



PITTSBURGH GEOLOGICAL SOCIETY

February 20, 2019

Social hour 6:00 PM

Dinner 7:00 PM

Program 8:00 PM

Dinner costs

\$30.00 per person

\$10.00 student member

Reservations

Email your name and
number of attendees to:

[pgsreservations
@gmail.com](mailto:pgsreservations@gmail.com)

You can also reserve
and pay via PayPal at:
[https://www.pittsburgh
geologicalsociety.org/](https://www.pittsburghgeologicalsociety.org/)

NEW LOCATION

Cefalo's Banquet &
Event Center,
Carnegie PA

**A Lake Sediment Record of Holocene
Climate Change from the Northern
Rocky Mountains of Montana
Developed using Core Transects and
Carbonate Oxygen Isotopes**



Dr. Matt Finkenbinder

**Assistant Professor of Geology
Wilkes University**

NEW DEADLINE for Reservations: Wednesday, February 13.

Speaker Abstract

Long term records of natural climate variability are essential to give context to the relatively short instrumental record of climate and to place recent changes into an appropriate geological perspective. Lakes and their sediments provide an excellent means to reconstruct long-term terrestrial climatic and paleoenvironmental change because lakes are ubiquitous features across high-latitude and mountainous regions. Lakes integrate changes in the surrounding watershed and atmosphere, and further respond rapidly and are sensitive to climatic change. In addition, lake sediments can provide continuous archives, are easily constrained with radiometric dating techniques, and can be analyzed for multiple indicators or proxies of environmental change. In this talk, I will present an analysis of sediments collected from Rock Lake, a small closed-basin lake located in the Northern Rocky Mountains of Montana. A series of sediment cores were collected along a water depth transect, from the shoreline to central depocenter, to reconstruct Holocene lake level variations using sedimentary facies analysis. To further document decadal to centennial variations in hydroclimate change, carbonate oxygen isotope analyses were conducted on the deep-water core sequence that spans the last 11,000 years. Results from both sets of analyses indicate the lowest lake levels and overall driest conditions occurred across several centuries after the Mazama climatic eruption (~ 7,600 years BP), supported by the highest oxygen isotope values during the entire record and sedimentological features in shallow water cores including mud-cracks and paleosols. A transition to higher lake levels and wetter conditions occurred over the next millennia, defined by an abrupt decrease in oxygen isotope values and the accumulation of fine-grained lacustrine sediment in shallow water cores. The last ~ 5,000 years are characterized by centennial variations in oxygen isotope values and high but variable lake levels. The implications of the lake level record, along with possible forcing mechanisms that could explain the variations, will be discussed in the context of other paleoclimate records from the region.



Speaker Biography



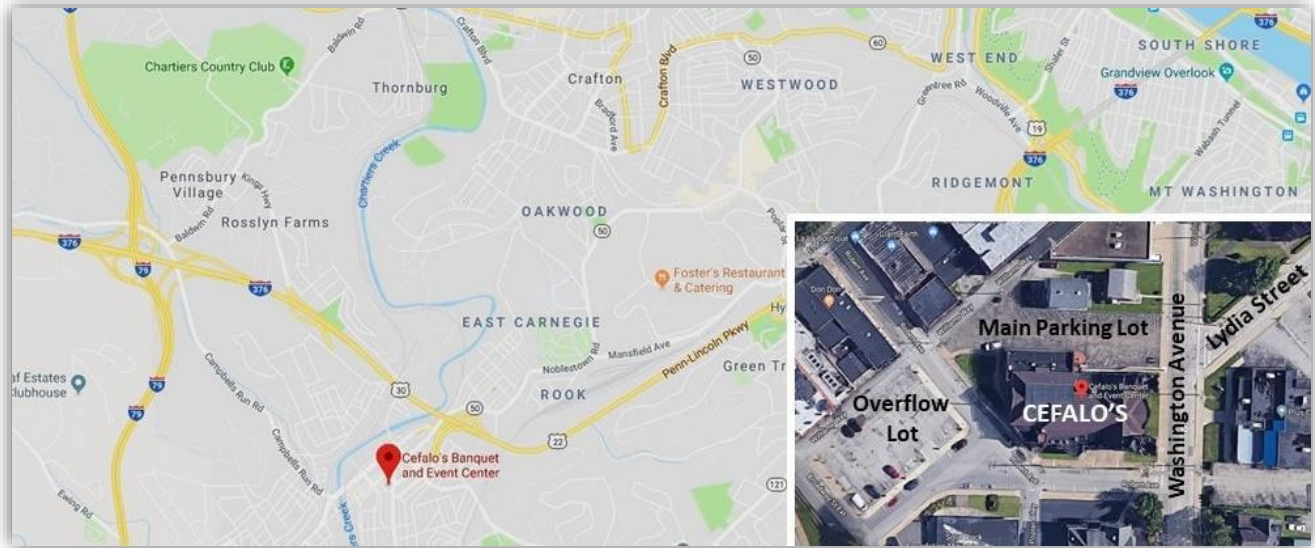
Dr. Matt Finkenbinder is an Assistant Professor of Geology at Wilkes University in northeast Pennsylvania. His teaching responsibilities include Historical Geology, Sedimentology and Stratigraphy, Paleoclimatology, Geomorphology, and introductory Geology courses. His primary research focus is to better understand past climatic changes on a range of timescales using the sedimentary record from small lakes. Dr. Finkenbinder is particularly interested in defining the timing and patterns of hydroclimate and environmental changes and assessing the underlying causes of natural climate variability from high-latitude regions in North America spanning the late-Quaternary. His research combines field-based investigations of modern limnologic systems and laboratory analyses that includes

sedimentology, elemental and organic geochemistry, stable isotope geochemistry, and a range of radiometric dating techniques. The aim of this methodological approach is to produce continuous and well-dated sedimentary records of continental paleoclimates, which provides important perspective to place current and projected climatic conditions into a longer context. His current projects include defining the timing of Laurentide Ice Sheet retreat from northeast Pennsylvania using proglacial lake records, reconstructing the Holocene drought history of northcentral North America using stable isotope analysis of lacustrine carbonates, and reconstructing the late Holocene climate history of Newfoundland using multi-proxy analysis of marl lake sediments.

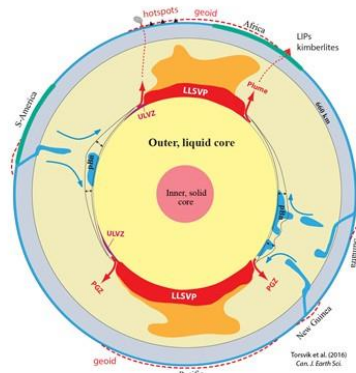
PGS MEETING LOCATION

A reminder that the Pittsburgh Geological Society has moved its monthly meetings for spring to [Cefalo's Banquet and Event Center](#) in Carnegie PA. Please note that for this facility, your dinner reservations must be made by **Wednesday of the week prior to the meeting.**

Directions: Take Parkway West to Exit 65 for Carnegie. If exiting from westbound lanes, use the left exit ramp (marked Heidelberg) to Lydia Street. Follow Lydia Street for four blocks until it ends at Washington Avenue. Cefalo's Banquet Center (a former church) will be directly across from you. Overflow parking is along side streets and across the street from the site.



Preview of the Next PGS Meeting



Could Earth's Long-wavelength (Degree-2) Mantle Structure Be Stable Through Time?

Dr. Mat Domeier

Post-doctoral Researcher
Centre for Earth Evolution and Dynamics (CEED)
University of Oslo

**New Dinner Location:
Cefalo's
Restaurant
in Carnegie**

Next month's PGS meeting will be held on March 20, 2019.

PRESIDENT'S STATEMENT

Welcome to 2019 and the start of a New Year! As 2018 closed out a couple of notable events affected many of us who live in western Pennsylvania.



First, Pittsburgh experienced its wettest year on record with 57.42 inches of precipitation beating the record set in 2004 of 57.41 inches. The unusual amount of rainfall triggered many flash floods and landslides throughout our region. It also produced perfect mosquito-breeding conditions!

Secondly, the longest US federal government shutdown began back in late December and continued to drag on until January 25 of this year. Some of us were not affected at all by the shutdown, for many it was an inconvenience, whereas others were faced with uncertainty and missing paychecks. The long-term effect of the 35-day shutdown may never truly be realized by the general public, but for many scientists there was a gap in the collection and reporting of scientific information. For example, an underwater landslide from Anak Krakatau volcano generated a tsunami that killed more than 200 people and injured more than 800 in Indonesia. The USGS would normally report events like these and offer valuable scientific information to the public, but, due to the work stoppage, the geologists with the USGS could not provide commentary. Many of us are not affected by an event like this, yet this is an example of how the shutdown can slow scientific progress and commentary during times of need.

The shutdown also kept scientists from collecting data in National Parks, submitting to and receiving sample analyses from government facilities, attending scientific conferences and disrupting payouts for disaster relief efforts. Many federal websites that display

real-time data and information needed for public health and safety were not available during this time and were updated only by a small work force. I was attempting to acquire some climate data from NOAA for a class I teach and the notice on the webpage indicated that the site was not available at this time, and that only the sites “necessary to protect lives and property are operational and will be maintained during this partial closure of the U.S. Government.” While this is not a big deal or life threatening, there was a disruption in my normal daily activity and a slight inconvenience. The government is back to work at least for now and daily activities will resume. Data collection will continue as before, but this temporary halt may take researchers months to catch up. The government is open for now; the polar vortex came and went, and temperatures soared to 45 degrees a few days later; what’s next? Stay tuned!

Thanks to all who attended last month’s meeting at Cefalo’s. Dr. Helmke’s presentation on using drones to collect scientific information demonstrated how advancing technologies can increase response time to natural disasters and allow scientists to monitor change in inaccessible regions of the planet. Having the chance to fly a small drone at the end was the perfect way to end the evening. I look forward to seeing everyone at the February meeting to learn about paleoenvironmental changes as interpreted from a glacial and lacustrine dataset from Dr. Finkenbinder.

As a reminder, student night and the drilling workshop will be held in April. Please see announcements in this newsletter for more information about these events, as well as our new PGS student scholarship. Finally, I would like to thank Dorso, Pennsylvania Soil and Rock, and Rosebud Mining for renewing their corporate sponsorships. And thanks to all that support the PGS and their efforts to provide professional development opportunities to our scientific community.

See you at the meeting!

Tamra

LOCAL GEOLOGICAL EVENTS

[GEOPHYSICAL SOCIETY OF PITTSBURGH](#)

February 5, 2019

"Arkoma- Woodford Depth Imaging Project" by Rob Yorke, Chief Executive Officer, Advanced Geophysical Technology, Inc.

Cefalo's Banquet Center, Carnegie PA

[SOCIETY OF PETROLEUM ENGINEERS](#)

February 12, 2019 (lunch meeting)

"Using DAS and DTS to Validate Completion Optimization with a Carbon Rod Conveyed DFO" by Ahmed Attia, North American Reservoir Manager for Ziebel

Cefalo's Banquet Center, Carnegie PA

[ASSOCIATION OF ENVIRONMENTAL AND ENGINEERING GEOLOGISTS](#)

February 19, 2019

(See details on page 7)

[AMERICAN CHEMICAL SOCIETY- ENERGY TECHNOLOGY GROUP](#)

Thursday, February 21, 2019

"Petroleum Pioneers of Pittsburgh" by Al Mann (Book discussion and signing)

Lombardozi's Restaurant, Pittsburgh PA

[AMERICAN SOCIETY OF CIVIL ENGINEERS – GEO-INSTITUTE](#)

February 28, 2019

(See details on page 8)

HELLO

NEW MEMBERS

The Pittsburgh Geological Society welcomes the following new society member:

Daniel P. Lapikas
Geologist (Junior Level)
TetraTech

THE PITTSBURGH GEOLOGICAL SOCIETY ENDOWMENT FUND

Established May 8th, 2014 through the



Contributions can be made through bequests, memorials, and gifts 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. For more information please contact Ray Follador, PGS Finance Committee Chair at (724) 744-0399.

PGS Member Spotlight: Nico Russo, Student Member

Geological Education

Slippery Rock University, Geology,
Graduating in May of 2019

How long have you been a member of PGS?

Three years.

Any interesting internships?

Intern for the Pennsylvania Geological Survey, and for the Carnegie Museum of Natural History.

Are you working on any research topics, please list title, describe?

Hydrogeology of Slippery Rock University's campus, obtaining aquifer parameters of the aquifer which was pumped from the 1970's to the 1980's



What is your favorite subject/area of study?

My favorite subjects of study are geophysics and hydrogeology.

What are your plans following graduation?

I am planning to go into the oil and natural gas industry after graduating from Slippery Rock University.



What is the most geologically exciting place you have visited so far?

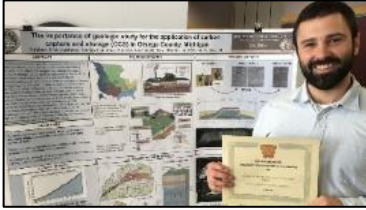
Devil's Tower, Wyoming

What is your favorite rock, mineral, or fossil?

My favorite rock is pegmatite.

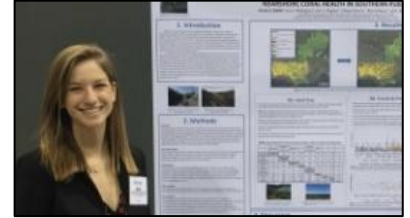
If you could meet any geologist, living or dead, who would you meet?

Charles Darwin



PGS – AEG – ASCE STUDENT NIGHT

April 17, 2019



University students, please consider presenting the results of your college research projects at the **17th Annual PGS – AEG – ASCE Student Night**. If you have been conducting undergraduate or graduate research in any geological or geotechnical field, here is an opportunity to show off your work to members of three professional scientific societies. Students who present their original research grow from the experience by improving their public speaking skills, networking with professionals and experts in their fields, listing a presentation on their resume and possibly even winning a cash award.

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 best poster presenters will each receive \$50.

Guidelines and Submission Forms can be downloaded from the PGS website:

<https://www.pittsburghgeologicalsociety.org/student-night.html>

The Student Night Guideline document contains the formatting rules to be used in the abstract submission and also the rules to be followed for the presentations themselves when the time comes. The Student Night Abstract Submission Form is a two-page fillable PDF document consisting of a cover sheet with digital signatures by the student and faculty mentor and an abstract describing the research project. A letter of support for the project must be submitted separately to PGS by the faculty advisor of the project.

Abstract submission forms and letters of support should be emailed to the PGS Program Chair, Dr. Daniel Harris, at Harris_D@calu.edu.

Some additional links that students may find helpful in putting together their abstracts and presentations are:

- The American Geophysical Union's oral presentation style guide with advice on best practices. <http://www.projectionnet.com/Styleguide/presentationstyleguide.aspx>
- Dennis Jerz's Tips on Oral Presentations. Dennis Jerz is an English professor at Seton Hill, and he's stellar at what he does. Do read and retain his coaching on oral presentations: it's top-notch. <https://jerz.setonhill.edu/writing/technical-writing/oral-presentations-tips/>
- The Professor's Guide to 15 Strategies for Giving Oral Presentations from US News & World Report. <https://www.usnews.com/education/blogs/professors-guide/2010/02/24/15-strategies-for-giving-oral-presentations>
- Rice University's site on oral presentations skills. There are sample clips to show you what to do (and not do) in your oral presentation. http://www.ownet.rice.edu/~cainproj/ih_presentation.html
- The National Institute of Health's 'Ten Simple Rules for a Good Poster Presentation' and 'Ten Simple Rules for Making Good Oral Presentations' <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1876493/>

**The deadline for abstract submissions will be March 22, 2019 by 5:30 PM.
Acceptance decisions will be announced in early April.**

Pittsburgh Geological Society Spring 2019 Student Field Workshop

SPECIAL 2 DAY EVENT

APRIL 5 & 6, 2019

California University of Pennsylvania



Friday (4/5): Evening Program with Dinner:
Networking and Preparing for a Geoscience Career
(A block of rooms has been reserved at a local hotel,
less than a mile from the morning drill site)

Saturday (4/6): Drilling and Sampling Field Workshop.
Light Breakfast and Lunch will be provided

**Registration: \$40.00 (Friday evening with
hotel and Saturday) or \$25 (One day, no hotel)**

YOU MUST REGISTER TO SAVE YOUR PLACE

Have you wondered what you might be doing on that first job? Chances are you'll be assigned to a project that involves taking samples with a drill rig. In this field workshop, you will have the opportunity to work alongside an experienced drilling contractor and field-wise professionals currently working in the industry. Not only is this an excellent learning opportunity, it is your chance to ask all those questions regarding life after college and brush up on your networking skills.

What will you experience?

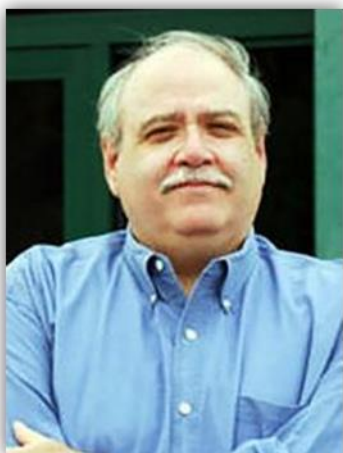
Soil sampling using a drill rig
Basic sampling techniques
Basic monitoring equipment

Soil & Rock descriptions
Well installation basics
Designing a drilling program

As with all field work, this will be a RAIN or SHINE event. Please watch the weather forecast carefully and prepare yourself. The drilling process can be dusty, wet, and muddy, so leave the designer jeans and flip-flops behind. **You must be an active student, not a corporate trainee.**

- Pre-payment can be made through PayPal to pgsreservations@gmail.com or using a credit card through our website: <https://www.pittsburghgeologicalsociety.org/field-workshop.html>
- Checks made payable to "Pittsburgh Geological Society" can either be mailed to P.O. Box, 58172 PITTSBURGH PA, 15209 or submitted in advance at a PGS monthly meeting.
- To register or for more information, contact Kyle Frederick at fredrick@calu.edu

The Pittsburgh Geological Society is proud to announce



The Frank Benacquista Undergraduate Scholarship

The PGS Frank Benacquista Undergraduate Scholarship is an award of \$500 to an undergraduate-level earth science student. This scholarship, created in honor of a long-time PGS member and student advocate, is intended to assist a student with college education costs and to promote student participation in the Pittsburgh Geological Society.

Eligibility Requirements

Any student who is majoring in the earth sciences, is at least a sophomore, and attending a four-year accredited college or university in the Pittsburgh region is eligible to apply.

The applicant must be a student member of PGS or must have applied for student membership at the time the application for the scholarship is submitted.

Required Materials

The full application must include the following:

- One-page resume
- Cover letter introducing yourself and elaborating on key points of your resume with a focus on activities outside of the classroom such as research projects, academic club service, or community involvement
- One-page essay describing your background, decision to pursue earth science, career goals, and academic objectives beyond the bachelor's degree (if any)
- Copy of your transcript (unofficial) and documentation that you are a current student. The requisite standard to apply is a minimum of 12 semester credits of earth science courses. Successful applicants should have a strong academic record that can be achieved through course work, research or service
- Letter of recommendation from a professor or another professional in the earth science field that provides information on your performance and activities in the classroom, in the department, or at an affiliated or non-affiliated institution. The letter should address your work ethic and your character in how you work and assist others in the classroom or field.

Scholarship Application Process

Your application packet may be printed out and submitted by mail to:

Pittsburgh Geological Society
Attn: Scholarship Committee
P.O. Box 58172 Pittsburgh, PA 15209

The application may also be sent in digital form (email with attachments) to the current PGS President at tamra.schiappa@sru.edu. Follow these instructions if sending as an email:

- In subject line of email message, please type “PGS Scholarship, Your Last Name”
- Include a professional message to the President stating that you are submitting your application for the PGS Frank Benacquista Undergraduate Scholarship
- Attach all documents required as Word or PDF documents. Please make sure that each document is titled with your last name.

For example: Jones Resume.pdf, Jones Essay.pdf

Application Deadline and Award Date

All applications must be received by May 1, 2019. The scholarship will be awarded at the first meeting of the Pittsburgh Geological Society in September.



Acceptable Fund Uses

Students may use the scholarship toward tuition fees, for field camp, to purchase equipment required for hands-on exploration as required by academic course work (e.g., rock hammers, hand lens), to attend geologic conferences or field trips, or to attend the PGS field trip, or to attend the Field Conference of PA Geologists.

Basis of Awards

Awards will be based on the cover letter, recommendation letter, transcript, and the content and creativity of the essay as judged by the Scholarship Committee. The decision of the scholarship committee is final.

UPCOMING EVENTS OF INTEREST TO MEMBERS OF PGS



The Greater Pittsburgh Chapter of the Association of Environmental and Engineering Geologists is Proud to Welcome...

The 2018-2019 Richard H. Jahns Distinguished Lecturer in Applied Geology

Deborah Green

Tuesday February 19, 2019

Topic: Let's Talk - A Conversation on How We Communicate About Science

Venue: Hofbräuhaus Pittsburgh
2705 S Water St
Pittsburgh, PA 15203

Dinner Menu: Please select one of following options:

Wiener Schnitzel- *Classic fried pork cutlet served with German Potato Salad, Fried Cabbage, and Cranberry Sauce.*

Hofbräuhaus Würstteller- Grilled Bierwurst, Bratwurst, and Frankfurter served with Sauerkraut and Mashed Potatoes.

Dunkel Bourbon Chicken- Grilled Chicken Breasts topped with Homemade Dunkel Bourbon Glaze and served with Mashed Potatoes and Vegetables.

Heidelberger Rahm Spätzle- Spätzle with roasted Chicken Breast, Caramelized Onions, and Field Mushrooms in a Marsala Cream Sauce

Vegetarian Kasespätzle- Sautéed Spätzle with Swiss Cheese, diced Onions and Cream Sauce, topped with Frizzled Onions and Chives.

A cash bar with a great selection of craft beer will be available as well.

Agenda: Social Hour - 6:00 pm
Dinner - 7:00 pm
Program - 8:00 pm

Meeting Cost: Students- \$15 Cash and Checks made out to Greater Pittsburgh AEG
Members- \$35 will be accepted at the door
Non-Members- \$40

**Please RSVP by Tuesday, February 12th to greaterpittsburghhaeg@gmail.com
Please include your dinner selection with your RSVP**

For more information on Deborah, or the Richard H. Jahns Distinguished Lecture series,
visit [AEG's Website!](#)

UPCOMING EVENTS OF INTEREST TO MEMBERS OF PGS



Pittsburgh Chapter

THE ASCE PITTSBURGH SECTION GEO-INSTITUTE CHAPTER PRESENTS



February 28, 2019 – Dinner Meeting

Foundation Remediation Using Micropiles and Low Mobility Grouting (LMG) at Sandy Cove Condominium, Barbados

Presented By: The DFI Travelling Lecturer, John R. Wolosick, P.E., D.GE, F.ASCE,
Director of Engineering for Hayward Baker Inc., Atlanta, Georgia



This case study describes the grouting aspects of the foundation improvements carried out to remediate the settlement distress of a partially constructed new building located on the west coast of the Caribbean island of Barbados. The foundation remediation ultimately included the construction of a 280-foot-long sub-surface 'sea-wall', the installation of 174 micropiles (providing direct and indirect support to the building), and the grouting of voids and interconnected fissures/fractures in the weak, vuggy, uncemented coralline limestone strata underlying the building foundations.

An investigation of the cause(s) of the settlement, a flexible remediation design, and close monitoring of the drilling and grouting operations during construction were essential to the success of the project. In addition, contractor procurement and operation based on an 'alliance' concept resulted in an excellent

consultant-contractor team relationship throughout and was key to the completion of the work within the tight schedule required by the owner.

John Wolosick is the director of engineering for the Atlanta office of Hayward Baker Inc. (HBI), where he is responsible for engineering design and business development support for HBI offices nationwide. With over 35 years of experience in geotechnical engineering and contracting, Wolosick specializes in slope stabilization, support of excavation, soil nailing, micro pile foundations including underpinning, and all types of grouting.

He holds Bachelor of Science and Master of Science degrees in civil engineering from the University of Illinois at Urbana-Champaign and is a registered professional engineer in 10 Southeastern and Mid-Atlantic states.

As an active member of the industry, he is the author of more than 35 technical papers, and was the recipient of the 2008 ASCE/Geo-Institute Martin S. Kapp Foundation Engineering Award.

DATE: Thursday February 28, 2019

Place: Penn Brewery
800 Vinial St.
Pittsburgh, PA 15212

Time:
6:00 PM – 7:00PM Socializing and Cash Bar
7:00 PM – 8:00PM Dinner
8:00 PM – 9:00PM Presentation

Reservations received on or before 2/8/19:

\$25 ASCE Pittsburgh Section Members /
Government Employee
\$30 Non-members
Free to Students

Reservations received from 2/9/19- 2/20/19:

\$30 ASCE Pittsburgh Section Members /
Government Employee
\$35 Non-members
\$10 Students

PLEASE RSVP by contacting Dr. Maria Jaime at mjaime@agesinc.com OR by registering online at <http://www.asce-pgh.org/>. **Online registration is highly encouraged and payments can be made with credit card.** Only cash or checks will be accepted at the door.

PGS EDUCATIONAL OUTREACH AT SHADYSIDE ACADEMY

The annual outreach event by the Pittsburgh Geological Society at Shady Side Academy Middle School was held on January 9th. Board members Ray Follador and Albert Kollar presented a 50 minute presentation on aspects on the Marcellus Shale to Matt Brunner's (2018 AAPG Eastern Section Teacher of the Year) Earth Science class of 75 students. Two brief PowerPoint presentations on Energy Sources and the engineering techniques of Marcellus drilling and hydrologic fracturing led to a well-balanced question/answer session that followed. The entire student group then engaged in an exercise that formed a long line while holding a rope that represented a borehole. Students were also asked to hold place cards depicting where different sedimentary rock types, aquifers, coal seams, and oil and gas zones were located from the surface to the wells total depth. This activity gave them "hands on" knowledge of how drilling is conducted in steps and why different size casings are placed to protect shallow aquifers.

Energy Sources in the United States

Mr. Albert Kollar

Carnegie Museum of Natural History

Wednesday, January 16, 2019

 CARNEGIE MUSEUM OF NATURAL HISTORY

Shady Side Academy Middle School Earth Science Class

January 16, 2019

The Process of Drilling and Fracing an Unconventional Natural Gas Well

Raymond M. Follador

Falcede Energy Consulting LLC

Introducing the URTeC Workshop!

From the same societies that bring you the Unconventional Resources Technology Conference annually (URTeC), comes the first-ever URTeC workshop. Join us in Pittsburgh, 15 April, 2019 for a student poster session from 4-7pm, concurrent with the opening conference reception.

The workshop program will last all day on 16 April 2019.

Only 25 tickets are available for students, so mark your calendars! Technical program and registration are coming soon. [Click here to submit your abstract via email.](#)

It is recommended that posters relate to Appalachian unconventional exploration and development.*

SAVE THE DATE TUESDAY APRIL 16 2019

THE ORIGIN OF WESTERN PENNSYLVANIA PLACE NAMES

The Borough of Baden, on the Ohio River about 20 miles north of Pittsburgh, is near the location of a significant former Native American settlement called Maugh-wa-wa-me. When settlers arrived in the area in the early 1700s, they set up a village they called Logstown. This became the site of the 1752 signing of the treaty of friendship between the Ohio Company and the First Nations that occupied the region in the years leading up to the French and Indian War. Although Logstown essentially became abandoned around that time, General “Mad Anthony” Wayne established a military camp there in 1792. It was the new nation’s first military boot camp.

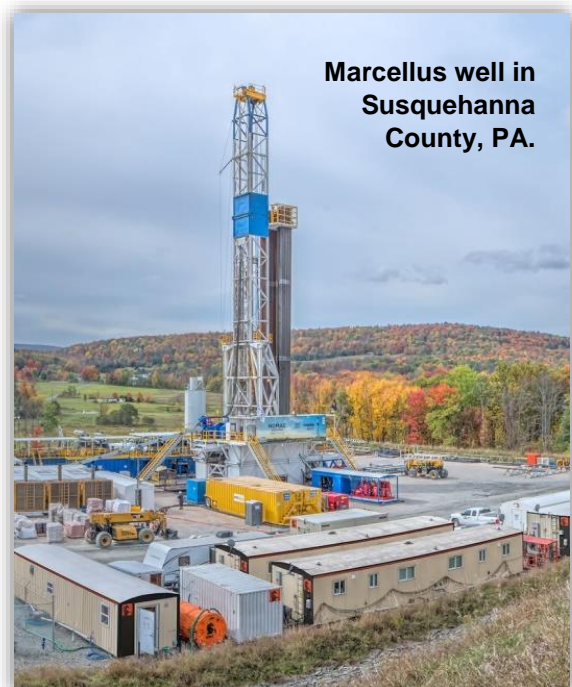
Settlers began moving back into the area sometime in the early 1800s. The village of Baden was founded in 1838, named for the German resort town of Baden-Baden. Baden grew with the advent of boat building, quarrying, and milling both wood and grain. It became borough in 1858, and soon after, steel mills, coal mining, and oil drilling came to the area, as well as railroads. One of Baden’s most notable establishments was Mount Gallitzin Academy, which opened in 1902 as a Catholic boarding school for boys. It later became a girl’s high school then an elementary school. The Pittsburgh Diocese shut its doors in 2009 because of decreasing enrollment. It is now a privately owned charter school.



Historical marker attached to a large granite boulder, erected in 1932 by the Fort McIntosh Chapter of the Daughters of the American Revolution (DAR). The marker commemorates the historic Native American village where, in 1752, the Treaty of Logstown gave European settlers (Virginians) the right to build a fort and trading post at the forks of the Ohio.

DID YOU KNOW . . . ?

Crude oil and natural gas liquids (NGL) production broke records in November during 2018. Industry produced nearly 11.7 million barrels of oil per day (BOPD) in November, 15.7% higher than in November 2017, and NGL production increased 11.2% to an average of almost 4.6 million BOPD during the same period. Through the end of November, reported monthly US crude production averaged more than 10.8 million BOPD, 16.4% more than the 2017 period. Average monthly NGL production through November of more than 4.3 million BOPD was almost 14.8% more than average monthly NGL production in 2017. These figures, published by the Department of Energy’s Energy Information Agency, confirmed findings published by the American Petroleum Institute.

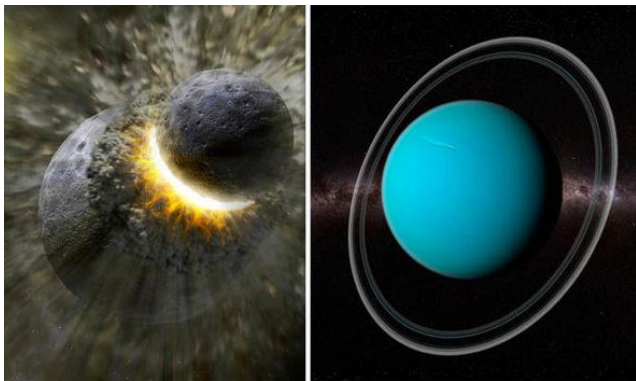


Marcellus well in Susquehanna County, PA.

Crude oil exports also hit a record high at 2.4 million BOPD during November and US petroleum net imports fell to their lowest monthly level in more than 50 years at 2.2 million BOPD. In a statement from the American Petroleum Institute's Chief Economist, Dean Foreman, "Robust American energy production has solidified the United States' position as the world's No. 1 oil producer; this has enhanced our energy security, economy, and benefitted consumers at home and abroad." He went on to say that 4.8 million BOPD production of NGL in November made the US gas industry the world's No. 4 oil producer.

<https://www.oji.com/articles/2018/12/eia-us-crude-ngl-production-broke-records-in-november.html>

Uranus, the seventh planet in our solar system, is an oddity – it is the only planet in the system that rotates on its side. It is a massive planet that tilts about 90° on its side, as do its five largest moons. Its magnetic field is also lopsided, and doesn't go out the poles like Earth's does. It is the only planet that doesn't have its interior heat escape from the core. It also has rings like Saturn, although they are faint. The tilted axis has been a puzzle for years, but scientists now think they know how it got that way – based on detailed computer simulations, they think it was pushed over by collision with a planetoid larger than Earth.



Uranus probably was hit by a giant proto-planet billions of years ago, which caused Uranus to tilt its axis.

The computer simulations show that the collision and reshaping of Uranus — possibly incorporating some or all of the planetoid that hit it — occurred

quickly, in a matter of hours. The large object that knocked over Uranus may still exist somewhere in the solar system too far away for us to see it, which would fit with a theory that a missing planet X is circling the sun well beyond Pluto. While it is possible that a lot of smaller planetoids the size of Pluto pushed Uranus over, the research points to a single huge unknown suspect. The collision happened 3 to 4 ga, probably before the larger moons of Uranus formed. The collision would have created a disk of planetary material that would eventually come together to form moons. When that happened, Uranus' odd tilt would have acted like a gravity tidal force pushing the five large moons to the same tilt. It also would have created an icy shell that is keeping Uranus' inner heat locked in (Uranus' surface temperature is -357°F which is why NASA reclassified both Uranus and Neptune as "ice giants" rather than "gas giants" about a decade ago).

Uranus is one of the least explored and least understood planets in our solar system. But that should change because a robotic probe to Uranus and Neptune is high up on the current wish-list from planetary scientists and may be funded soon. One last fun fact: Uranus, named for the Greek god of the sky, is commonly mispronounced. It is NOT pronounced "yur-A'-nus". The correct pronunciation is YUR'-uh-nus. It's no laughing matter.

<https://www.apnews.com/d1e2c440af57450ab82b62d035adac61>

We've all heard of the "lost continent of Atlantis," by far the most famous of the legendary lands. Even today, books, songs, and movies feature strange tales of this mostly mythological place. There is a lot of hype about Atlantis. Some insist it was a continent in the middle of the Atlantic Ocean destroyed by gods or aliens or whatever. Yet, what we actually know of it comes from the work of the Greek philosopher Plato who wrote about it more than 2,300 years ago. He described Atlantis as a powerful island empire that ruled over several other islands as well as lands across Africa and Europe, which most likely would have placed it in the Mediterranean Sea rather than the middle of the ocean. The Atlantians' power led them to seek

further fortunes and they waged a war across the rest of the world. The Athenians, with the help of the gods, finally defeated the Atlanteans. The gods destroyed the island nation with violent earthquakes and floods and it disappeared in the depths of the sea in a single day and night.

In the 1930s, Spyridon Marinatos, a Greek archaeologist, suggested that this description was based on the actual destruction of the island of Thera in the Aegean Sea. Thera, which is now called Santorini, was almost completely destroyed in 1600 BCE by a volcanic eruption, accompanied by powerful earthquakes that were felt all around the Mediterranean Sea. Today, most scholars assume that Plato's story is a work of fiction, but it is still possible that Plato was inspired by earthquakes or volcanic eruptions happening in the Mediterranean Sea to make his narrative about Atlantis sound more credible.

Surveys conducted of the sea floor in the region have revealed submerged debris. Then there's a tale from part of the 4000-year-old Mahabharata epic of ancient India that tells how the city of Dvārakā disappeared in the Arabian Sea. In 1963, an archaeological investigation discovered ruins in the sea surrounding the peninsular region of Gujarat. Underwater excavations made during 1983-1990 suggest that the submerged city is the Dvārakā described in the Mahabharata. Tsunamis, coastal erosion, and slow sea level rise can flood human settlements. Around 20 ka, sea level was about 400 ft below its present level due to waters frozen solid in the polar ice caps. As temperatures rose at the end of the last ice age, the ice started to melt. Around 10,000 years ago sea levels gradually rose to reach modern levels. As a result, legends by Aboriginal societies from Australia tell of kangaroo hunting grounds near Melbourne lost to the sea.



Panoramic view of the Santorini caldera, which many scholars believe is the “Lost Continent of Atlantis.”

Tales similar to Atlantis are told around the world, and some of them even have geological evidence suggesting that they really happened. For example, a tale from the Solomon Islands tells of Roraimenu, whose wife Sauwete'au went to live with another man on the island of Teonimanu. The jealous Roraimenu cursed the island and a series of large waves washed over the land until it sank beneath the sea. Geologists believe that this tale is based on an earthquake or large underwater landslide. As the foundations of the island collapsed, Teonimanu disappeared in the sea some 400 years ago.

Other legends tell of flooded land bridges between Australia and islands that became separated from the mainland as the sea level continued to rise over hundreds of years. There are many legends about lands being destroyed by the sea. Not all of them are myths.

<https://www.forbes.com/sites/davidbressan/2018/12/21/the-atlantis-style-myths-that-geology-proved-to-be-true/amp/>



An artist's rendering of a supernova explosion.

According to a team of scientists from the University of Kansas, about 2.6 ma, during the Pliocene Epoch, an wave of cosmic energy from a massive supernova (or perhaps or a series of them) about 150 light-years away reached Earth and walloped the atmosphere, touching off climate change and triggering the mass extinction of large marine animals.

This concept is based mostly on a series of recent papers showing that ancient seabed deposits contain a radioactive isotope of iron called iron-60, which provides strong evidence of the timing and distance of supernovae. Since iron-60 is radioactive, it would have decayed away if it had been formed on Earth, so it must have come from outside of Earth. Among astronomers, there's some debate about whether there was only one nearby supernova or a whole chain of them, with the research time favoring a combination of the two.

Other evidence for a series of supernovae is found in the very architecture of the local Universe. Earth is right on the edge of a giant region about 300 light-years long called the Local Bubble. It's basically very hot, very low-density gas. Nearly all the gas clouds were created from it. And the best way to manufacture such a bubble is to have a bunch of supernovae make it bigger and bigger, which seems to fit well with idea of a chain.

Whether or not there was one supernova or a series of them, the supernova energy that spread layers of iron-60 all over Earth also caused the elementary particles called muons to shower Earth, causing cancers and mutations among, especially, the larger animals. About one-fifth of our daily radiation dose comes by way of muons, but when a wave of cosmic rays hits, the muons can multiply by a few hundred. Although only a small fraction of them will interact with biota in any way, when the number is very large and their energy very high, mutations and cancer can increase. For example, the cancer rate would increase about 50% for something the size of a human, and it only gets worse the bigger the animal — think elephant or whale!

The end-Pliocene extinction was concentrated in coastal waters, where larger organisms would catch a greater radiation dose from the muons. Damage from muons would extend hundreds of feet into ocean waters, becoming less severe at greater depths. Large, fierce marine animals living in shallower waters may have been doomed by the supernova radiation. The demise of *Carcharocles megalodon*, the largest shark that ever lived on Earth, was one of the more prominent of the extinctions that occurred 2.6 million years ago, leading the researchers to speculate it might have had something to do with the muons.



***Carcharocles megalodon*, a shark the size of a school bus, vanished at the end of the Pliocene. Modern orcas shown here for scale.**

<http://www.sci-news.com/astronomy/supernova-explosions-end-pliocene-marine-mass-extinction-06716.html>

Thanks to humans' insatiable appetite for chicken, there are barns full of thousands of chicks found all over the world. Broiler chickens, as birds raised for meat are called, are the most populous species of birds on Earth, with an estimated 23 billion on the planet at any given time. That's 10 times more than the next most populous species, the red-billed quelea from sub-Saharan Africa with a population of about 1.5 billion. It's about 40 times more populous than sparrows.



Wouldja believe . . . one of the world's tastiest meals, the humble broiler chicken, will have an effect on shaping Earth's geosphere.

We humans breed and eat so much chicken that scientists say it will have a permanent effect on the geological record. While we might think about our time on Earth being marked plastic, concrete, and black carbon left over from burning fossil fuels, we should realize it will also be marked by a layer of chicken bones. A recent study published by the Royal Society of London provides the details.

Because the industry is completely reliant on technology, from egg to slaughterhouse, 90% of chicken comes from only three companies, so genetic diversity among commercial breeds basically no longer exists. The rapid growth of leg and breast muscle tissue leads to a relative decrease in the size of other organs such as heart and lungs, restricting their function and the chickens' longevity. Changes in the centre of gravity of the body, reduced pelvic limb muscle mass and increased pectoral muscle mass cause poor locomotion and frequent lameness. It used to be that chickens pecked for bugs in the backyard. No longer. Modern broilers are fed cereals like corn, wheat, and barley that are commonly mixed with fishmeal and re-processed hatchery and broiler

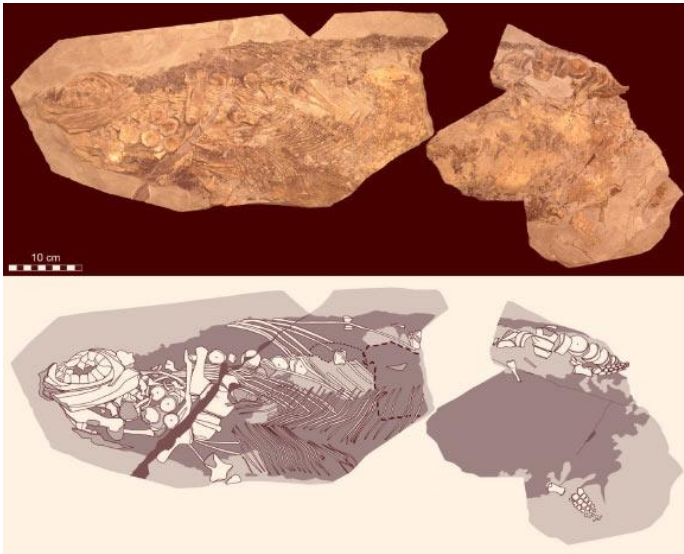
waste such as egg shells, chicks, and other chickens.

The modern broiler chicken, with an average life of five to nine weeks until slaughter has five times the mass of its ancestor. It has a genetic mutation that makes it eat insatiably so that it gains weight rapidly. And because of its diet, its bones have a distinct chemical signature that future geologists will be able to recognize as belonging to *Gallus gallus domesticus*. The chemical signature will be aided further by the bones themselves, which do not decompose easily because we tend to throw them in the garbage encased in a plastic bag of other household waste. Instead of breaking down, therefore, they become fossilized. Perhaps this period we are living in will end up being called the Galluscene rather than the Anthropocene.

<https://www.treehugger.com/animals/amp/people-eat-so-much-chicken-it-will-affect-geological-record.html>

An international team of paleontologists has found the exceptionally preserved remains of a *Stenopterygius* ichthyosaur that lived 180 million years ago during the Early Jurassic. The fossil is so well-preserved that its soft tissues retain some of their original flexibility. Molecular and microstructural analyses of the fossil have revealed that this creature was warm-blooded, had insulating blubber, and used its coloration as camouflage from predators.

Ichthyosaurs had many traits in common with dolphins, even though, as reptiles, they were not even remotely related to those mammals. Although they also have a lot of features in common with living marine reptiles like sea turtles, we know from the fossil record that they gave live birth, which is associated with warm-bloodedness. The 6.5-foot-long ichthyosaur fossil, from Germany, exhibits both the body outline and remnants of internal organs, including the liver. It is so well-preserved that it is possible to observe individual cellular layers within its skin, including cell-like microstructures that held pigment organelles within the skin. The team also found chemical evidence for subcutaneous blubber, the first direct, chemical evidence for warm-bloodedness in an ichthyosaur.



Top: Biomolecules, cells, and cellular organelles in preserved soft parts of a *Stenopterygius* ichthyosaur. Bottom: A diagrammatic representation of the fossil in the photo at the top.

Taken together, the findings indicate that *Stenopterygius* ichthyosaurs had skin similar to that of a whale, and coloration similar to many living marine animals (dark on top and lighter on the bottom) that would provide camouflage from predators. The team found that, both morphologically and chemically, *Stenopterygius* lost the scaly skin associated with reptiles, just as the modern leatherback sea turtle has. Losing the scales would have reduced drag and increased maneuverability underwater.

<http://www.sci-news.com/paleontology/early-jurassic-ichthyosaur-warm-blooded-blubber-camouflage-06703.html>



As reported in the October 2016 issue of the PGS Newsletter, a research team claimed to have found evidence of life in a remote outcrop of 3.7 ga rocks in Greenland. This find pushed back the origin of life by at least 220 million years. *Quanta Magazine* found this new find, as well as other evidence of early life and geological evidence from the Earth and the Moon, added weight to the idea that Earth was warm and watery from the outset, and that in such conditions, life emerged quickly.

But – not so fast! A follow-up study published recently in *Nature* suggests that those signs of life

in Greenland may just be a case of squished rock and mistaken identity. The authors of the *Nature* article argued that the geologic features that were taken as clear marks of life can be readily explained by the normal, lifeless workings of tectonic forces .

The debate highlights the challenges in reading signs of life into relics, in this case, stromatolites. In an ideal world, the outline of an ancient stromatolite would pop out in vivid contrast to a background of rock. It would be finely layered and shaped like a pyramid, dome or perhaps even a perfect cone — a form difficult to explain without invoking biology. But geology is rarely ideal. Over the course of billions of years, geologic processes can create structures embedded in rock that look like stromatolites but aren't. In addition, a perfect stromatolite can be squeezed, warped, crimped, and crushed until any indication of past life becomes virtually indistinguishable from geologic noise. The farther back in time you go, the more difficult it is to glean any evidence of life from rocks.



Photograph of putative stromatolitic structures in a Greenland outcrop (shown by the arrows). Notice some structures point down, others point up.

Are the structures identified in 2016 evidence of ancient life or not, you might ask. One of the *Nature* authors previously described the earliest known stromatolites, 3.5 ga specimens from Western Australia that are close to ideal. Their clearly defined layers are embedded within sediment indicative of prime microbe habitat. While their shapes vary, they all point upward, making it difficult to argue that brute geologic forces produced such delicate diversity. Scientists largely agree that

these specimens represent our earliest record of microbial life.

The proposed stromatolites from Greenland, however, were almost too perfect, with each cone sliced neatly through its apex. If they truly were stromatolites, they were perfectly aligned in a row. So the new team went to Greenland to have another look. Almost immediately after finding the site, they saw that some of the “stromatolites” were upside down. Stromatolite cones should always point upward, toward the sun. They should also be approximately triangular from any perspective. So the researchers cut a slab out of the rock. From one angle, the “stromatolites” were triangular, but when viewed from another side, they were flat, like ridges. It was like a long set of waves rolling across the sea: pointy from the side, but flat from the front. They looked like they were pushed and squeezed and bent and tortured through normal tectonic processes, not the delicate action of generations of microbial mats. In addition, the microcrystalline structures within the “stromatolites” were oriented in the same direction as the larger fold of the ridge, evidence that’s consistent with geological, not biological, forces.

The authors of the original paper disagree with the latest concept, of course. The entire debate captures the inherent difficulty in peering so far into the past. Let’s imagine that we’re on a beach where cyanobacteria form a microbial mat that gets buried up to 6 miles deep over three billion years. It subsequently experiences folding, fluids running through it, minerals dissolving and re-precipitating . . . Is it reasonable to assume that what you’d see three billion years from now would look like how it looks today?

<https://www.quantamagazine.org/worlds-oldest-fossils-now-appear-to-be-squished-rocks-20181022/>



Illustration of a space rock burning up as it enters Earth's atmosphere, possibly similar to the fireball that exploded over Greenland in July 2018.

At approximately 8 p.m. local time, July 25, 2018, residents of the town of Qaanaaq on Greenland's northwestern coast reported seeing a bright light in the sky and feeling the ground shake as a meteor combusted over the nearby Thule Air Base. But the event was detected by more than just human observers. Seismographic equipment, which had been installed near Qaanaaq just a few months earlier to monitor how ground shaking affected the ice, also recorded the meteor's fiery blast. The Qaanaaq fireball provided scientists with the first evidence of how an icy environment, including perhaps a distant ice-covered world, would respond to a meteor impact.

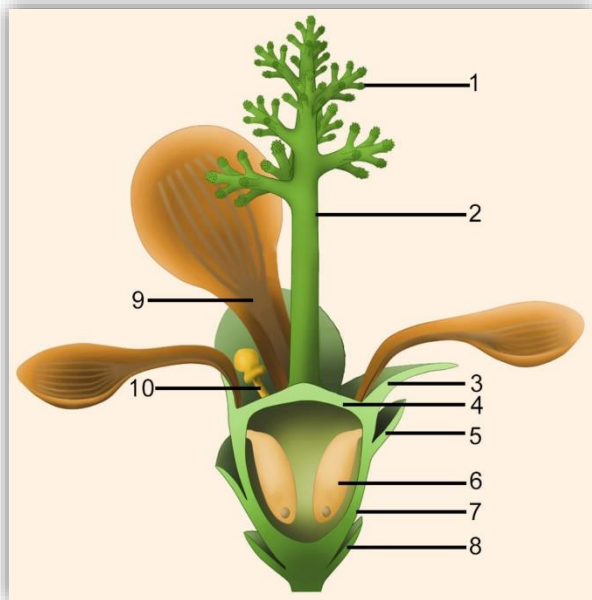
The first indication of the meteor was a brilliant flash in the sky over Greenland. It was brightest at an altitude of approximately 27 miles above the ground, traveling at nearly 54,000 mph. When the meteor exploded over Thule Air Base, it was like a bomb going off. With a calculated impact energy of 2.1 kilotons of TNT, this blast was the second-most-energetic fireball of the year. Researchers with the Seismometer to Investigate Ice and Ocean Structure (SIOS) at the University of Arizona had installed an array of seismometers about 43 miles north of Qaanaaq. Recordings captured by the seismic sensors were interpreted by two Danish Seismological Network broadband stations in Greenland.

The seismologists were able to identify a seismic event that matched the arc of the traveling ground

waves and estimate the impact point of the fireball. They pinpointed the epicenter of the event near Humboldt glacier on the Greenland ice sheet, and seismic equipment picked up tremors from the impact location as far away as 218 miles. This seismic event was the first-ever recorded analog for impact events on ice-covered worlds, such as Jupiter's moon Europa and Saturn's moon Enceladus. The findings will inform impact science across objects throughout the solar system, according to the researchers.

<https://amp.livescience.com/64291-greenland-fireball-seismic-recordings.html>

An international team of paleontologists has identified and described a new genus and species of extinct angiosperm based on over 200 specimens from the South Xiangshan Formation in China. Named *Nanjinganthus dendrostyla*, the newly-identified flowering plant dates back to the Early Jurassic, more than 174 million years ago, making it the oldest known record of an angiosperm by almost 50 million years.



Reconstruction of *Nanjinganthus dendrostyla*: (1) branches of dendroid style; (2) dendroid style; (3) sepal; (4) ovarian roof; (5) scale; (6) seed; (7) cup-form receptacle/ovary; (8) bract; (9) petal; (10) unknown organ (staminode?).

Angiosperms produce most of the fruits and vegetables that we can see on display in a supermarket. While we may take little notice of the rose gardens and cherry blossoms around us, how flowers came to be has been intensely debated over the years. The current understanding, based mainly on other fossils, is that flowers appeared about 125 million years ago in the Cretaceous period. Not everybody agrees, of course. Genetic analyses suggest that flowering plants are much more ancient. Besides, researchers were never certain where and how flowers evolved because it seems that many flowers just “popped up” in the Cretaceous.

Studying fossil flowers, especially those from earlier geologic periods, is the only reliable way to get an answer to the questions. The researchers studied 264 specimens of 198 individual flowers preserved on 34 rock slabs from the South Xiangshan Formation. The abundance of fossil samples used in the study allowed the team to dissect some of them and study them with sophisticated microscopy, providing high-resolution pictures of the flowers from different angles and magnifications. The scientists then used this detailed information about the shape and structure of the different fossil flowers to reconstruct the features of *Nanjinganthus dendrostyla*.

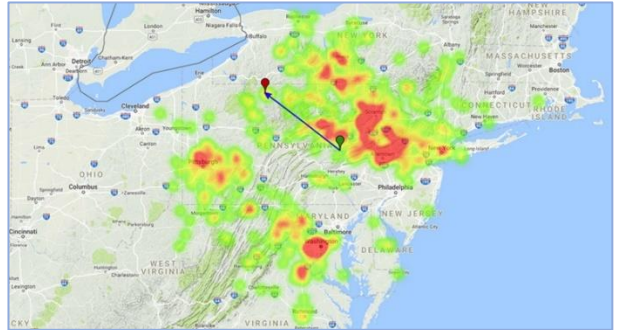
The key feature of an angiosperm is “angio-ovuly” — the presence of fully enclosed ovules, which are precursors of seeds before pollination. *Nanjinganthus dendrostyla* was found to have a cup shaped receptacle and ovarian roof that together enclose the ovules/seeds. This was a crucial discovery, because the presence of this feature confirmed the flower's status as an angiosperm. The new fossils have moved the field of botany forward. This research will allow a better understanding of angiosperms, which in turn will enhance our ability to efficiently use and look after Earth's plant-based resources.

<http://www.sci-news.com/paleontology/nanjinganthus-dendrostyla-06755.html>

PGS WEBSITE OF THE MONTH

www.amsmeteors.org/fireballs/

Eyewitnesses reported more than 900 sightings of a fireball in the skies above Pennsylvania on August 25, 2017 around 9:14 pm.



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Fun Fact Having Nothing to Do with Geology

Every year since the movie “Groundhog Day” was released in 1993, more than 30,000 people have been showing up at Gobbler’s Knob on February 2 to see if Punxsutawney Phil sees his shadow.

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