PITTSBURGH GEOLOGICAL SOCIETY

Celebrating 75 Years

September 16, 2020

Virtual Meeting Times

Board Meeting	6:00 PM
Social Gathering	7:00 PM
Presentation	7:30 PM

Pre-Registration is Required

PGS members and guests must RSVP by September 15 to receive the meeting Zoom link. Register here: pittsburghgeologicalsociety.org

PDH Certificates are Available

Attendees can receive an emailed PDH certificate at their request. Non-PGS members are asked to kindly donate $10 to either the Pittsburgh Geological Society Endowment Fund or the PGS Galey Fund for Students when they request a certificate on the PGS website.

Online Meeting Guidelines

All attendees are encouraged to join the meeting no later than 7:20 PM when announcements will be made. PGS requests all attendees to mute their own audio and video during the presentation to avoid disruptions and to lower bandwidth.

Reconsidering the Appalachian Orogen in the Context of Laurentian Tectonics

Photo source: https://gatlinburgareaguide.com

Dr. Steven Whitmeyer

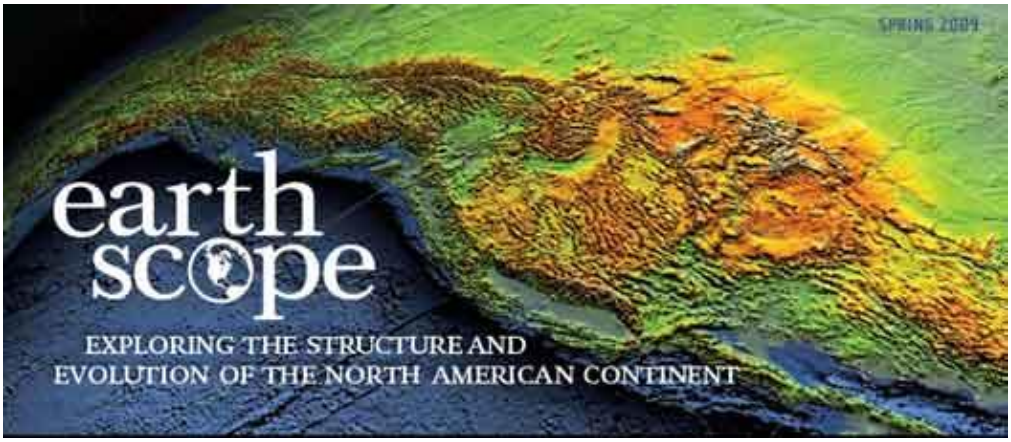
Professor of Geology & Environmental Science
James Madison University

Please RSVP by September 15 to receive the Zoom link.

Speaker Abstract

The Appalachian orogen represents several collisional episodes that led to the assembly of Pangaea in the late Paleozoic. However, that was only one protracted episode in a cycle of supercontinent assembly and breakup that has dominated global tectonics for at least the past 2 billion years. Recent work has highlighted the dependence of Appalachian fabrics and deformation on earlier tectonic events, as well as providing new models that address the present-day anomalously high elevations of much of the Appalachian Mountains.

This presentation will highlight new data and models from the recently concluded continental-scale EarthScope experiment and other geophysical surveys that focused on Eastern North America.



New models that synthesize a variety of data sources will be considered in order to refine traditional concepts of Appalachian tectonics.

Speaker Biography

Dr. Steven Whitmeyer is a Professor in the Department of Geology and Environmental Science at James Madison University (JMU). He has also served as a program director at the National Science Foundation since 2018 for the Tectonics, Geoinformatics, and National AI Institutes programs.

Prior to arriving at JMU in 2005, Whitmeyer was a Post-doctoral Fellow at the University of New Mexico and a Visiting Scholar at the University of Tennessee. He received his B.S. from the University of New Hampshire in 1999 and earned his Ph.D. in Earth Sciences from Boston University in 2004.

Whitmeyer's primary areas of expertise are in structural geology, tectonics, geospatial analyses, digital field techniques, and geoscience education. He directed the JMU Geology Field Course in Ireland from 2006-2018.

More information about Steve Whitmeyer's research can be found at his website: http://csmgeo.csm.jmu.edu/geollab/Whitmeyer/web/Index.htm

PRESIDENT'S STATEMENT

Welcome to the 2020-2021 PGS season! It is hard to believe that summer is coming to an end. Soon fall temperatures will set in and the abundant green will transition to a vibrant assortment of fall colors. I have no idea how your summer has been but after a summer of no field work, no traveling or vacationing for me, I look forward to engaging with the members at our monthly meetings.

Life during the COVID 19 Pandemic for the past 6-7 months has given me time to hit the pause button and reboot, but life has been anything but normal. I would have never imagined that the days just prior to the university's Spring Break, would be the last time spent in the classroom with my students that semester and into the fall. Prior to shutdown I was ready to hop on a plane to travel to Death Valley and lead a field trip, I was joking with students in my office, teaching classes face to face, entering classrooms with students laughing, talking and sitting inches from each other. This all came to a screeching halt; the parking brake was set, and it hasn't been released. The pandemic hit and the fall 2020 semester has started but of course not as it would have been. At this point, I am not sure if life in the academy will ever be back to the way most of us are familiar; however, the field awaits the curious mind and I will be back teaching in the field when this is all over.

The COVID-19 global pandemic has made for historic times. It has impacted every single person's life in a variety of different ways. I never thought that, within one lifetime, an event and the actions that we have taken could change the course of history. The way of life as we have known has changed dramatically and we have entered a new way of living. The list of how life has changed is endless and every one of us has a different story.

For me, life in the academy has changed and I have had to learn new technologies to teach and engage students in the virtual classroom. I also enjoy live music and love to travel. My days of congregating for large concerts my never happen for quite some time and travel is more restrictive. Despite this my challenges are miniscule compared to many dealing with health issues, disruption in employment, fiscal problems or injustices and prejudices that have surfaced during the pandemic.

So if individual health reasons or the change in lifestyle/work habits during the pandemic haven't been enough to have to deal with, we are also dealing with economic strain, socioeconomic and racial/ethnic divides leading to an outbreak in protests and a country so divided I no longer recognize it. There is so much to handle and take in that having more creative interactions will help alleviate anxiety, depression and the urge to scream.

Unfortunately, due to the rules and regulations set in place by the Commonwealth of PA, we will be holding virtual Zoom monthly meetings at least through December. We have a great lineup of speakers that will surely help distract, engage us in the sciences and bring us together even if it is for only a few hours.

2020 was supposed to be a big year for PGS, celebrating our 75th anniversary! We will eventually celebrate this milestone with the offering of great field trips, but those have been delayed until it is safe to transport large groups of individuals to field locations. Please continue to watch for updates and the rescheduled dates for these events.

I would like to remind you to renew your membership early so you can take advantage of all the benefits. I am looking forward to working with the Board of Directors and the members of PGS this year. See you online at the upcoming virtual meeting!

Tamra

Former PGS Board Member named Mayor of the Year

Ken LaSota served as a Board Member of the Pittsburgh Geological Society (PGS) for a number of years as a Director-at-large, Board Secretary, and Chair of the Educational Outreach Committee. In 1998, Ken was elected mayor of the Borough of Heidelberg. He has since been re-elected five times and is serving his 22rd year as mayor. The Borough of Heidelberg, founded in 1903, is located six miles southwest of Pittsburgh and has a population of 1,237.

The Pennsylvania State Boroughs Association (PSBA) at its 49th annual conference in Valley Forge, PA, on July 18, 2020, named Kenneth A. LaSota, Ph.D., Mayor of the Borough of Heidelberg, as the "Pennsylvania Mayor of the Year" for 2020. The PSBA is the signature professional society for mayors from the 958 boroughs and 56 cities within Pennsylvania. Each year the Association selects a mayor who has had significant impact upon his/her community, is a leader in his/her community, and has had extraordinary accomplishments during his/her tenure, to be named the Mayor of the Year. The Association found that Ken LaSota served his Borough exceptionally well in a number of capacities over his twenty-two (22) years as the Mayor of Heidelberg with some of his many accomplishments listed below.

- He has attended over the 90% of the Borough's scheduled regular and special council meetings during his tenure, and served as the Borough's representative and voting delegate to a number of multi-municipal organizations and non-profit organizations at the local, county and state level.
- He has presided over the expansion of the Borough's police department from two fulltime officers when he came to office to the current staffing of five fulltime officers.
- In 2008 he was instrumental in obtaining a 1.2 million dollar congressional earmark to upgrade the Borough's business district and has also published articles in several regional and statewide journals outlining the Borough's history and economic vitality.
- He has signed into law scores of ordinances and resolutions, vetoing only three, and presented dozens of Mayoral Proclamations honoring and recognizing residents, organizations, and activities within the Borough for exemplary achievement.
- He has officiated at 74 marriage ceremonies marched as Grand Marshall in 19 Halloween parades; performed numerous ribbon cuttings for several new business and economic activities.
- He has advanced his mayoral and administrative training by graduating from two statewide governmental training institutes and has volunteered for the last 14 years as a Disaster Services Specialist for the American Red Cross.

While performing all this exceptional service to the Borough of Heidelberg, Mayor LaSota has continued to work fulltime in his career as an Associate Professor of Geology and Earth Sciences at Robert Morris University. Mayor LaSota has been a faculty member at RMU since 1988. He is a sandstone petrologist and has published on the distribution and diagenesis of porosity within the Upper Devonian Venango Group of Southwestern Pennsylvania, and for the last 16 years developed a passion for teaching an introductory astronomy course for non-science majors at RMU.

"Being recognized as Mayor of the Year is certainly a surprise and truly something that I will always be proud of," Ken LaSota told the association. "But more than recognition for myself, I am delighted that this award may act to spread the word that the Borough of Heidelberg is indeed a wonderful place to live, work, and play. I would also say that if I have had any success at all as a mayor it is because of the love, support and guidance afforded me by the First Lady of Heidelberg, Rebecca Stanhope".

UPCOMING PGS MONTHLY MEETINGS

Meeting Date	*Scheduled Speaker*	*Presentation Topic*
October 21, 2020	Steve Kite, WVU	Rock Fall in Morgantown WV
November 18, 2020	TBA	
December 16, 2020	Amy Henrici, Carnegie Museum	Vertebrate Paleontology
January 20, 2021	TBA, Joint Meeting with ASCE and AEG	Engineering Geology
February 17, 2021	TBA	
March 17, 2021	Kendra Murray, Idaho State University	Cenozoic Magmatism on the Colorado Plateau
April 21, 2021	Student Research Night Joint Meeting with ASCE and AEG	Student Posters & Presentations
May 19, 2021	Thomas Bardol, Seneca Resources	Oil and Gas Industry Talk

OTHER GEOLOGICAL EVENTS

Pitt IRISE Research Consortium / ASCE Geo-Institute / Pittsburgh Geological Society

September 4, 2020 11:00 AM – 12:15 PM

"Landslide Capacity Building Virtual Seminars - Part 1: Instrumentation and observational techniques for landslide monitoring and mitigation, including several specific recent case studies."

September 11, 2020 11:00 AM – 12:15 PM

"Landslide Capacity Building Virtual Seminars - Part 2: Photogrammetry, LiDAR, interferometric synthetic radar (InSAR), laser scanning, and neural networks."

Register for the virtual meetings: https://www.engineering.pitt.edu/IRISE/Events/

Society of Women Environmental Professionals

September 10, 2020 7:00 PM-9:00 PM

"SWEP Three Rivers Virtual Trivia Night Fundraiser for ***Strong Women, Strong Girls***"

Register: https://swep3rivers.org/event-3950034

Pennsylvania Council of Professional Geologists

September 22, 2020 1:00 PM-2:00 PM

"Webinar: Recent Advancements in UAS (Drone) Technologies for Geologists and Allied Fields"

Register: http://www.pcpg.org/event-3945825

LANDSLIDE

Capacity Building Virtual Seminars

Friday, September 4 and Friday, September 11

11 a.m. – 12:15 p.m

Building on its successful August 2019 Exploring Approaches to Managing Landslide Risks workshop, the Impactful Resilient Infrastructure Science and Engineering (IRISE) research consortium at the University of Pittsburgh, is conducting a series of seminars focused on various aspects of the landslide problem in Southwestern Pennsylvania. These are being conducted in partnership with the Geo-Institute (American Society of Civil Engineers), the local section of the Association of Engineering Geologists, and the Pittsburgh Geological Society.

The objectives of the seminars are to:

- *Expose interested engineering and geology students and young professionals to the criticality and nature of the landslide problem in Southwestern Pennsylvania and to state-of-the-practice techniques for addressing the problem.*
- *Provide a forum for exposing interested students to professionals working the landslide problem and for exchanging information among participating professionals*

The **two seminars** will feature leading professional experts with years of experience in the community who will present and lead discussion on a variety of topics.

The **September 4** session will include presentations that deal with instrumentation and observational techniques for landslide monitoring and mitigation, including several specific recent case studies.

The **September 11** session will focus on applying technology to the problem, including a variety of techniques such as photogrammetry, LiDAR, interferometric synthetic radar (InSAR), laser scanning and neural networks.

Each of these seminars will consist of three parallel sessions. Participants will be randomly assigned to one of the sessions, but with the permission of the presenters, all will be recorded and made available on the IRISE website for later viewing. The seminars will begin and conclude with brief plenary sessions.

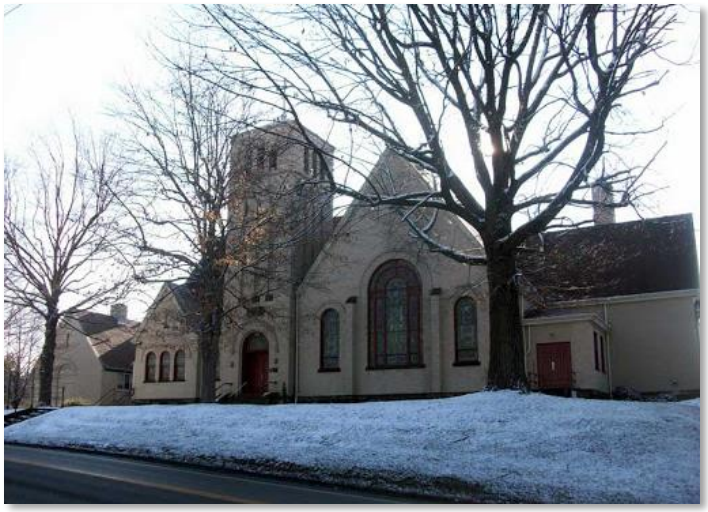
Continuing Education Unit credits will be available.

Register at:

tinyurl.com/LandslideCapacityBuilding2020

THE ORIGIN OF WESTERN PENNSYLVANIA PLACE NAMES

Rev. John McMillan, the first Presbyterian missionary west of the Alleghenies, founded Bethel Presbyterian Church in 1776 with initial meetings held in Oliver Miller's log cabin in what at that time was part of Snowden Township. It is the oldest Presbyterian congregation in Allegheny County. The name "Bethel" was suggested in 1802 for the general area of the township because that was the name of the neighborhood meeting house. In 1886, Bethel Township was carved out of Snowden Township (now called South Park Township), and in 1949 Bethel Ttownship was incorporated as the Borough of Bethel Park. The now-closed Coverdale Pittsburgh coal mine underlies part of Bethel Park. It opened around 1920 and closed in 1947.



Bethel Presbyterian Church in Bethel Park, the oldest Presbyterian church in western Pennsylvania, was founded in 1776 in what was then Snowden Township, Allegheny County.

DID YOU KNOW . . . ?

Just when you thought all of the Founders of PGS were prominent professional male geologists, along comes Edith Baum, the society's first Associate (i.e., non-professional) Charter Member, who played a key role in the formation of PGS.

Edith Irwin Baum (1912-2001) was born in the Greenfield section of Pittsburgh. She walked the three miles to and from Schenley High School (now the Schenley Apartments) every school day until she graduated with a secretarial diploma. That happened on a Friday; on the Monday following she was in the Chamber of Commerce Building in downtown Pittsburgh working for South Penn Oil Company in their Social Security Department.

Photo of Edith Irwin Baum, one of only two women founders of PGS, during her time as Pennsylvania's Women's Speed Skating Champion, 1939-1941. *Photo courtesy of the Detre Library & Archives, Heinz History Center*.

In 1936, Edith joined the firm of Huntley & Huntley, a well-known local independent oil and gas operation, where she served as a clerical employee, typing lease records, drilling-well proposals and agreements, well records, financial reports, and well-reserve reports, as well as general correspondence. During her time with Huntley & Huntley, she worked alongside such local luminaries as L. Guy Huntley, Dan Busch, and James Swain (who died tragically in an airplane accident in 1948).

In 1952, Edith moved to the Gulf Oil Company where she worked for the famous Dr. Hollis D. Hedberg, then chief geologist for Gulf (Hedberg

wasn't the only famous person in her life – her cousin Jim Irwin was the eighth man to walk on the moon). Edith handled all of Dr. Hedberg's correspondence. In fact, she became so adept at it that she was able to take just a brief outline of a letter from him and produce a finished letter. She retired from Gulf in 1977.

Edith also had an interesting social and sporting life. She started ice skating while very young when the creeks and rivers froze over in winter, and eventually became an excellent skater. While skating at Duquesne Gardens in Oakland, she met her future husband Alexander Baum, nicknamed Ax. She developed into a speed skater with the help of local coaches and won many prizes. In fact, she was the Pennsylvania State Women's Speed Skating Champion in 1939, 1940, and 1941. Once, when asked if she would ever consider getting into figure skating, Edith exclaimed, "Heavens no! That's a sport for pantywaisters!"

Edith continued to skate until 1993 helping many young people become excellent skaters. During the summers, Edith and Ax enjoyed canoeing down the Allegheny River, frequently camping overnight. After Ax passed away in 1973, Edith stayed active by continuing to ice skate and canoe, and in the late 1970s she took up water skiing.

As a Founder of PGS, Edith Irwin Baum was also a Charter (Associate) Member, and she maintained her membership through the years. In April 1970, in celebration of PGS's 25th anniversary, those Charter Members (Founders) of the Pittsburgh Geological Society who had maintained membership through the years, including Edith, were named as Honorary Life Members.

According to new research, the end-Permian mass extinction 252 million years ago seems to have occurred differently and at different times on the land and in the sea. Former research had suggested that a series of volcanic eruptions in Siberia occurring in large pulses over a million years was primarily responsible for the entire end-Permian extinction. Global environmental changes, including a warming climate, a rise in atmospheric CO_2, and an increase in ocean acidification that occurred around the end of the Permian period and the beginning of the Triassic possibly contributed to the extinction. New age dates for Early Triassic vertebrate fossils indicate that environmental changes began hundreds of thousands of years earlier on land than in the sea, with the extinction event wiping out as much as 70% of terrestrial vertebrate species, whereas the later marine extinction annihilated nearly 95% of oceanic species over a time span of only tens of thousands of years.

When researchers dated ash deposits from this hill in South Africa, they found the lower part exposed strata from before the end-Permian extinction, the Palingkloof Member of the Balfour Formation, whereas the upper part contains layers from the Katberg Formation deposited after the extinction.

The extinction of Permian vertebrates is best documented in Gondwana, especially in the South African Karoo Basin. The extinction of marine species, probably best associated with the trilobites, is best documented in the Northern Hemisphere, especially in China. The non-synchronous nature of these extinction events demands separate causes.

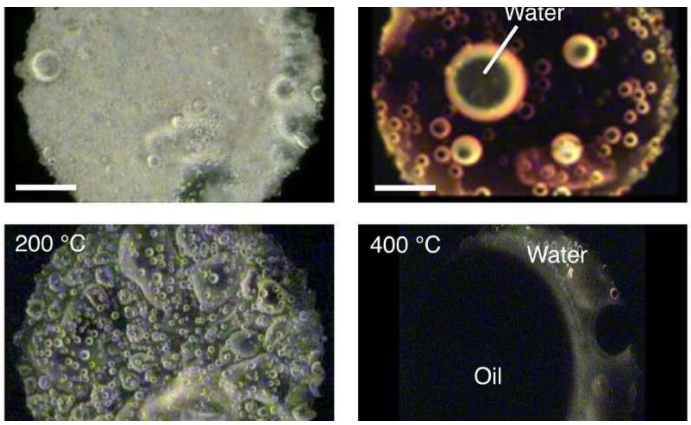
An international team of researchers conducted experiments on living plants to determine whether a collapse of Earth's protective ozone layer may have irradiated and wiped out plant species. The team used U-Pb dating of zircon crystals from well-preserved volcanic ash in the Karoo Basin to get a more precise age and found that sediments from several feet above the dated layer were devoid of pollen from the seed-fern index fossil *Glossopteris*. At 252.24 ma, the zircons are 300,000 years older than dates obtained for the confirmed Permian-Triassic boundary in China,

meaning that the sediment layer assumed to contain the boundary in South Africa was actually at least 300,000 years too old. In addition, previously published dates for an ash deposit occurring just above the layers that document the initial plant extinction in Australia came in almost 400,000 years older than thought.

Even though scientists have known for years that disturbance of life on land continued well into the Triassic, finding that the start of the terrestrial turnover happened so long before the marine extinction was a surprise to everyone. The results of this recent research prompted the team to conclude that science should now try to focus on a more gradual, complex, and nuanced transition of terrestrial ecosystems during the latest Permian and early Triassic.

https://phys.org/news/2020-03-earth-largest-extinction-die-offs-began.amp

Among the many mysteries still to be unraveled on our planet, the origin of water on Earth has remained one of the more elusive. Most studies have suggested that water was delivered by icy comets or meteorites containing hydrous silicates that came from outside the "snow line" (the boundary in the solar system beyond which ice can condense due the low temperatures). More recent studies, however, oppose the cometary origin hypothesis, without suggesting any plausible alternatives for the source of terrestrial water. Until now, that is.



An analog of interstellar organic matter produced water droplets and oil during heating experiments.

Little attention had been paid to organic matter by comparison, despite an abundance of it inside the "snow line." Now, a group of Japanese planetary scientists has demonstrated that heating interstellar organic matter at high temperatures could yield abundant water and oil, suggesting that water could be produced inside the "snow line" without any contributions from comets or meteorites from outside the "snow line."

To begin their research, the scientists created an analog of organic matter in interstellar molecular clouds by irradiating a mixture containing H_2O, CO, and NH_3 with UV light. This process imitated the natural synthetic process of creating interstellar organics. Then, they gradually heated the analog from 24 to 400 ℃ under pressure in a diamond anvil cell. The sample was uniform until 100 ℃ but became separated into two phases at 200 ℃. At about 350 ℃, water droplets began to form, which increased in size as the temperature rose. At 400 ℃, black oil formed in addition to water.

The group conducted similar experiments using larger amounts of organic matter with the same results. Analysis of absorption spectra revealed that the main component of the aqueous product was pure water. Chemical analysis of the produced oil indicated it had similar characteristics to the kind of crude oil found in the subsurface of Earth. The results of this study confirmed that interstellar organic matter inside the "snow line" is a potential source for Earth's water. In addition, the abiotic oil formation suggests the possibility of more extensive sources of petroleum for the early Earth than previously thought. The researchers feel that analyses of organic matter in samples from the asteroid Ryugu, which the Japan's asteroid explorer Hayabusa2 will bring back later this year, should advance scientists' understanding of the origin of terrestrial water.

https://phys.org/news/2020-07-insight-earth.html

Andrew Carnegie (1835-1919) was born the son of a poor Scottish weaver in Dunfermline, Scotland, but emigrated to the US at the age of 12 with his parents. He began his illustrious career as a mere telegrapher but, imbued with an incredible gift for doing business, by the 1860s he

was investing in railroads, bridges, and oil. He eventually entered the steel-making business and built his first mill, the still extant Edgar Thompson Steel Works in Braddock, in 1872. Twenty years later, he and his associates formed Carnegie Steel Company, which owned and operated many mills, foundries, and other steel-related factories. In 1901, Carnegie Steel sold out to J. P. Morgan's United States Steel Corporation for almost $500 million dollars, with almost half of that amount going to Carnegie alone. This made him America's richest man for a time, surpassing even John D. Rockefeller.

For the remainder of his life, Carnegie became a philanthropist, doling out his fortune to build libraries, music halls, museums, and other public works. Yet even before 1890, he had begun funding libraries and other organizations in his industrial home, including the Carnegie Library of Pittsburgh in 1885 and the Carnegie Institute, which included a natural history museum, in 1895.

"Dippy" the diplodocus outside the Carnegie Museum of Natural History in the Oakland Section of Pittsburgh.

The Carnegie Museum of Natural History is ranked as one of the top five natural history museums in the US. Carnegie's vision had been a museum that would exhibit the varied wonders of nature to everyone in Pittsburgh, from low-paid mill workers to the wealthiest members of society. At the time it opened, the museum's collections included Egyptian artifacts, exotic minerals, and wildlife taxidermy from around the world. Several years later, with the news that fossilized dinosaur remains had been discovered in the western US, Carnegie funded expeditions to look for them for his museum. This led to the discovery of *Diplodocus carnegii* (fondly nicknamed "Dippy") in 1899, one of the most complete dinosaur skeletons ever found. Carnegie was so fond of his namesake dinosaur that he had casts of it made and sent to all the major museums of the world.

***Ameropiltonia lauradanae* Brezinski, the type specimen of a Mississippian trilobite from Missouri in the Carnegie Museum's invertebrate paleontology collections.**

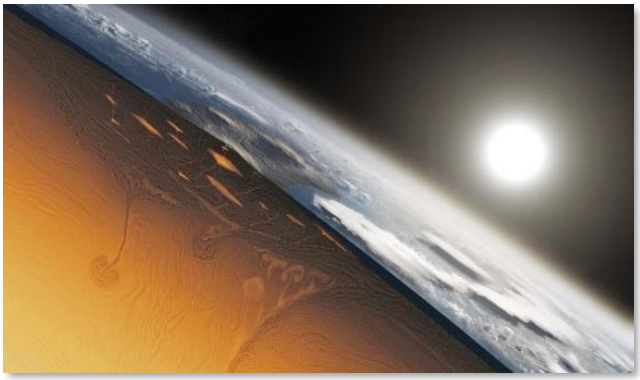
Today the Carnegie Museum of Natural History houses large collections of minerals, invertebrate fossils, and vertebrate fossils from around the world. The dinosaur collections alone are famous for including the largest assemblage of Jurassic dinosaurs in the world. *Dinosaurs in Their Time* is the third largest collection of mounted and exhibited dinosaurs in the country, eclipsed only by those of the Smithsonian's National Museum of Natural History in Washington, D.C. and the American Museum of Natural History in New York. Besides "Dippy" the diplodocus, other famous specimens in the collections include one of the world's only fossils of a juvenile *Apatosaurus* and the holotype specimen of everyone's favorite, *Tyrannosaurus rex*.

In addition, the museum houses large collections of invertebrate, vertebrate, and plant fossils, including many type specimens, as well as a dazzling display of fabulous minerals. And it all started with a philanthropic industrialist giving back to the city that built his fortune.

Portrait of Andrew Carnegie.

https://carnegiemnh.org

An analysis of rocks from the Honeyeater Basalt of the East Pilbara Craton, a stable block of crust in Western Australia, provides strong evidence that Earth's tectonic plates were already moving 3.2 billion years ago, during the Archean Eon. The timing of the first tectonic shifts has long been debated in geology. Earth is the only known planetary body that has robustly established plate tectonics of any kind. Now, as scientists search for planets in other solar systems, they need to keep in mind that plate tectonics has been key in the evolution of life, the stabilization of climate, and the development of Earth. That makes it imperative to understand the whole set of processes that led to plate tectonics on Earth and what driving forces transpired to initiate it.



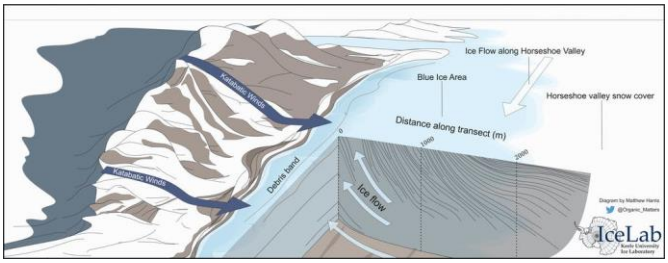
Hypothetical cross section of early Earth 3 to 4 billion years ago showing crust formation.

That should give us a sense of whether or not it is easy for plate tectonics to occur on other worlds. In an effort to determine whether Earth's tectonic plates experienced significant motion before 2.8 ga, a team of researchers from Harvard extracted 235 magnetically oriented Honeyeater Basalt core samples. Because they knew the ages of rocks that crystallized at different times within the East Pilbara Craton block, they were able to deduce changes in the block's latitude over millions of years. They found that this section of crust drifted at an average rate of at least 2.5 cm per year, a velocity comparable to plate motion rates observed today. Based on this evidence, it appears that plate tectonics most likely occurred on the early Earth.

http://www.sci-news.com/othersciences/geophysics/earths-plate-tectonics-08357.html

A team of Australian scientists found evidence of minute amounts of marine life in the ancient Antarctic ice sheet that they believe helps explain a longstanding puzzle: why were rising CO_2 levels stalled for hundreds of years as Earth warmed from the last ice age? Their answer? Apparently, it was due to an explosion in marine life productivity at the surface of the Southern Ocean thousands of years ago that supposedly played a part in regulating the climate. This finding has big implications for future climate change projections.

The team drilled a series of ice cores in the area or Antarctica called Patriot Hills where strong frigid katabatic winds pour off the polar plateau. These winds tend to remove the surface ice through sublimation, so older, deeper ice is exposed the closer you get to the Patriot Hill. It is like travelling back in time as you cross the ice. Thus the exposed ice revealed what happened during the transition from the last ice age around 20,000 years ago into the warmer world of the Holocene. As Earth was warming, atmospheric CO_2 levels rose rapidly from about 190 to 280 ppm. The warming trend wasn't all one way, however; around 14.6 ka, there was a 2 ka-long period of cooling in the southern hemisphere known as the Antarctic Cold Reversal where CO_2 levels stalled at approximately 240 ppm. But no one knew why that occurred, and it was crucial to understand it for attempting to improve today's climate projections.



Cross section of Antarctic ice near Patriot Hills showing that older, deeper ice occurs at the surface the closer you get to the hills.

The team was surprised to find organic molecules, remnants of marine life from thousands of years ago, in their ice samples. Apparently, cyclones off the Weddell Sea swept up organic molecules from the ocean surface and dumped them onshore to be preserved in the ice. Now, for the first time, scientists can reconstruct what was happening offshore in the Southern

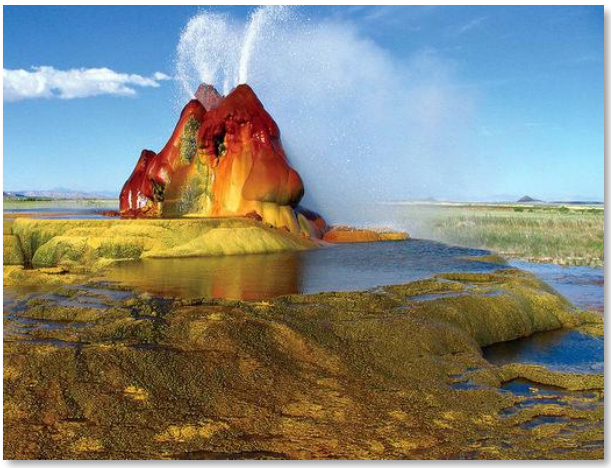
Ocean at the time of ice formation thousands of years ago.

The team found that the high concentrations of a diverse range of marine microplankton that increased ocean productivity coincided with the Antarctic Cold Reversal, indicating that the reversal was a time of massive change in the amount of sea ice across the Southern Ocean. At the end of the last ice age, summer warmth melted large amounts of sea ice, releasing nutrients into the Southern Ocean and fueling an explosion in marine productivity as recorded in the team's ice cores. The photosynthesizing marine life drew a lot of CO_2 from the atmosphere and essentially sequestered it on the sea floor when they died. The amount of CO_2 absorbed in the ocean was sufficiently large to register around the world.

Today, the Southern Ocean absorbs about 40% of all anthropogenic carbon in the atmosphere, so we urgently need to better understand the drivers of this important part of the carbon cycle. Marine life in the Southern Ocean still plays an important role in regulating the amount of atmospheric CO_2, but as the world warms, less sea ice will form in polar regions. The result is that the natural marine-life carbon sink of will only weaken and global temperatures will probably increase further.

https://theconversation.com/marine-life-found-in-ancient-antarctica-ice-helps-solve-a-carbon-dioxide-puzzle-from-the-ice-age-141973

Fly Ranch, a 3,800-acre property near Gerlach in northern Nevada, is home to hot and cold springs, geysers, wetlands, animals, and more than 100 identified types of plants. The two geysers on Fly Ranch have separate histories. Fly Ranch's owners created the first nearly 100 years ago in an effort to make a part of the desert usable for farming. They drilled a well and hit 200º water, which obviously was not suitable for irrigation. The geyser was left alone and it formed a 10 to 12-foot calcium carbonate cone. Then in 1964, a geothermal energy company drilled a test well a few hundred feet north of the old geyser and encountered the subsurface pool of water. At 200º, the water was hot, but not hot enough for the company's purposes. Although the well supposedly was plugged and abandoned, the plug didn't hold and again a new geyser formed.



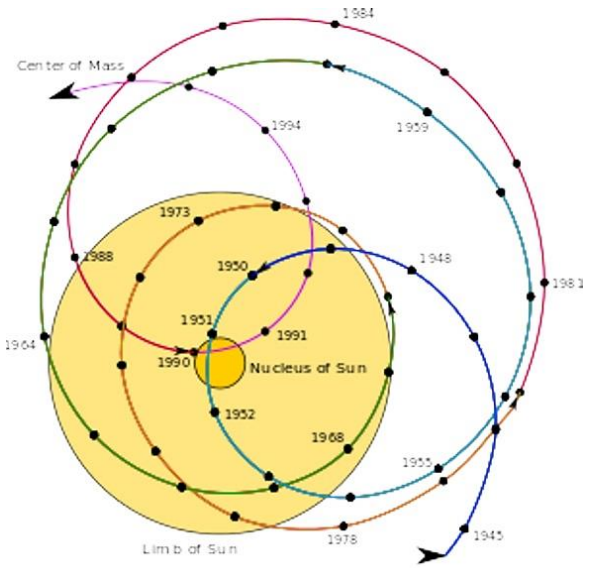
Fly Geyser, a man-made geyser with an impressive colorful cone.

The original geyser lost its water as a result and its cone now lies dry in the desert. The second geyser, known as Fly Geyser, has formed a substantial cone during the past 56 years as minerals from the leaking well became deposited at the surface. The Fly Geyser cone is not as large as the original but is far more impressive due to its alien appearance. It is constantly spraying water five feet into the air, depositing minerals, and enabling the growth of multi-colored thermolitic algae on its surrounding natural terraces, resulting in multiple hues of green and red that add to its out-of-this-world appearance. Since 2018, the Fly Geyser has been opened to the public with nature walks that allow visitors to see a portion of the 3,800-acre property.

https://www.atlasobscura.com/places/fly-ranch-geyser

We all know that the Sun is the center of the Solar System, right? The planets, as well as the asteroid belt, some meteor fields, and a handful of comets orbit it. But is that correct? Not entirely. Actually, everything orbits the center of mass of the Solar System, even the Sun. That center of mass is called the barycenter, the point of an object at which all of its mass is distributed evenly on all sides – balanced perfectly, so to speak. That point in our Solar System rarely lines up with the center of the Sun. It is only natural to think that Earth orbits the center of the sun, but in fact that doesn't happen very often. The Sun actually circles millions of miles around the barycenter.

That means sometimes the Sun passes over it, sometimes it strays away from it.



Motion of the Solar System's barycenter relative to the Sun.

Much of Sun's seemingly erratic movement is the result of Jupiter's massive gravity. Although the Sun accounts for about 99.8% of the mass of the Solar System, Jupiter contains most of the remaining 0.2% mass, enough to exert a gentle pull on the Sun. So, in reality, the Sun actually orbits Jupiter slightly. Even within the Solar System, the planets and their moons also have their own barycenters. For example, even though their barycenter remains inside Earth, the Earth and the Moon dance around each other. Pluto and its moon Charon do something similar; however, for this dancing duo, the barycenter is always outside of Pluto. The result is that every planetary system, including the star or planet that appears to be at the center, orbits an invisible point that most likely does not coincide with the center of the major body. Barycenters sometimes help astronomers find hidden planets circling other stars, since they can calculate that the system contains mass they can't see. (to see videos of the Sun and planets, and the Earth and Moon, orbiting their barycenters, go to:

https://www.sciencealert.com/mesmerising-animations-show-our-entire-solar-system-doesn-t-exactly-orbit-the-sun

Jane L. Freedman (1921-2002), the only other female founding member of the Pittsburgh Geological Society, was the first woman to work in the Section of Vertebrate Paleontology at the Carnegie Museum of Natural History. Born in Maryland and reared in Squirrel Hill, Jane Miller attended Taylor Allderdice High School where her lifelong interest in science was born from a tenth-grade assignment requiring a paper on any subject of interest. She chose archaeology and, determined to write a good paper, went to the Carnegie Museum to talk with an archaeologist. She did not, however, find her archaeology contact to be very interesting. She chose instead to work with the Curator of Vertebrate Paleontology, Dr. James Kay. Kay found a disciple in Jane, and she found her true interest in life.

Following high school graduation, Jane attended the University of Pittsburgh at a time when there was no Department of Geology and misogynistic antagonism in science education was running rampant. Science classes were for men, by God, and Jane was required to sit at the back of the classroom wearing skirts and heels, attire that made field trips somewhat problematic. But despite the difficulties and the prejudice, she tenaciously clung to her ambitions, got her degree, and went to work with Dr. Kay at the museum for the next four years. In 1943, Jane married Lester Freedman and two years later left the museum to start a family. And a geological society.

In 1944, when word arrived at the museum that a group of local earth scientists were interested in the possibility of a local geological organization, she signed on and became a founding and charter member of PGS. Over the years, she acted as the long-time editor of the newsletter and helped plan, organize, write, and/or edit many PGS publications, including *"Lots" of Danger: Property Buyer's Guide to Land Hazards of Southwestern Pennsylvania* and the massive, 888-page *The Geology of Pennsylvania.* She was a regular at the monthly meetings and helped advise the Board of Directors. She was also a long-time judge for PGS at the annual regional science and engineering fairs.

For her long and dedicated service to the Society, PGS awarded Jane the second Walt Skinner Award in 1988.

Jane's activities outside of PGS were equally impressive. She was instrumental in starting one of the first pre-schools in Pittsburgh and for almost two decades found time as the Chairperson of Temple Sinai Sisterhood to record books for blind students. She gave educational programs that included slide presentations and rock and fossil samples from the many countries she visited. She promoted the earth sciences, allocated time to improving educational opportunities for those less fortunate, and taught literacy and English as a second language to immigrants.

Photo of Jane L. Freedman, one of only two women who were founding members of PGS. ***Photo courtesy of Mike Bikerman.***

An active member of Western Pennsylvania Mensa, she often judged at their annual essay contest to award college scholarships. But she had her not-quite-so-educational interests as well – Jane was also an avid fan of the Pittsburgh Pirates, cheering on her Buccos and forming the "Knot Holers," a Cub Scout group she chaperoned to baseball games at Forbes Field.

Jane was passionate about science, education, and giving kids (even those >30 years old) someone to inspire them (e.g., John Harper, who credits her with getting him involved with the Society by requesting and including four of his cartoons in *Lots of Danger*). Jane was an inspiration to many of us and will always be remembered fondly as the First Lady of PGS.

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PGS WEBSITE OF THE MONTH: HTTPS://YELLOWSTONE.NET/

Geology Overview | Geology by Area | Geology Videos | Caldera | Volcano | Earthquakes | Steam Explosion | Lava Flow

Park Geology

Yellowstone National Park is a treasure that inspires awe in travelers from around the world. New Zealand and Iceland are known for their geysers, but nowhere are there as many as in Yellowstone. Scenery, wildlife, and history were contributing factors influencing Congress to establish Yellowstone as the world's first national park in 1872.

At the heart of Yellowstone's past, present, and future lies volcanism. Catastrophic volcanic eruptions occurred here

- About 2 million years ago,
- then 1.2 million years ago,
- and then again 600,000 years ago.

The latest eruption spewed out nearly 240 cubic miles of debris. What is now the park's central portion then collapsed, forming a 28- by 47- mile **caldera** (or basin). The magmatic heat powering those eruptions still powers the park's famous *geysers, hot springs, fumaroles,* and *mud pots*. The spectacular **Grand Canyon of the Yellowstone River** provides a glimpse of Earth's interior: its waterfalls highlight the boundaries of lava flows and thermal areas. Rugged mountains flank the park's volcanic plateau, rewarding both eye and spirit.

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Officer Contacts: If you wish to contact a PGS Officer, you can email Tamra Schiappa, President, at tamra.schiappa@sru.edu; Dan Harris, Vice President at Harris_D@calu.edu; Kyle Fredrick, Treasurer, at fredrick@calu.edu; or Diane Miller, Secretary, at dmiller@appliedgeology.net.

Memberships: For information about memberships, please write PGS Membership Chair, PO Box 58172, Pittsburgh PA 15209, 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 or have a suggestion for a future speaker, contact Dan Harris, Program Chair at Harris_D@calu.edu.

Newsletter: To contact the Newsletter Editor, Karen Rose Cercone, with questions or suggestions for articles, job postings or geological events, please email kcercone@iup.edu.

Facebook: Follow the PGS at https://www.facebook.com/PittsburghGeologicalSociety

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Fun Fact Having Nothing to Do with Geology

September 13 is Uncle Sam Day. When Samuel Wilson, a meat packer from Troy, NY, supplied barrels of beef stamped "U.S." to the Army during the War of 1812, the soldiers called it "Uncle Sam." In 1961, the U.S. Congress issued a resolution recognizing "Uncle Sam" Wilson and authorizing a monument in his hometown. Uncle Sam Day became official in 1989.

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