



EARTHQUAKE

e-Newsletter about what's movin' and shakin' at the Earth Science Museum

Earth Science Museum, 3215 W. Bethany Home Rd., Phoenix, AZ 85017
www.earthsciencemuseum.org, scote@earthsciencemuseum.org, 602-973-4291

September 2021
Volume 10, Issue 9

ESM OUTREACH UPDATE

Mardy Zimmermann, Outreach Coordinator

On September 11th, ESM board member Shirley Coté presented a hands-on mineral identification program for five fellow North Mountain Visitor Center volunteers, a couple of fellow Daisy Mountain rock club members and a City of Phoenix park ranger.



Attentive participants at the hands-on mineral identification class
D. Duffy photos



Rock and mineral specimens for the participants to handle and inspect

On September 25th, ESM board member Mardy Zimmermann gave a presentation on her and her husband Richard's Forty Year Adventure of collecting Arizona Fluorescents at the Flagg Mineral Foundation's Minerals of Arizona Symposium. This year the symposium was held at the University of Arizona Alfie Norville Gem and Mineral Museum, 115 N Church Ave Ste 121, Tucson, AZ 85701.



Mardy giving her presentation on fluorescents
Photo by Kelli Wakefield



Fluorescent mineral display at the museum
Photo by Ray Grant

The ESM is Seeking New Board Members

Are you looking for an opportunity to become involved with the Earth Science Museum (ESM)? Would you consider contributing your time and talents towards our mission to excite and inspire all generations about Earth sciences? The ESM is currently seeking applicants to serve on its board of directors.

Board members are involved with helping the University of Arizona Mining, Mineral, and Natural Resources Education Museum reopen the old mineral museum in Phoenix. Candidates should ideally have some background relating to the Earth sciences; however, experience in either an educational or museum setting is also acceptable. A key attribute involves a strong interest and flexibility to participate in a variety of supporting activities. These activities may include one or more of the following tasks:

- Attending board meetings or meetings with University of Arizona officials
- Participating in work sessions at the museum or other locations
- Outreach programs at schools, gem and mineral shows, or other community events
- Contributing newsletter content

If you are interested, please send a brief resume to:

harvey.jong@earthsciencemuseum.org

Resumes will be reviewed by current board members who will make recommendations on which candidates to include on a board of directors ballot.

If selected, you will need to confirm that:

1. You approve of your name appearing on the ballot.
2. You are a current ESM member. If you are not a member, an application form appears on the last page of our newsletter.
3. You agree to follow the ESM conflict of interest policy.

The general ESM membership will vote on the slate of candidates at the next annual meeting, and candidates receiving a majority of the votes will serve a one year term.

Thank you for your interest and consideration!



ESM Outreach at the yearly Flagg Gem & Mineral Show; Egg Carton Program and Sales Tables (below)
Photos by S. Coté





Arizona Rocks 100

Text & Photos by Ray Grant

When you write Arizona Rocks 100 do you do something special? I started collecting minerals when I was a kid, studied geology in college, taught geology and mineralogy, wrote about minerals, and now started a Geology and Mineral Museum in Coolidge, so I thought I'd do something about minerals for 100 as it is my number one interest. Then I had my first visit to the University of Arizona Alfie Norville Gem and Mineral Museum in Tucson as part of the Flagg Mineral Foundation's Minerals of Arizona Symposium and I had my 100th subject.

The Alfie Norville Gem and Mineral Museum is fantastic and worth a visit, and be sure to have at least a couple hours or more to see it. The museum is in the old Pima County Court House in Tucson. There are mineral specimens and the number and quality of those on exhibit is amazing. If minerals are not your thing there are fossils, gemstones, meteorites, geology and more. Look for the large amethyst geode and turn the handle to open and close it. Check out the fluorescent minerals. The gemstone gallery with all the cut stones and some fantastic mineral specimens will take some time. Watch the videos on the two large on the wall projections or on one of the many smaller screens around the museum. The museum is now open Monday to Friday from 10 to 4, but I would check on their website before visiting and there is information about cost and parking.

I hope that the University of Arizona will do a similar great job for the museum planned for Phoenix and that I will be writing about it someday in this column.

Finally, there would be no Arizona Rocks without Shirley Coté doing this newsletter. Shirley deserves a lot of recognition and thanks for her hard work to have this newsletter every month since October 2012. Thank you, Shirley!



Alfie Norville Gem and Mineral Museum is in the old Pima County Court House, 115 N Church Ave Ste 121, Tucson, AZ 85701



The Bisbee mineral pocket recreation



Some of the wulfenites on exhibit



AZ Mining, Mineral & Natural Resources Education Museum Update September 2021

<https://ammnre.arizona.edu/>

Catie Carter Sandoval

cscarter@email.arizona.edu

703.577.6449

Help support the museum at:

<http://tinyurl.com/SupportMM-NREMuseum>

The Banquet of Rocks is now on display at the Cave Creek Museum (6140 E Skyline Dr, Cave Creek, AZ 85331, 480-488-2764).

The setup includes a Thanksgiving-themed dinner complete with entrees, sides, drinks and desserts. The food rock collection was donated to the AMMM in the 1990s by Margaret and Arless Nixon and featured at the museum until it closed. It is on loan to the CCM for the rest of the season, which runs from October to May. The museum is open from Wednesday through Sunday and also hosts regular demonstrations of their Golden Reef 10-Stamp Mill.



The Cave Creek Museum's resident miner Happy Harry with the Banquet of Rocks



Left to right in front: Judith Hatsell, Sarah Ziker, Stephanie Bradley (striped), Darlene Southern (with candy box), Judi Smith (with pie); in the back: Evelyn Johnson (black dress), and Jo Ann Stuckey "enjoying items" from the Banquet of Rocks



Assortment of "rock candy"



Assortment of "fruits and a cantaloupe"



Pinal Geology & Mineral Museum

Pinal Museum and Society News

351 N. Arizona Blvd., Coolidge, AZ

Pinal Geology and Mineral Society meeting

October 20, 2021

www.pinalgeologymuseum.org

Ray Grant raycyn@cox.net.

The Museum will be open on Saturdays

October 9, 16, 23, and 30 from 10 a.m. to 2 p.m.

The Museum is reopening on a limited basis for right now and hopes to expand the open days in the future. We will try to open on Fridays also, but please check our website to see which days we are open.

Masks are required for all visitors and volunteers over five years old. We have taken this step to protect our volunteers so they can safely open the Museum for you. Please provide your own masks. We will have some on hand at the Museum, but cannot guarantee to provide them. If wearing a mask is a problem, please plan your visit for later.



Steve Scott donated this really large fossil shark's tooth (megalodon) to the Museum. He collects them scuba diving in the Gulf of Mexico near Venice, Florida. After dinosaurs, one of the favorite fossils of kids are the shark's teeth.

The Bahama Banks

Wikipedia

The **Bahama Banks** are the submerged carbonate platforms that make up much of the Bahama Archipelago. The term is usually applied in referring to either the Great Bahama Bank around Andros Island, or the Little Bahama Bank of Grand Bahama Island and Great Abaco, which are the largest of the platforms, and the Cay Sal Bank north of Cuba. The islands of these banks are politically part of the Bahamas.

The limestone that comprises the Banks has been accumulating since at least the Cretaceous period (145-66 mya), and perhaps as early as the Jurassic (201-145 mya); today the total thickness under the Great Bahama Bank is over 4.5 kilometers (2.8 miles). As the limestone was deposited in shallow water, the only way to explain this massive column is to estimate that the entire platform has subsided under its own weight at a rate of roughly 3.6 centimeters (2 inches) per 1,000 years.

The waters of the Bahama Banks are very shallow; on the Great Bahama Bank they are generally no deeper than 25 meters (80 feet). The slopes around them however, such as the border of the Tongue of the Ocean in the Great Bahama Bank, are very steep. The Banks were dry land during past ice ages, when sea level was as much as 120 meters (390 feet) lower than at present; the area of the Bahamas today thus represents only a small fraction of their prehistoric extent. When they were exposed to the atmosphere, the limestone structure was subjected to chemical weathering that created the caves and sinkholes common to karst terrain, resulting in structures like blue holes.

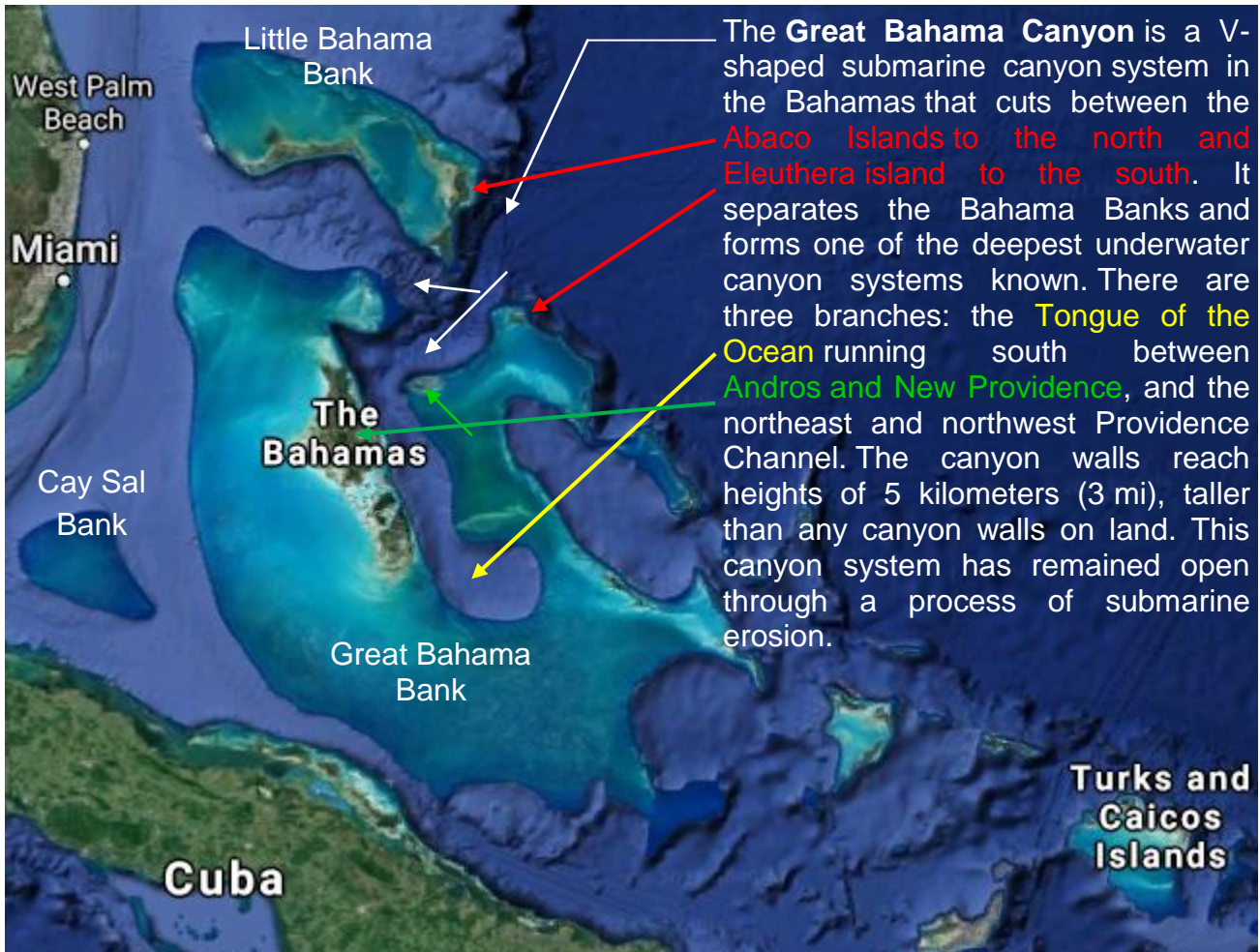


Modern ooids from a beach on Joulter Cays, the Bahamas
By [Mark A. Wilson](#) (Department of Geology, the College of Wooster)



Dean's Blue Hole Long Island Bahamas
By [Ton Engwirda](#)
CC BY-SA 3.0 nl

Oolitic aragonite sand is composed of the calcium carbonate mineral, aragonite, with an egg-like shape ("oolitic" from the Ancient Greek word for "egg") and sand grain size. This sand type forms in tropical waters through precipitation, sedimentation, and microbial activity, and is indicative of high energy environments. The production of oolitic aragonite sand in the Bahamas surpasses anyplace else in the world. Changes in seawater chemistry and paleoenvironments can be interpreted by the sand's chemical composition and structure.



The **Great Bahama Canyon** is a V-shaped submarine canyon system in the Bahamas that cuts between the **Abaco Islands to the north and Eleuthera island to the south**. It separates the Bahama Banks and forms one of the deepest underwater canyon systems known. There are three branches: the **Tongue of the Ocean** running south between **Andros and New Providence**, and the northeast and northwest Providence Channel. The canyon walls reach heights of 5 kilometers (3 mi), taller than any canyon walls on land. This canyon system has remained open through a process of submarine erosion.

The Tongue of the Ocean (TOTO)

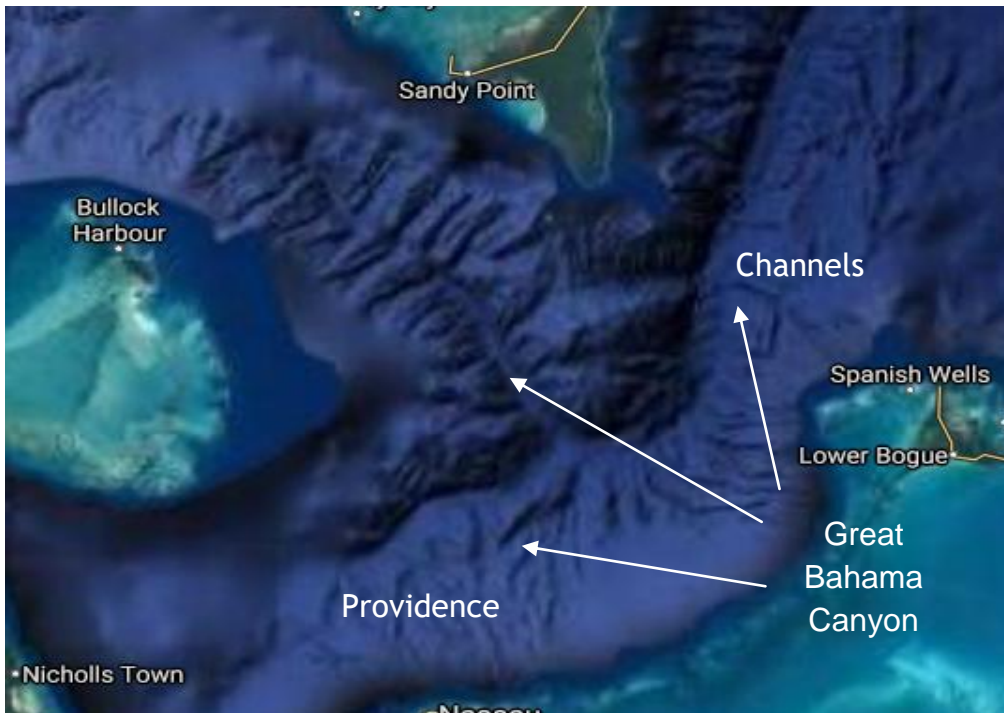
Wikipedia & Google Maps

The **Tongue of the Ocean (TOTO)** is the name of a region of much deeper water in the Bahamas separating the islands of Andros and New Providence.

The TOTO is a U-shaped, relatively flat-bottomed trench measuring approximately 30 by 240 kilometers (20 by 150 mi). Its depth varies gradually from 1,100 m (3,600 ft) in the south to 2,000 m (6,600 ft) in the north.

Its only exposure to the open ocean is at the northern end. Except for the northern ocean opening, the TOTO is surrounded by numerous islands, reefs, and shoals which make a peripheral shelter isolating it from ocean disturbances, particularly high ambient noise.

This channel (TOTO) and the Providence Channels are the two main branches of the Great Bahama Canyon, a submerged geological feature formed by erosion during periods of lower sea level. During their early history the Tongue of the Ocean and the Providence Channel were broad, relatively shallow basins flanked by growing carbonate banks. As the Blake-Bahama platform subsided, sedimentation kept pace with subsidence on the banks, but not in the basins.



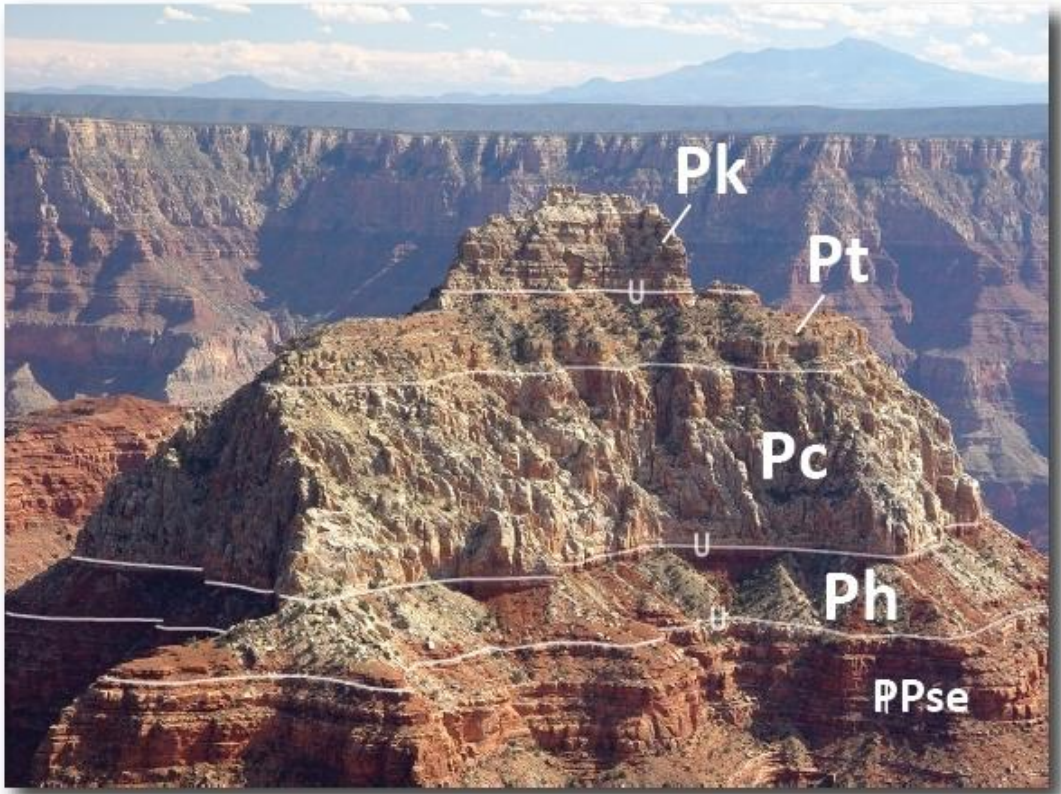
Great Bahama Canyon and Providence Channels - Google Maps



Stromatolite formation on Highborne Cay in the Exumas, The Bahamas.
By Vincent Poirier CC BY-SA 3.0

Stromatolites or **stromatoliths** (from Greek *strōma* "layer, stratum" (GEN *strōmatos*), and *lithos* "rock") are layered sedimentary formations that are created by photosynthetic cyanobacteria. These microorganisms produce adhesive compounds that cement sand and other rocky materials to form mineral "microbial mats". In turn, these mats build up layer by layer, growing gradually over time. A stromatolite may grow to a meter or more. Although they are rare today, fossilized stromatolites provide records of ancient life on Earth.

Arizona Geology Blog – Grand Canyon Stratigraphy: a fresh view



Today - 9/9/2021, AZGS released Bob Leighty's magnificent and informative [Grand Canyon Stratigraphy](#). It includes the usual strat column features: geologic time, lithologies and rock units. The Lithologies section boasts nearly 40 radiogenic age dates tracking the temporal evolution of strata exposed in Grand Canyon. Also included, is a rich suite of symbols representing key sedimentary features and structures: fossils, mud cracks, cross bedding, convoluted bedding, to name a few.

Other useful features: Canyon Etymology, Tectonic History, a dozen photos of representative Grand Canyon rock units, and major hydrologic features. The full sized poster measures 24 x 54 inches.

See today's [Arizona Geology blog](#) for more details or go directly to view/download the publication at [AZGS Document Repository](#). A Spanish translation is available, too, courtesy of AZGS' Victor Higareda Garcia.

We thank Bob Leighty (Mesa Community College) for an excellent contributed report.

Got questions or concerns, drop us a line (fmconway@arizona.edu)

Thanks,
AZGS Staff

F. Michael Conway
Sr. Research Scientist
Arizona Geological Survey
fmconway@arizona.edu cell: 520.971.3688

The upper & central portions of Grand Canyon strata



FIELD GEOLOGY

All images taken by B. Leighty



A basalt-filled Whitmore Wash paleochannel at the southern end of the Linker volcanic field



The Moenkopi and Chinle Formations are exposed at river level only in the Lees Ferry area



The cliff-forming Fossil Mountain member of the Kaibab Formation along the South Rim near Yaki Point



The upper Paleozoic section (Supai through Kaibab) at Vishnu Temple as seen from Cape Royal



Brick-red mudstone and sandstone of the slope-forming Hermit Formation at Soap Creek Rapids



Cliffs and slopes of the four formations of the Supai Group in the O'Neill Butte area



The massive, banded Mooney Falls member of the Redwall Limestone across from Vasey's Paradise

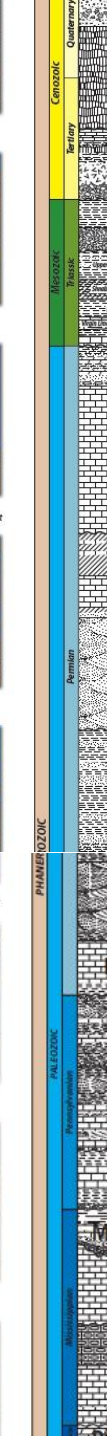


GEOLOGIC TIME

Unit thicknesses not drawn to scale

Lateral thickness changes are not depicted

west — east

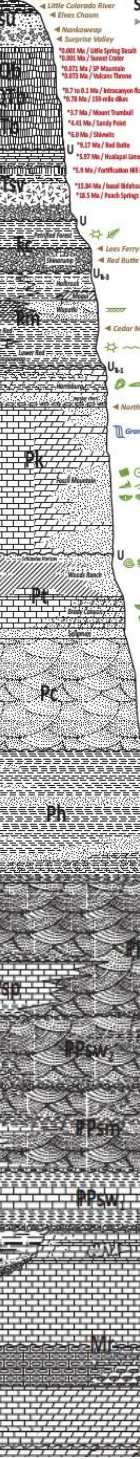


LITHOLOGIES

Unit thicknesses not drawn to scale

Lateral thickness changes are not depicted

west — east



Surficial Deposits, undivided (Qsu)

► Pleistocene to Recent
fluvial sediment, spring-related travertine and tufa, eolian sand deposits, colluvium, talus, and landslides // stream channels, springs, slopes, rockfalls, landslides

Basaltic Volcanics (Qvtb)

► Miocene to Holocene (>9 Ma to 0.001 Ma)
basaltic lava flows, cinder cones, and tuff cones of the Linker volcanic field (2.7 Ma to 0.001 Ma), San Francisco volcanic field (8.0 Ma to 0.001 Ma), Hopi Buttes volcanic field (8.5 Ma to 4.1 Ma), Mount Floyd volcanic field (6.8 Ma to 6.4 Ma), Shivwits Plateau basalts (9.1 Ma to 1.4 Ma), and Grand Wash basalts (>4.4 Ma) // mostly Hawaiian- to Strombolian-style eruptions

Tertiary Sedimentary & Volcanic Rocks (Tsv)

► Eocene to Late Miocene (~50 Ma to 5.5 Ma)
fluvial and lacustrine deposits, and hydrothermal flow and basaltic lava flows predating the modern Grand Canyon (Long Point lakebeds, Music Mountain and West Water Formations, Buck & Doe Conglomerate, Blue Mountain and Rose Well-Frazier Wall gravels, Peach Springs Tuff (18.5 Ma) and basalts (19.94 Ma to 14.63 Ma), Shivwits and Separation Canyon gravels, Muddy Creek Formation, Bidakochi Formation (16 Ma to 5.5 Ma) // alluvial fans, braided streams, lakes

Chinle Formation (Tc)

► Late Triassic / Norian (~227 Ma to 209 Ma)
conglomerate, sandstone, mudstone, and volcanic ash, locally containing vertebrate fossils and abundant petrified wood fragments (Anurocaecyon arizonicum) // and coastal plain, northwest-flowing braided streams and meandering streams, flood plains, lakes
► correlates with: Dolores Formation (CO)

Moenkopi Formation (Rm)

► Middle Triassic / Anisian (~245 Ma to 240 Ma)
mudstone, sandstone, evaporite, and carbonate rocks // and coastal plain, sabkha, tidal flat, shallow marine shelf (W)

Kaibab Formation (Pk)

► Late Early Permian to Middle Permian / Roadian (272 Ma to 269 Ma)
fossiliferous limestone, dolomite, sandstone, and chert // open to restricted shallow marine shelf, lagoon, sabkha
► correlates with: Coche Limestone (southeastern AZ), Basin Valley Formation (southeastern AZ), Plympton Formation (UT), Garden Valley Formation (NV), Road Canyon Formation (TX)

Toroweap Formation (Pt)

► Early Permian / Kungurian (284 Ma to 272 Ma)
sandstone, evaporite, limestone, and dolomite // open to restricted shallow marine shelf, tidal flat, sabkha, eolian dunes
► correlates with: Schuery Hill Formation (southeastern AZ), Glorieta Sandstone (northwestern NM), San Andres Limestone (NM), White Rim Sandstone member of the Cutler Formation (southeastern UT)

Coconino Sandstone (Pc)

► Early Permian / Kungurian (284 Ma to 272 Ma)
cross bedded quartz arenite (sandstone) // and coastal sand dunes
► correlates with: Schuery Hill Formation (southeastern AZ), DeChelly Sandstone (northwestern NM), Glorieta Sandstone (northwestern NM), Yucca Formation (northwestern NM), White Rim Sandstone member of the Cutler Formation (southeastern UT)

Hermit Formation (Ph)

► Early Permian / Late Sakmarian & Artinskian (292 Ma to 284 Ma)
mudstone and sandstone (interbedded) // and coastal flood plains
► correlates with: Organ Rock Formation (northwestern AZ, UT), Queenweap Formation (northwestern AZ), Leap Formation (southeastern AZ), Alto Formation (NM)

Esplanade Sandstone (Ppse)

► Early Permian / Asselian & Sakmarian (299 Ma to 290 Ma)
cross bedded quartz arenite (sandstone) and minor mudstone // and coastal sand dunes
► correlates with: Cedar Mesa Sandstone (northwestern AZ, UT), Hologate Formation (northwestern AZ, UT), Queenweap Formation (northwestern AZ)

Pakoon Limestone (PPsp)

► Early Permian / Asselian to Sakmarian (299 Ma to 295 Ma)
fossiliferous limestone and dolomite // shallow marine shelf
► correlates with: Hologate Formation (northwestern AZ), Queenweap Formation (northwestern AZ), Brad Spring Formation (NV)

Wescogame Formation (PPsw₁)

► Late Pennsylvanian / Kasimovian to Gzhelkin (307 Ma to 300 Ma)
sandstone, mudstone, limestone, minor conglomerate // and coastal sand dunes and flood plains
► correlates with: Hermitage Group (southeastern AZ), Leap Formation (southeastern AZ), Coche Limestone (NV)

Manakacha Formation (PPsm)

► Middle Pennsylvanian / early Moscovian (315 Ma to 311 Ma)
sandstone, mudstone, and minor limestone // and coastal sand dunes and flood plains
► correlates with: Hermitage Group (southeastern AZ), Coche Limestone (NV)

Whatahomigi Formation (PPsw₂)

► Early Pennsylvanian to Middle Pennsylvanian / Bauhinian and early Moscovian (323 Ma to 315 Ma)
mudstone and cherty limestone // coastal plain and shallow marine shelf
► correlates with: Black Prince Limestone (southeastern AZ), Moles Formation (southeastern UT), Coche Limestone (NV)

Surprise Canyon Formation (Msc)

► Late Mississippian (~326 Ma to 325 Ma)
purple-red mudstone, limestone, and conglomerate // estuaries, karst
► correlates with: Leap Springs Formation (northwestern NM), Chautauque Formation (western UT), Big Foot Formation (southeastern AZ, UT), Spring Formation (southeastern NV)

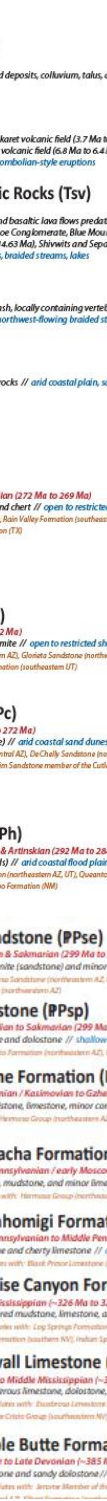
Redwall Limestone (Mr)

► Early to Middle Mississippian (~353 Ma to 325 Ma)
fossiliferous limestone, dolomite, and chert // shallow marine shelf
► correlates with: Beaudou Limestone (southeastern AZ), Leakeville Limestone (southeastern AZ), Moles Formation (southeastern UT)

Temple Butte Formation (Dtb)

► Middle to Late Devonian (~385 Ma to 375 Ma)
dolomite and sandy dolomite // estuaries (E) to shallow marine shelf (W)
► correlates with: Jerome Member of the Martin Formation (central AZ), Chinle Valley Formation (northwestern AZ)

ROCK UNITS



EXPLANATION

FILL PATTERNS

Sedimentary Rocks

Sedimentary breccia	Conglomerate
Sandstone	Sandstone (cross bedded)
Mudstone	Mudstone & Sandstone
Gypsum	Travertine
Limestone	Limestone (sandy)
Limestone (muddy)	Limestone (cherty)
Dolomite	Dolomite (sandy)
Dolomite (muddy)	Dolomite (cherty)

Igneous & Metamorphic Rocks

Mafic Volcanics	Felsic Tuff
Granitic Intrusives, Pegmatite	Diabase, Granodiorite, Diorite, Gabbro
Schist	Gneiss

SYMBOLS

U	unconformity	742	contact (sandstone-granite)
U	unconformity	742	biotic date (paleo)
U	unconformity	742	major watercut
U	unconformity	742	major spring
U	unconformity	742	Laramide

Sedimentary Structures & Fossils

mud cracks	current ripples	cross bedding	convoluted bedding
molluscs	nautilus	brachiopods	crinoids
sponges	coral	hyozoans	condonits
trilobites	trilobite tracks	vertebrate tracks	burrows
stromatolites	algal domes	plants	

Tectonic Structures

light to isoclinal folds	bounding
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IMPORTANT TERMS

fluvial	= stream-related	eolian	= wind-related
lacustrine	= lake-related	estuarine	= tidal channel-related
sabkha	= coastal salt flat	subtidal	= below the low tide water line
alluvium	= stream deposits	colluvium	= slope deposits
detrital	= composed of rock fragments	arenite	= sandstone
sill	= layer-parallel intrusion	dike	= cross-cutting intrusion
protolith	= original rock type	foliation	= tectonic layering
orogeny	= mountain-building event	isoclinal	= parallel fold limbs



Parent/Teacher Resource Page 1

<https://www.earthsciweek.org/>

EARTH SCIENCE WEEK UPDATE - SEPTEMBER

PLAN FOR UPCOMING EARTH OBSERVATION DAY

Earth Science Week 2021 invites you once again to take part in Earth Observation Day during this weeklong celebration of the geosciences! Earth Observation Day (Tuesday, October 12) aims to engage students and teachers in remote sensing as an exciting and powerful educational tool.

The event is a STEM educational outreach event of AmericaView and its partners. AmericaView is a nationwide partnership of remote sensing scientists who support the use of Landsat and other public domain remotely sensed satellite data through applied remote sensing research, K-12 and higher STEM education, workforce development, and technology transfer.

For lessons and activities by AmericaView and other organizations, as well as additional Earth Observation Day resources, please see the [program website](#).

AGI WEBSITE LOCATES GEOHERITAGE IN YOUR STATE

Did you know that in the roughly 30-mile-wide Rio Grande Rift, running from Colorado through New Mexico, the continental crust is thinning as it stretches to the east and west at a rate of a few millimeters per year?

Or that West Virginia, Kentucky, and Ohio preserve fossil-rich reefs, remnants life that once thrived in shallow seas spanning eastern North America throughout the Paleozoic?

To learn about the ways people interact with geoh heritage where you live, explore the Our Shared Geoh heritage page of the Earth Science Week website and unearth the geologic history of your state. This page also links educators and students to recommended resources including downloadable reports, articles, blogs, geoh heritage locations, and learning activities.

View Earth Science Week's [Geoh heritage by State](#) to learn more about geoh heritage where you are. And learn more about [Our Shared Geoh heritage](#) online.

NATIONAL NATURAL LANDMARKS OFFER EDUCATION RESOURCE

The National Park Service's National Natural Landmarks (NNL) program — which recognizes and encourages the conservation of sites that contain outstanding biological and geological resources — provides teachers and students with unique opportunities to study and experience geoscience in their part of the country.

NNL sites are designated by the U.S. Secretary of the Interior for their condition, illustrative character, rarity, diversity, and value to science and education. Many of the nearly 600 sites across the country have been given this designation for their significant geological resources.

Each site tells a piece of the story of the nation's natural history, from various geological processes to characteristic landforms to evidence of plants and animals that lived thousands to millions of years ago. To find out more about the NNL program, visit [online](#).

Parent/Teacher Resource Page 2



<https://learn.concord.org/earth>

Earth Science Resources

This online collection of **transformative geoscience resources** includes Earth system models, data visualization tools, and curriculum modules. Each module is designed for middle and high school students and is aligned with the Next Generation Science Standards. Teacher Editions, which include detailed background information, tips, and exemplar student responses, are available to help teachers guide their students through each module. Classroom management tools, reports, and a real-time dashboard to help teachers track their students' progress are also available. Validated pre- and post-assessments for each module are provided.



West Valley Rock & Mineral Club
 Buckeye's 7th Annual

Helzarockin' GEM & MINERAL SHOW

October 8 • 9 • 10 2021
 9 a.m. - 5 p.m. Fri-Sat
 9 a.m. - 2 p.m. Sun
 Adults \$3 kids under 13 free

Open Air Event
Buckeye Arena
 802 N 1st Street (Miller Road)
 Buckeye, Arizona

Rocks, Gems, Jewelry, Minerals, Fossils, Beads,
 Slabs, Cabs, Gold Panning & Scavenger Hunt
 Rock Painting
 Snacks and Beverages Available

show@westvalleyrockandmineralclub.com
 westvalleyrockandmineralclub.com

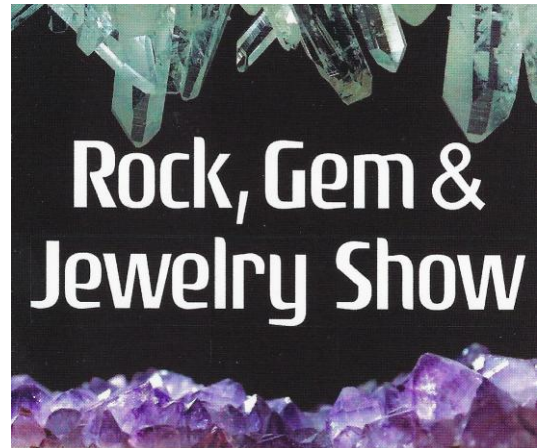
Alice: (602) 329-2519 | Kurt: (508) 735-4072
 Gloria: (206) 931-6993 | Lars: (602) 405-2926



47TH ANNUAL HUACHUCA GEM, MINERAL & JEWELRY SHOW

October 9th & 10th, 2021
 Sat. 9-5, Sun. 10-4

<http://huachuacamineralandgemclub.info/>
 The Mall at Sierra Vista
 2200 El Mercado Loop
 Sierra Vista, AZ



Rock, Gem & Jewelry Show

October 16 & 17
 Sat 10-5 / Sun 10-4

Sedona Red Rock High School - 89A at
 Upper Red Rock Loop Rd, W. Sedona

Hourly Raffles Grand Prize

Admission - \$ 4
 Children under 12 - Free



For more information go to:
www.sedonagemandmineral.org

**ALL ARIZONA CLUB MEETINGS MAY BE CANCELED
DUE TO HEALTH CONCERNS!**



Apache Junction Rock & Gem Club

Meetings are on the 2nd Thursday
Next Meeting: October 14, 2021, 6:30 pm
www.ajrockclub.com
@ Club Lapidary Shop
2151 W. Superstition Blvd., Apache Jct.



Daisy Mountain Rock & Mineral Club

Meetings are on the 1st Tuesday
(unless a Holiday then 2nd Tuesday)
Next Meeting: October 5, 2021, 6:30 p.m.
Please go to their website for more info
www.dmrmc.com
@ Anthem Civic Building
3701 W. Anthem Way, Anthem, AZ



Maricopa Lapidary Society, Inc

Meetings are on the 1st Monday
(unless a Holiday then 2nd Monday)
Next Meeting: TBA, 2021, 7:00 pm
www.maricopalapidarysociety.com
@ North Mountain Visitor Center
12950 N. 7th St., Phoenix



Mineralogical Society of Arizona

Meetings are on the 3rd Thursday
Next Meeting: October 21, 2021, 7:30 pm
In person and online
www.msaaaz.org
Franciscan Renewal Center
5802 E. Lincoln Dr., Scottsdale



Pinal Geology & Mineral Society

Meetings are on the 3rd Wednesday
Next Meeting: October 20, 2021, 7:00 pm
On YouTube until further notice
www.pinalgeologymuseum.org
@ Artisan Village
351 N. Arizona Blvd., Coolidge



West Valley Rock & Mineral Club

Meetings are on the 2nd Tuesday
Next Meeting: October 12, 2021, 6:30 pm
www.westvalleyrockandmineralclub.com
@ Buckeye Women's Club
845 E. Monroe Ave., Buckeye, AZ



White Mountain Gem & Mineral Club

Meetings are on the 1st Sunday
(unless a Holiday then 2nd Sunday)
Next Meeting: October 3, 2021, 1:00 pm
www.whitemountain-azrockclub.org
@ VFW Hall
381 N. Central, Show Low



Wickenburg Gem & Mineral Society

Meetings are on the 2nd Friday
(February & December on the 1st Friday)
Next Meeting: October 8, 2021, 7:00 pm
www.wickenburggms.org
@ Coffinger Park Banquet Room
175 E. Swilling St., Wickenburg

ESM's Meeting Notice

ESM's next meeting will be at North Mountain Visitor Center, 12950 N. 7th St., Phoenix, on Tuesday, TBA 2021, at 6:30 p.m.

BECOME A MEMBER!
Join the Earth Science Museum's



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**ESM Earth Science Investigation
 Team Membership Form**
 _____ **New Member** _____ **Renewal**

Membership levels:

_____ **ESI Family \$20**

_____ **ESI Individual \$10**

Membership benefits:

- ◆ Monthly e-newsletter *Earthquake*
- ◆ Official team membership card
- ◆ Knowledge that your contribution is making a difference in earth science education.

MANY THANKS TO OUR MAJOR DONORS!

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- Flagg Mineral Foundation
www.flaggmineralfoundation.org
- Friends of the AZ Mining & Mineral Museum
- Maricopa Lapidary Society
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www.msaz.org
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Earth Science Museum

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602-973-4291

Editor E-Mail:

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We're on the Web!

Visit us at:

www.earthsciencemuseum.org

Mission

Our Mission is to excite and inspire all generations about earth sciences through educational outreach.

Vision

We envision a community where students and the general public have curiosity about, passion for, and understanding of the underlying principles of earth sciences.

For more information about the ESM, how to become a member or how to arrange for a school visit or Community function, go to:
www.earthsciencemuseum.org.

NOTICE:

ESM's next meeting will be at North Mountain Visitor Center, 12950 N 7th St, Phoenix, on Tuesday, TBA 2021, at 6:30 p.m.

THANK YOU FOR YOUR CONTINUING INTEREST & SUPPORT!!!

**EARTH SCIENCE MUSEUM
NON-PROFIT BOARD OF DIRECTORS**

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