron-rich rain would create the kinds of pockets of iron currently found in the mantle. That same dissolution of iron into vapor could have occurred with the moon but, the because of its weaker gravity, the moon would have been unable to capture the bulk of free-floating iron atoms, explaining the dearth of iron deposits on our planet's satellite.

**A large planetoid striking the newly forming Earth**

- The U.S. Geological Survey has resurrected, and remade, maps showing Afghanistan's largest-known gold deposit, as well as other gold, copper, mercury, and iron ore sites. The new maps were modified and interpreted from a collection of unpublished Soviet-era maps dating back to 1967. Although tattered and torn, the older maps were legible because the Afghans had for decades been safeguarding them despite years of war and political corruption. The remade maps are part of a decade-long project of cooperation between Afghan and USGS personnel to gather and update the country's mineral and energy resources information, and to build the country's capacity to conduct modern earth science research. During that time, the project trained a cadre of Afghan scientists, installed modern earth science equipment and networks, and generated more than 40 terabytes of earth science data.

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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) 464-0525, or e-mail jharper.pgs@gmail.com.
Membership information may also be found at our website: www.pittsburghgeologicalsociety.org.

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Kyle Frederick, Program Chair at 724. 938-4463 or email at fredrick@calu.edu.

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

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# PGS Newsletter

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| Vol. LXVII, No. 9 | Robert Botterman, Editor | May, 2015 |
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**Wednesday, May 13, 2015**
**The Pittsburgh Geological Society presents**

## *Hudson River PCB Superfund Site, New York – A Public Health Perspective*

**Presented By: Justin Deming, New York State Department of Health's Bureau of Environmental Exposure Investigation**

The Hudson River PCB Superfund Site is one of the largest Federal Superfund sites in the Country, extending 200 miles from Fort Edward to New York City. Historic releases of PCBs to the river have resulted in deposition and accumulation of PCBs in river sediments and floodplain soils, increasing bioavailability and thus the potential for human exposure to PCBs in the environment. The New York State Department of Health's Center for Environmental Health has worked collaboratively with the United States Environmental Protection Agency and the New York State Department of Environmental Conservation to understand the nature and extent of PCBs within the Hudson River and to evaluate potential human exposure pathways. Mr. Deming will provide an overview of the project and discuss the NYSDOH's role in evaluating potential exposure pathways and making recommendations to minimize exposure where necessary.

**Bio:**

Justin Deming currently works in the New York State Department of Health's (NYSDOH) Bureau of Environmental Exposure Investigation where he is responsible for NYSDOH oversight of hazardous waste and other remedial sites within three areas of New York including the Capital District Area, western New York from Rochester to Elmira, and the New York City Area. Mr. Deming has over 10 years of experience evaluating potential human exposure to contaminants in the environment, including a significant amount of time spent working on various aspects of the Hudson River PCB Superfund Site. Mr. Deming holds an M.S. in Geology from the University of Buffalo.

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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 pgsreservations@gmail.com**. Please put "PGS Dinner Reservation" in the subject line. Reservations can also be made using PayPal at our website **http://pittsburghgeologicalsociety.org.** In either case, please leave your name and number of reservations needed by **noon, Monday**, **May 16.**

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

## PRESIDENT'S STATEMENT – May 2015

As the 2014-2015 Society year comes to a close with the May meeting I would like to thank my fellow officers and Board members for their dedicated service to the Society. To begin, it has been a rewarding and challenging year. To name just a few of the highlights; (1) we established a student representative position on our Board that includes student liaisons from five different colleges, (2) conducted a field trip to the Finger Lakes region of New York, (3) have had record attendance increases at our meetings, (4) have had an increase in outreach requests that we have tried our best to fulfill and, (5) ran two student workshops that were well received by the attending students.

May, of course, is Society election month as we look to fill future officer and Board positions. I would like to thank all of our members who chose to be nominees. I encourage all of our professional members to VOTE via internet, U.S. Mail, or at the May meeting (see the ballot in this newsletter). I would like to send out a big thank you to some of our outgoing officers and Board members who have been entrenched in their positions for some time. Steve McGuire has been our Treasurer for seven of the last eight years, a record that likely will never be surpassed. Bob Botterman has been our newsletter editor for five years, Kyle Fredrick has been our Vice President for three years and Judy Neelan has been our Secretary for two years. Kudos to all of you.

Our May speaker, Justin Deming, comes to us from the New York State Department of Health's Bureau of Environmental Exposure Investigation where he is responsible for oversight of hazardous waste and other remedial sites. His presentation will be a historic perspective and overview of the Hudson River PCB Superfund Site. I hope to see you all there.

Please do not forget to VOTE. Have a great summer.

Ray Follador , President

## PGS ELECTIONS

This year's ballot is attached at the end of this newsletter. Be sure to submit your selections if you will not be able to vote at the May meeting.

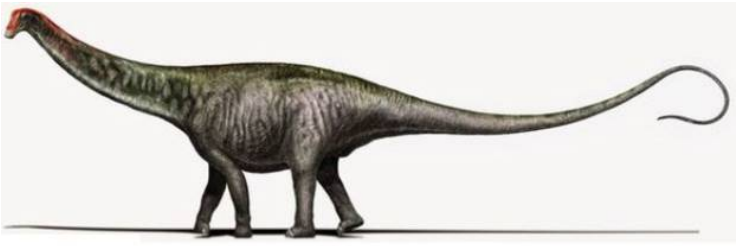
## ORIGINS OF WESTERN PA PLACE NAMES


**Strand Theater in Zelienople**

The town of Zelienople, a borough in Butler County 28 miles north of Pittsburgh, was named for Fredericka Basse, eldest daughter of Baron Dettmar Basse, the founder of the town. Fredericka preferred to be called Zelie, the name of her favorite doll, so the town became Zelienople rather than Frederickanople. Baron Basse bought 10,000 acres of land in Beaver and Butler counties when he immigrated to America in 1802 from Germany and proceeded to lay out a village and build a private residence. Zelie, who was still in Germany, was betrothed to Philip Louis Passavant, and the Baron made extensive preparations to establish a new home and town in America and prepare it for his daughter's and future son-in-law's arrival in September 1807. At first, Zelienople commerce was essentially agricultural because there was no viable means of transportation until 1878 when a railroad came through and spurred industry. Zelienople, located on the left bank of Connoquenessing Creek, lies in an area with much mineral wealth. Coal and iron ore were developed early for use in iron furnaces, while oil and natural gas were discovered later and were profitably developed.

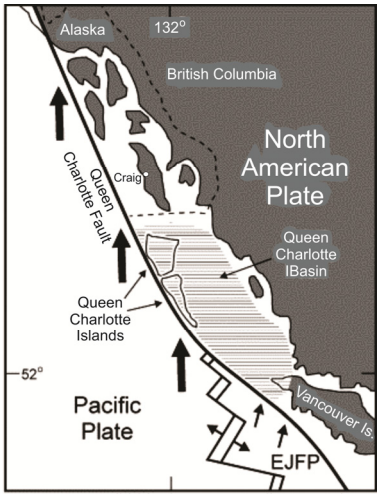
**DID YOU KNOW . . . ?**

- *Brontosaurus* is back! The most famous of the sauropod dinosaurs, *Brontosaurus* ("thunder lizard") was second only to *Tyrannosaurus rex* as the most popular and recognizable dinosaur for almost a century until paleontologists told us *Brontosaurus* didn't exist; it had been renamed *Apatosaurus* early in the 1900s, but most of us didn't hear about it until the 1960s or 1970s. What a let-down; *Brontosaurus* was one of our favorite dinosaurs and those nasty vertebrate paleontologists said it didn't exist!!! The reason was clear, and valid. Famed Yale paleontologist Othniel Charles Marsh named *Brontosaurus* in 1879, but in 1903 another paleontologist named Elmer Riggs succeeded in convincing the paleontological community that *Brontosaurus* was just a smaller version of *Apatosaurus*, which Marsh described and named in 1877. Because the name *Apatosaurus* had priority, the name *Brontosaurus* was relegated to the nomenclatural dustbin. Now a new study suggests *Brontosaurus* and *Apatosaurus* are different enough to belong to separate genera after all. In a study nearly 300 pages long, a team led by Emanuel Tschopp at the New University of Lisbon in Portugal analyzed 477 different physical characters of 81 sauropod specimens housed in museums in Europe and the United States over a five-year period. The team was looking to clarify the relationships among the accepted genera and species of the diplodocid family, which includes *Diplodocus* and *Apatosaurus*. They concluded that not only is *Brontosaurus* a valid genus of diplodocids, but also that there are three known species, *Brontosaurus excelsus* (Marsh's original 1879 discovery), *Brontosaurus parvus,* and *Brontosaurus yahnahpin*. To quote Stephen J. Gould's 1991 book of essays, *Bully for Brontosaurus*!



***Brontosaurus excelsus*, once gone, now is back**

- Most geologists believe that Iceland consists only of very thick oceanic crust. The established concept is that such geological features, known as oceanic plateaus, occur as the result of the interaction of ocean-ridge sea-floor spreading with a hot mantle upwelling. New research, however, indicates otherwise, at least as far as Iceland is concerned. Maps of crustal thickness produced from satellite gravity data, together with geochemical, plate tectonic reconstruction and mantle plume track analysis, show that southeastern Iceland is underlain by continental crust that extends offshore to the east. The results of this research suggest that the presence of fragments of continental crust is another critical ingredient that has been ignored. The discovery has important implications for how mantle plumes interact with plate tectonics.
- The Pacific and North America plate boundary off the coast of British Columbia and southeastern Alaska represents a complex system of faults capable of producing very large earthquakes. Take for example some recent quakes. On October 27, 2012, a 7.8 $M_w$ earthquake with its epicenter at Moresby Island of the Haida Gwaii archipelago (formerly the Queen Charlotte Islands) occurred off the coast of British Columbia. This was the second largest Canadian earthquake ever recorded. On January 5, 2013 a 7.5 $M_w$ offshore earthquake occurred 63 mi west of the town of Craig, Alaska. Both earthquakes released strain built up over years, but did not release strain along the Queen Charlotte Fault, which remains the likely source of a future large earthquake.




**Map of the Pacific/North American plate boundary off British Columbia and southern Alaska.**

- New research on what, for years, have been considered the Earth's oldest microfossils now indicates that they are, in fact, not fossils at all, but minerals. The strange structures, tiny, 3.46 billion-year-old carbon-rich filaments from Western Australia, were described in 1993 as a form of bacteria similar to

cyanobacteria ("blue-green algae") that formed reefs during the Precambrian. Questions about these fossils emerged in 2002 when researchers revealed that the host rock was part of a complex, high-temperature hydrothermal vein, with evidence for multiple episodes of subsurface fluid flow over a long time, rather than a sedimentary chert deposit as originally described. Now a group of researchers from England and Australia has used high-spatial resolution data to demonstrate that the "microfossils" actually comprise stacks of plate-like clay minerals arranged into branched and tapered worm-like chains. Carbon was then absorbed onto the edges of these minerals during the circulation of hydrothermal fluids, giving a false impression of carbon-rich cell-like walls.

- A seismology team has concluded that high volumes of wastewater injection, combined with brine extraction from natural gas wells, is the most likely cause of earthquakes that occurred at two interconnecting faults near Azle, Texas between late 2013 and spring 2014. The team developed a sophisticated 3D model to estimate stress changes induced in the area by two wastewater injection wells and more than 70 gas wells that remove both natural gas and brine. Conclusions from the modeling study integrate a broad-range of estimates for uncertain subsurface conditions. Ultimately, better information on fluid volumes, flow parameters, and subsurface pressures in the region will provide more accurate estimates of the fluid pressure along the faults.
- On a similar note, the USGS recently issued a report that showed that earthquake activity in the central and eastern United States has sharply increased since 2009. This increase has been linked to industrial operations that dispose of wastewater by injecting it into deep wells.
- As everyone is aware, California has a drought problem. Well, it IS mostly desert, after all. Typically, when this has happened in the past, there has been large-scale weeping and gnashing of teeth, and a cry for the state to do something about it, but that's about all that happens. Water is, of course, necessary to preserve all the golf courses, swimming pools, lawns, car washes, etc. – and they all certainly take their share. Still, some people look to the west and can't help noticing that there is a huge untapped reservoir of water, 187 quintillion gallons of it, lapping at California's shores. Now, finally, California is ready to turn the Pacific Ocean into an everyday source of drinking water. A $1 billion desalination plant currently under construction will supply water to San Diego County as early as November, providing a major test of whether California cities will be able to resort to the ocean to solve their water woes.
- A landslide in late April on the Delaware River bluff at Florence, NJ, has forced engineers to evacuate two houses at the top of the scarp. The houses are on the brink of falling into the river. Erosion of the bluff has been a problem for homeowners for several years in this area of Florence, but recent rain activity created a problem that is growing larger. Homeowners suspect an old sewer system that runs from the street into the river 70 feet below is to blame, but county engineers suggested that the landslide may have been caused by a high water table and is likely due to natural causes.

**You're from western Pennsylvania. Does this look familiar?**

- Some of the world's largest and most powerful volcanoes occur not on land but deep beneath the ocean. occupying vast stretches of ocean floor. Chains of these submarine volcanoes extend for hundreds or even thousands of miles. One such chain known as the Kermadec Arc, runs north of Auckland, New Zealand, and includes Havre volcano, which is almost ½ mi deep. When it last erupted in 2012, it prompted a team of scientists from 5 countries to study its products and architecture. Using a remotely operated vehicle named Jason, and an autonomous underwater vehicle named Sentry, the team mapped the volcano's new post-eruption topography and the different rock types that erupted. Havre volcano and the surrounding ocean floor were mapped in 2002. Following the 2012 eruption, the floor was remapped. The team found numerous new vents ranging in depth between 2,300 and 4,900 ft. Their preliminary estimate suggested that up to 0.5 $mi^3$ of volcanic pumice had been ejected. It was roughly the size of the Mount St Helens eruption of 1980, and perhaps more than 10 times bigger than the 2010 Eyjafjallajokull eruption in Iceland.

- About one year ago, the US produced about 66 billion cubic feet per day (Bcf/d) of natural gas with a national average price of $4.59 per million BTUs. Today, we're producing roughly 72 Bcf/d of natural gas and the average national price as of mid-April was $2.35 per million BTU.
- If the nuclear reactions taking place in the sun's core somehow could be switched off today, it would take 10 million years before its surface to start to cool and the Earth to feel its effects.
- On May 29, 1986, twelve schoolchildren in western China were sucked up by a tornado and put down again on some sand dunes 12 miles away, completely unharmed.
- A 250 mile-wide impact zone has been discovered in Central Australia that resulted from a huge meteorite that broke in two just before slamming into the Earth. The exact date of the impacts is unclear. The surrounding rocks are 300 to 600 million years old, but the types of evidence usually left by other meteorite strikes is lacking. The crater has long disappeared, and the only evidence is hidden deep in the earth's crust. A team of geophysicists found the twin scars of the impacts during drilling for a geothermal research project in an area near the borders of South Australia, Queensland, and the Northern Territory. The two meteorites must each have been over 6 miles across, and the impact zone is the largest ever found on Earth.

**FUN FACT HAVING NOTHING TO DO WITH GEOLOGY:**
You might not believe it, but within the last 5 years there have been at least four cases where people have been caught cooking meth in a Walmart.

## PGS Website of the Month

*http://www eia.gov/energyexplained/index.cfm?page=natural_gas_home*

*Special thanks from outgoing newsletter editor, Bob Botterman, to all who contributed newsletter items this season.*

**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. Be sure to also send an email address and phone number where you may be contacted.

**PGS Board-of-Directors**

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| **Other PGS Positions** | | **AAPG Delegate:** | Dan Billman | **AAPG Delegate:** | Andrea Reynolds |
| **Webmaster:** | Mary McGuire | **Newsletter Editor:** | Robert Botterman | **Historian:** | Judy Neelan |

**Officer Contacts**: If you wish to contact a current PGS Officer, please call or email Ray Follador, President, at 724 744-0399 / Geodawg@comcast.net; Kyle Fredrick, Vice President, at 724 938-4463 / fredrick@calu.edu; Judy Neelan, Secretary, at jneelan@verizon.net.

**Memberships**: For information about memberships, please write PGS Membership Chair, PO Box 58172, Pittsburgh PA 15209, or email John Harper at jharper.pgs@gmail.com.
Membership information may also be found at our website: www.pittsburghgeologicalsociety.org.

**Programs:** If you would like to make a presentation at a PGS meeting, please contact Kyle Frederick, Program Chair at 724-938-4463 or email at fredrick@calu.edu.

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

# SEPM Clastic Diagenesis Group

## Annual Meeting

## Monday June 1st 2015 at 7pm

## Grays Peak Room -Grand Hyatt Hotel

### Call for speakers

Join us to discuss challenges in clastic diagenesis and reservoir quality

Contact Gemma & Kitty with your topic

### Student Photo Competition

Award for best capture of sandstone diagenesis

Please submit images by Friday May 22nd 2015

### The Challenge Question:

**Is there more that we can do to predict carbonate cements in sandstone reservoirs?**

Prize for the best response

1926 SEPM Society for Sedimentary Geology


**Contacts:**

Kitty Milliken
kittym@mail.utexas.edu

Gemma Barrie
GemmaBarrie@chevron.com

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