



National Association of Geoscience Teachers  
**Southeastern Section Newsletter**  
Winter-Spring 2018

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**Summer-Fall 2018**

**Newsletter Deadline:**

**August 15, 2018.** Please send  
news items to Bill at  
[bill@georgiarocks.us](mailto:bill@georgiarocks.us)  
or to your state rep by Aug. 1.

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## President's message

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by Frank Forcino, SENAGT president

### **Business Meeting April 12 in Knoxville, TN**

I invite you to attend the NAGT Southeastern Section business meeting on Thursday, April 12 in Knoxville, TN during the SEGSA meeting. The meeting will take place at Downtown Grill & Brewery from 12:00pm to 1:30pm, about five blocks from the convention center. This meeting is in between the morning education poster session and the afternoon education talk session. If you are presenting in those sessions, we would like to have your input in this meeting. At this meeting, we will discuss some overall goals for NAGT as well as ideas for education sessions for SEGSA 2019 and fields trips geared toward K12 educators. This is a great chance to make your voice heard and get involved with NAGT. If you're interested in providing input for NAGT or just having lunch with fellow educators, please come to this meeting.

### **Funding for attending NAGT field trip at 2018 SEGSA meeting**

Additionally, at this year's SEGSA meeting in Knoxville, TN there will be a NAGT sponsored field trip on Saturday, April 14, 7:30 am to 5:00 pm, cost \$35. We are providing reimbursement for up to \$75 to a limited number of K-14 teachers attending the trip, who **apply and register by March 5**. The field trip, titled *Lessons from Limestone: How to Teach All Sciences with Limestone*, will take participants on a tour of limestone outcrops in east Tennessee with the goal of providing information on how to teach about earth processes using limestone. Details are in the article on p.4.

### **Outstanding Earth Science Teacher Award**

Do you know an Earth science educator who deserves recognition for his or her standout teaching practices? Or is there an Earth science teacher who has had a large impact on your career? This is your chance to nominate that teacher for the NAGT Outstanding Earth Teaching Award. Awards are given out to a teacher in each state and one for the southeast section as a whole. Deadlines vary based on state, starting as soon as March 29. See the following website for specifics:

<https://nagt.org/nagt/awards/oest.html>

This is a great way to for teachers to find out about NAGT. It is a way for NAGT to get out into the community and look for exemplary teachers who don't know who we are. Teachers are encouraged to nominate themselves. Even if you do not intend to nominate anyone, please spread the word that this award exists. Teachers deserve recognition for the amazing work they do, and this is a small way that can be accomplished.

### **Get Involved in SENAGT!**

Make sure to keep up your membership in NAGT. There are some great current benefits, and we are working on additional ones. Please spread the word about NAGT to your colleagues. It would be great to increase our membership, particularly among K12 educators and graduate students. If you or someone you know is interested in serving SENAGT, we are currently seeking a new vice president. We are also always interested in gaining new state representatives across the southeast.

I look forward to seeing many of you at SEGSA in April!

*Frank Forcino*

## Teacher Grants Available for April 14 Geology Field Trip at SEGSA

by Michael Gibson, NAGT Tennessee Co-State Representative, and Bill Witherspoon

K-14 Science Teachers in the Southeast are invited to apply **by March 5** for funding to reimburse registration costs for the Saturday, April 14 NAGT-sponsored geology field trip, "Lessons From Limestone: How to Teach All Sciences with Limestone." The trip follows the SEGSA meeting in Knoxville. To be eligible for reimbursement, you must both complete the [application form](#) and [preregister for the trip by March 5](#).

The NAGT reimbursement following the trip will be \$75. This covers \$40 "Field Trip Only" registration for the April 12-13 Southeastern GSA meeting plus the \$35 trip registration fee. (As a bonus, GSA lets K-12 teachers register for the full meeting for only an additional \$5).

The link for the application is <https://goo.gl/forms/lqPzFfpZUBE31aBj2>. Register for the meeting and trip at:

[http://www.geosociety.org/GSA/Events/Section\\_Meetings/GSA/Sections/se/2018mtg/registration.aspx](http://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/se/2018mtg/registration.aspx).

Michael Gibson (UT Martin) and Don Byerly (Emeritus UT Knoxville) will be leading the trip. Participants will learn why limestone is ideal for teaching cross-disciplinary STEM subjects of biology, chemistry, and physics, along with history and culture. The trip will address Next Generation Science Standards related to chemical reactions, biological evolution, geochemical cycles, economic and environmental impact, and limestone's historical importance to the fine arts.

Limestone, a nearly ubiquitous sedimentary rock, provides many lessons about Earth's systems (geosphere, hydrosphere, atmosphere, and biosphere), including the geochemical, hydrologic, and rock cycles. Additionally, limestone is ideal for teaching cross-disciplinary STEM subjects of biology, chemistry, and physics, along with history and culture through its uses in society. It is a readily available commodity to teachers and students, thus is an ideal material for budget-strapped STEM education.



*Limestone construction near the quarry at Ijams Park*

This field trip and accompanying materials address *Next Generation Science Standards* (NGSS) including: using fossils to develop concepts of paleoecology and evolution; using limestone to reconstruct ancient geography (including plate tectonics); the relevance of limestone to our society as a building stone, medical uses, and as a potential hazard associated with karst (caves and sinkholes), including where, how and why limestone forms. Five cross-disciplinary content standards will be addressed in the proposed guidebook paper and during field instruction: (1) enhancement of the understanding of chemical reactions, (2) biological evolution, (3) geochemical cycles, (4) economic and environmental societal impacts, and (5) historical importance and fine arts use of limestone to society.

Limestone formations are important archives of biotic and abiotic Earth history, provide valuable economic resources, and can sometimes be the cause of environmental hazards. Deposits around the world provide data for reconstructing global climate change and recreating Earth's changing paleoecology throughout geologic time, including human history. As a sink for carbon, carbonate rocks are Earth's main long-term antidote to global warming.

# Meeting Calendar

Most recently reported dates of past or future meetings

National Science Teachers Association and Affiliates		
Area	Latest date on web site	City
<a href="#">National</a>	Mar. 15-18, 2018	Atlanta
<a href="#">Eastern</a>	Nov. 15–17, 2018	National Harbor, MD
<a href="#">Southern</a>	Nov. 29 – Dec. 1, 2018	Charlotte
<a href="#">Alabama</a>	Mar. 7-8, 2017	Birmingham
<a href="#">Florida</a>	Oct. 19-21, 2017	Orlando
<a href="#">Georgia / NSTA Nat'l</a>	Mar. 15-18, 2018	Atlanta
<a href="#">Louisiana</a>	Oct. 22-24, 2018	Shreveport
<a href="#">Mississippi</a>	Oct. 29-31, 2017	Biloxi
<a href="#">North Carolina/ NSTA S</a>	Nov. 29 – Dec. 1, 2018	Charlotte
<a href="#">South Carolina</a>	Nov. 8-10, 2017	Columbia
<a href="#">Tennessee</a>	Nov. 1-3, 2018	Murfreesboro

Geological Societies		
Organization (Area)	Latest date on web site	City
<a href="#">GSA (National)</a>	Nov. 4-7, 2018	Indianapolis
<a href="#">GSA (Southeastern)</a>	Apr. 12-13, 2018	Knoxville
<a href="#">GSA (South Central; incl. LA)</a>	Mar. 12-13, 2018	Little Rock
<a href="#">Alabama Geological Society</a>	Oct. or Dec. 2018 TBD	Birmingham
<a href="#">Carolina Geological Society</a>	Sep. 28-30, 2018	Boone, NC
<a href="#">Georgia Geological Society</a>	Oct. 6-8, 2017	Carrollton

## FOSSIL Project Announcement

by Eleanor Gardner, SENAGT Secretary

FOSSIL – which stands for **F**ostering **O**pportunities for **S**ynergistic **S**TEM with **I**nformal **L**earners – is an NSF-funded project headquartered at the University of Florida.

The project team has been following up with K-12 teachers who participated in the August 2017 ‘FOSSILs 4 Teachers’ professional development workshop. The teachers are reporting success implementing the paleontology-related lesson plans that were developed during the PD. Lesson plans are freely accessible at <https://www.myfossil.org/category/k-12/>.

One teacher participant recently reported that her high school Earth and Space Science class hosted a group of 14 fourth and fifth graders (right) and assisted as the elementary students sorted through fossil-rich matrix from the Aurora, NC, phosphate mine. The students drew scientific (as close as possible!) drawings of their favorite finds. She was very proud of her students.






The FOSSIL Project has put out a call for the following fossils, to go in fossil kits for K-12 teachers:

- Fish fossils (vertebrae, fin rays, etc.)
- Echinoid fossils
- Oysters
- Trilobites
- Ammonites

If you have any of the above fossils that you'd like to donate, please contact the FOSSIL Project Coordinator, Sadie Mills, at [smills@floridamuseum.ufl.edu](mailto:smills@floridamuseum.ufl.edu).

A sister project at the University of Florida, called iDigFossils, is recruiting 30 teachers to participate in a workshop on 3D printing of fossils. (announcement at right) The workshop will take place June 20-22 at the Florida Museum of Natural History at the University of Florida. The application deadline has been extended past February 18. If you are a K-12 teacher with access to a 3D printer, please consider applying for this fantastic opportunity. For more information, contact the iDigFossils Project Coordinator, Claudia Grant, at [cgrant@flmnh.ufl.edu](mailto:cgrant@flmnh.ufl.edu).

**iDigFossils**   College of Education  
UNIVERSITY of FLORIDA  FLORIDA MUSEUM

**3D Printing and Paleontology for Student Engagement in Science**

**Where:** Florida Museum of Natural History  
Gainesville, FL

**When:** June 20 – June 22, 2018  
Travel days are June 19 and June 23

**Cost:** Travel, lodging and meals are covered by the project

**Stipend:** \$1,000

**To Apply Visit:** [www.idigfossils.org/professional-development/2018-2](http://www.idigfossils.org/professional-development/2018-2)  
**Deadline to Apply:** Feb. 18, 2018

**Participation Requirements**

- > Be a K-12 Science Teacher
- > Have a 3D printer available at school
- > Have access to technical support
- > Attend 3-day PD in June in Gainesville, FL
- > Design 1 lesson
- > Implement lesson during Fall 2018
- > Improve lesson after implementation
- > Facilitate collection of survey data
- > Allow for classroom visits and observations
- > Gather consent forms for iDigFossils research

A stipend (\$1,000) will be provided after successfully completing all components of this PD

## State News in Geoscience Education

**Alabama** (submitted by David C. Kopaska-Merkel, Geological Survey of Alabama, State Representative)

### Camp McDowell workshops June 11-13

McDowell Education Programs, located at Camp McDowell about 10 miles north of Jasper, AL, are preparing for some exciting, field-based teacher professional development opportunities. We have a three-day, fully funded field-based workshop entitled 'Using Alabama Rocks, Inquiry, and Observation to Unearth our Past,' from June 11-13 at Camp McDowell. We also have an eight day field experience from June 24-July 1 that starts in the mountains of northwest Alabama and travels all the way to Dauphin Island Sea Lab to experience the unique aspects of Alabama's biosphere, geosphere, hydrosphere, and atmosphere in a trip called 'Mountains to the Gulf.' This one used to be sponsored by Legacy, but that agency has been crippled by funding cuts imposed by the state legislature.

We have been working on a place-based curriculum to integrate local geology into classrooms across the state that is funded in part by an education grant from the Paleontological Society. Aligned to the Next Generation Science Standards and to Alabama's newly revised science standards, the curriculum unit will feature activities for Middle and High School aged learners to help teachers address Earth Science content in an authentic, locally-relevant, and inquiry-based way. Many of the activities are easily modified for fourth and fifth grade classrooms to address relevant content standards and can be used to bring Earth Science inquiry into elementary classrooms, as well! The workshop will feature using Google Earth to virtually visit locations, field trips to explore and practice using inquiry to understand Earth Science, and opportunities to create classroom rock and fossil collections. Our three-day workshop is our first official unveiling of this curriculum, and we're excited to invite teachers who'd like to pilot this curriculum in their classrooms to come to Camp McDowell June 11-13.

Please contact Trish Smrecak ([trish@campmcdowell.com](mailto:trish@campmcdowell.com)) with questions. To register for our upcoming workshops, visit our website: <https://mcdowellc.com/teacher-workshops>

### **Alabama Geological Society Scholarship Deadline March 23**

The Alabama Geological Society is pleased to announce that applications are now being accepted for the 2018 Newton and Winefordner Scholarships. Please share the link below with Alabama university students in the geological sciences.

[http://www.alageolsoc.org/uploads/3/4/4/4/34440427/scholarship\\_announcement\\_s18.pdf](http://www.alageolsoc.org/uploads/3/4/4/4/34440427/scholarship_announcement_s18.pdf)

### **Alabama Geological Society Field Trip (Fall 2018 date TBD)**

The 2018 AGS field trip will focus on mining in the Birmingham district, including coal and limestone as well as iron ore. Mining buildings and railroads will be included as field trip stops. Andrew Rindsberg (University of West Alabama) and Tim Chowns (University of West Georgia) will be the trip leaders. At press time the date, either in October or December, has not been determined.

### **Ichnofabric Workshop May 2019**

I included this last time, but it is just as topical today. The International Ichnofabric Workshop, which meets every couple of years and emphasizes sedimentologic and stratigraphic aspects of ichnology, will meet at the University of West Alabama in Livingston, Alabama, in May 2019, probably with three days of talks and a four-day field trip in or near Alabama. This will be the first time that the conference has been held in the United States since 1993. If you would like to be involved in planning this conference or leading a field trip stop, please contact Andy Rindsberg ([arindsberg@uwa.edu](mailto:arindsberg@uwa.edu)).

### **ALLELE lectures**

The University of Alabama's long-running series of lectures on evolution continues this year with presentations on many subjects that have evolutionary components. Past lectures can be listened to on iTunes U. You can find information about recent and upcoming lectures here: <http://evolution.ua.edu/> there are generally six per academic year, and there are three planned for this spring. These lectures are all free and open to the public.

### **Speaking Evolution**

"Speaking Evolution" is a new Alabama Public Television show, narrated by NPR's Debbie Elliott and produced by the Alabama Museum of Natural History: <https://www.aptv.org/episodes/983162/Speaking-Evolution//>. It is the brainchild of Roger Reid, writer for Discovering Alabama, and Dr. Leslie Rissler, of the National Science Foundation (formerly University of Alabama). The first episode concerns the question of why the products of evolution look like the products of design. It features clips from interviews of more than a dozen scientists. Many of these people were in Tuscaloosa because they were presenting in the ALLELE lecture series. All were interviewed by Roger Reid. The show is a companion to the "Speaking Evolution" website: <http://www.speakingevolution.org/>. This show is astonishingly good. It features superb nature photography, and really clear and understandable explanations of how evolution has generated today's diverse biosphere. Subsequent shows are planned, contingent on securing adequate funding.

### **People**

Dana Ehret, Curator of Paleontology at the Alabama Museum of Natural History, has taken a new position at the New Jersey State Museum. Ehret's energetic outreach to the public about anything and everything related to fossil organisms is sorely missed. He has not yet been replaced.

### **University of Alabama**

The GeoKids initiative began as outreach on the part of graduate students in the Department of Geological Sciences. Every Friday, they attend a class of young students (5-6 graders) in a local school and present them with a "lecture" on a selected geological subject. A couple of years ago a small grant from UA allowed the purchase of materials that enhanced our hands-on activities.

## October 2017's Fossils of the Black Belt teacher workshop

The Geological Survey of Alabama, Discovering Alabama, the Birmingham Paleontological Society, the Alabama Geological Society, the University of West Alabama, and the Museum of the Black Belt, collaborated on a one-day paleontology field workshop for teachers. In 2016, we focused on biostratigraphy and lithostratigraphy. Last fall (October 17, 2017), we returned to the same large Cretaceous outcrop to study taphonomy and fossil preservation. I, Andrew K Rindsberg, and James Lamb led the workshop, with the invaluable assistance of members of the Birmingham Paleontological Society. We had a couple of dozen attendees, mostly K-12 teachers.



The weather cooperated, and everybody had a good time. In previous years we have found a turtle carapace, a brittle star, and a pterosaur. Last year we found nothing quite so remarkable, but everyone had a good time and learned a lot. Anyone interested can email me, or visit the workshop's Facebook page:

<https://www.facebook.com/Fossils-of-the-Black-Belt-690641810945830/>.

Above: Last instructions before setting out.

Left: *Hamulus* worm tubes.

## Geological Survey of Alabama

The Geological Survey, Alabama's oldest state agency (founded in 1848), has recently revamped its website. A lot of material has been added, and more publications are available as free downloads. The entire catalog of the paleontological collection (about 20,000 numbered items) is online and searchable. Most of these things will be of educational interest only at the college level, but more and more of the Survey's publications written for the general public are being scanned and made available online at no charge.

## Alabama book helps solve 87-year-old mystery at the American Museum of Natural History

The book, "*Footprints in Stone: Fossil Traces of Coal-Age Tetrapods*," by Ronald J. Buta and David C. Kopaska-Merkel, helped solve a mystery at the American Museum of Natural History in New York City. Senior Museum Specialist Carl Mehling had been working to identify some unknown specimens from an unlabeled crate. His only clue was the newspaper used to cushion the specimens. He explained in an email to Buta and Kopaska-Merkel on October 11, 2017:

"I have to thank you guys for something unexpected. I got a copy of *Footprints in Stone* about a month ago. In the Intro, I read that G.G. Simpson collected trackways down there in January 1930. I was immediately thrilled because this promised to help solve a mystery I first became aware of in 2005."

Mehling found documentation that proved at least three of the specimens were associated with the Galloway No. 11 underground coal mine near Carbon Hill, Alabama – the location in Buta and Kopaska-Merkel's book.

In the 1920s, workers at the Galloway No. 11 Mine reported seeing fossil animal footprints (trace fossils) preserved in the rock layers above the coal seam they were mining. The footprints attracted the attention of paleontologist George Gaylord Simpson, of the American Museum. Simpson selected 14 large slabs of tracks, now thought to be 310-315 million years old, to be shipped to New York in 1930. The fossils were promptly lost.

Mehling closed his email: "I am absolutely thrilled to have reunited these specimens with their data. And I love the serendipitous path that took me there."

**Thanks to** Natasha Dimova, Andrew K Rindsberg, Denise Hills, and Trish Smrechak.

## **Florida** (submitted by Eleanor Gardner, SENAGT Secretary)

### **Florida Teachers Selected for GABI-RET**

Out of the ten total K-12 participants who were selected for the 2018 cohort of the GABI-RET program, four are from Florida. GABI stands for the Great American Biotic Interchange, and RETs are NSF-funded Research Experiences for Teachers. This program is run out of the University of Florida and its mission is to advance knowledge of ancient Neotropical biodiversity based on new fossil discoveries in Florida and New Mexico, educate the next generation of scientists via research experiences for teachers, and communicate research discoveries to the public.



### **Elementary Class Visits Dig Site**

In December 2017, a class of fifth graders experienced what a "real live paleontology dig" is all about. Ms. Sexton's class from East Marion Elementary Schools in Silver Springs, FL (right), went to the Montbrook fossil dig site near Williston, FL, where paleontologists are uncovering tons of well-preserved fossils dating to 5.5 million years old. They had a great time and learned a lot from the paleontologists working in the pit.

### **Middle School Job Opportunity**

For those on the job hunt: Candidates with middle school science experience may be interested in a job opportunity available via the University of Florida at the P.K. Yonge Developmental Research School in Gainesville, FL. This is a unique opportunity to implement IQWST (Investigating and Questioning our World through Science and Technology)--a Florida Standards/Common Core/Next Generation Science Standards aligned, inquiry-based, learning-goals-driven, National Science Foundation science curriculum. Learn more at <http://explore.jobs.ufl.edu/cw/en-us/job/506187/middle-school-science-instructor>.

## **Georgia** (submitted by Christy Visaggi, Co-State Representative)

### **Atlanta Science Festival, March 9-24**

The Atlanta Science Festival (ASF) will be held March 9-24. Bill Witherspoon, our newsletter editor, along with Bill Waggener, of the Georgia Mineral Society, will be leading "Roadside Geology" walks among the building stones and outcrops of Midtown Atlanta, and students from the Department of Geosciences at Georgia State University are once more offering the Rock n' Walk geology hikes up Stone Mountain.

The Giant Traveling Map of Georgia (16' by 20' floor map from National Geographic) will make an appearance at several events including Eco Expedition at Stone Mountain, Discovery Day at Georgia State University, and the Exploration EXPO in Piedmont Park. There is a special event this year at ASF that combines both the joy of geology with the sport of curling as seen in the Winter Olympics given the very unique granite used on the ice!



## **NSTA National Conference, March 15-18**

Teaching science and Georgia will be on my mind as well due to the National Science Teachers Association (NSTA) annual meeting to be held in Atlanta from March 15-18. Bill Witherspoon and Bill Waggener will offer repeats of their ASF city walk as “Stones and Stories,” and Pamela Gore and Bill Witherspoon will host a tour of the “White Whaleback of Stone Mountain.” See here for events at the conference: <http://www.nsta.org/conferences/national.aspx>.

## **GGA Institute late June**

Finally, looking ahead to the end of the school year, I'd proud to say that the Georgia Geographic Alliance (GGA) will be hosting a geo-inquiry institute for K-12 educators at Georgia State University in late June. The focus will be on water resources, especially in the middle grade levels, so if you're interested, please send an email to Dr. Visaggi, GGA Director of Education and Outreach for more information ([cvisaggi@gsu.edu](mailto:cvisaggi@gsu.edu)).

## **Louisiana** (Submitted by Wendy Demers, State Representative)

### **OEST Nominations Open till April 15**

Nominations are being accepted at this time for Louisiana's 2018 Outstanding Earth Science Teacher. The deadline for submitting nominees for Louisiana is **April 15, 2018**. Nominations are made online at <http://nagt.org/nagt/awards/oest-nom.html> and followed up with an email to the state representative for NAGT, Wendy DeMers.

### **GIFT workshop at December 2017 AGU**

During the December 2017 American Geophysical Union meeting in New Orleans, the Geological Society of America's Dean Moosavi and University of New Orleans' Dinah Maygarden, Director of the Coastal Education Program at UNO, contributed a field trip to the GIFT workshop for K-12 teachers.

The field trip sought to demonstrate the reasons for the founding of New Orleans at this location along the Mississippi River and how the geologic basis for this decision has left the city with a legacy of flood risk as observed during the 2005 Katrina disaster.

Teachers had the opportunity not only to observe the "high" land along the Mississippi River on which the French Quarter is built, but also to use basic survey tools to measure the downward slope of the landscape as one heads into the city. Through this field trip experience, teachers were also provided with a concrete example of how quantitative geoscience can be taught in the field even in urban environments, with simple tools a K-12 teacher could afford to buy or make.

### **High School Wins Samsung Grant**

Jeanne LeJeune and her students at Sulphur High in Sulphur Louisiana, are Louisiana's winners of the Samsung Mobile Solver for Tomorrow grant. As part of the reward, Louisiana DEQ brought its Mobile Air Monitoring Lab (MAML) for students to tour. The vehicle, a 2006 Winnebago RV, has been equipped with a number of innovative technologies that enhance the Department of Environmental Quality's air monitoring resources.



### **Students Visit Colorado**

Students from Louisiana School of the Math, Science, and Arts in Natchitoches, Louisiana, recently took a six-day trip to Colorado as a part of Special Projects Week. Through this trip they were exposed to aspects of renewable energy and conservation. They visited and toured the National Renewable Laboratory in Golden Colorado, as well as the Colorado School of Mines, a leading institution in renewable energy and conservation research. The group also took a ranger-guided snowshoe hike through Rocky Mountain National Park to observe wildlife and talk about conservation with renowned scientists from the Denver Museum of Natural Science.

## Mississippi (Submitted by Renee Clary, Mississippi State University, State Representative)

### Mississippi Museum of Natural Science

**Fossil Road Show March 4:** See the museum's fossil collection and collector displays, and meet institutional exhibitors. Enjoy hands-on activities, a simulated fossil dig and an intro to scientific illustration. Bring a fossil for the staff to identify.

**When:** March 4, 2018 - Saturday – 10:00 a.m. to 3:00 p.m.

**Where:** Mississippi Museum of Natural Science: Jackson, MS

**Information:** <https://www.mdwfp.com/museum/calendar/fossil-road-show/>

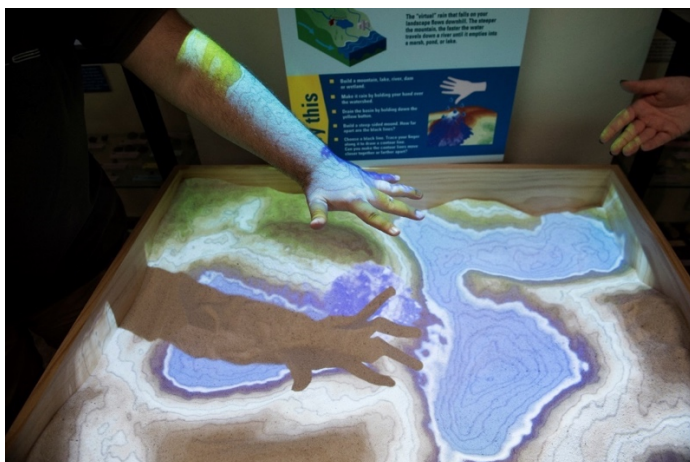
### Mississippi State University

- **Earth Day:** The Dunn-Seiler Museum, in partnership with Gaining Ground Sustainability Institute of Mississippi, is sponsoring a 2018 competition to promote awareness of single use plastics, and especially drinking straws. Mississippi's K-12 students are invited to design and submit an original, unique item constructed from straws that will otherwise be discarded. **"The Straw Solution" entries are due April 16, 2018.** The contest description can be found on the Dunn-Seiler Museum website at <https://www.geosciences.msstate.edu/dunn-seiler-museum/news-and-events/>.
- **Darwin Week:** February 10-18, 2018. Daily events recognized the life and work of Charles Darwin. Darwin Week is cosponsored by the Department of Biological Sciences and the Department of Geosciences at Mississippi State University.
- **Science Night at the Museum:** February 15, 2018. The Mississippi State University Museums and Galleries Committee celebrated Darwin Week with a series of interactive, family-friendly activities between Cobb Museum of Archaeology, Hilbun Hall's Dunn-Seiler Museum, and Biological Sciences in Harned Hall.
- **National Fossil Day:** The Dunn-Seiler Museum celebrated National Fossil Day by sponsoring a K-12 National Fossil Day Art and Story competition that focused upon prehistoric fish in the state. The Dunn-Seiler also hosted Fossil Extravaganza on October 12, 2017 and unveiled the winning contest entries that are currently on display.

*Renee Clary, Dunn-Seiler Museum Director, cuts the National Fossil Day cake for visitors to the Fossil Extravaganza event.  
(Photo by Megan Bean / Mississippi State University)*



- **Arbor Day Celebration with *The Tree Lady*:** The 15° Laboratory and the MSU Tree Campus USA cosponsored an outreach event at Emerson Family School in Starkville, Mississippi. Volunteers read the 2017 Giverny book winner, *The Tree Lady*, to preschoolers and donated classroom book copies to teachers on February 15, 2018. *The Tree Lady* tells the story of Kate Sessions, who researched and planted arid-tolerant trees in San Diego's Balboa Park for an interdisciplinary science story of geoscience and biology. More information on the Giverny Award, given annually to the best children's science storybook, can be found at <http://www.15degreelab.com/>. The Arbor Day planting event was held on Mississippi State University's campus on February 21, 2018.



Left: The new augmented reality sandbox was a big hit among visitors to Fossil Extravaganza at the Dunn-Seiler Museum. (Photo by Megan Bean / Mississippi State University). Right: Margot Hoffman reads the 2017 Giverny book, *The Tree Lady*, to a class of preschoolers at Emerson Family School while her mother, Amy Moe-Hoffman (Dunn-Seiler Museum) displays the illustrations. Dr. Steve Grado, MSU Campus Tree Trail, also participated in the event. (Photo Renee Clary, 15<sup>o</sup> Laboratory)

## **North Carolina** (submitted by Randy Bechtel, N.C. Geological Survey, State Representative)

### **OEST and OESE Nomination Deadline is March 29**

Nominate an N.C. Outstanding Earth Science Teacher and Educator (OEST and OESE)! The Nomination Form and any supporting material need to be received by Randy Bechtel by March 29, 2018. The Nomination Form can be found at the bottom of this link (or google NC Geoscience Education): <http://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/geoscience-education/outstanding-educators-awards>

To see previous winners and find out more about the awards, see [this link](http://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/geoscience-education/previous-nc-outstanding-earth-science-teacher-outstanding-earth-science-educator-award-winners) (or google NC Geoscience Education): <http://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/geoscience-education/previous-nc-outstanding-earth-science-teacher-outstanding-earth-science-educator-award-winners>

### **The North Carolina Science Festival (NCSF) is the entire month of April!**

The 2018 NC Science Festival is going to be bigger than ever before, now with a full month of science from April 1-30. If you want to promote the geosciences yourself, or if your company wants to do outreach, this is a great opportunity. Here are some links to get you started:

[www.ncsciencefestival.org/opportunities-scientists](http://www.ncsciencefestival.org/opportunities-scientists) and [www.ncsciencefestival.org/host-event](http://www.ncsciencefestival.org/host-event).

The theme for the 2018 Festival is the "science of food and drink." Not all events need to adhere to the theme. Organizations looking for event ideas or interested in proposing an event can contact [ncscifest@unc.edu](mailto:ncscifest@unc.edu) to consult with Festival staff.

As the N.C. Geological Survey Education Geologist, I can also provide some insight into this event and the process. An "event" can be as big or small as you like. I have presented an all-ages building stone tour of downtown Raleigh (The Rockin' Walkin' Tour) each year for this event. An individual can do a classroom presentation; a company can give a tour of a lab, site, or facilities; or you can volunteer for an event to see what it is all about. The Festival Staff [ncscifest@unc.edu](mailto:ncscifest@unc.edu) can also assist you with ideas about how you can participate. This is a great opportunity to promote the geosciences!

From the NCSF website: *"The Festival, a celebration of science, technology, engineering and math (STEM) and its impact on North Carolina, is the largest science festival in the nation and the first to encompass an entire state. In 2017, the two-week long Science Festival had a presence in all 100 N.C. counties! The NCSF had 240,139 participants and 850 events at schools, museums, community*

centers, libraries, parks and other venues. Two astronauts, 5,218 volunteers and 2,743 STEM professionals contributed to its success.”

### **2018 Combined National and NCSTA Area Conference Nov. 29- Dec 1**

The National Science Teachers Association (NSTA) holds Area Conferences each year which combine the national and a state science teacher's association. The Area Conferences rotate through states in a region and every 5 years the NSTA combines with the North Carolina Science Teachers Association (NCSTA) in Charlotte. Different date and location this year! [www.nsta.org/conferences](http://www.nsta.org/conferences)

The combined NSTA-NCSTA Area Conference will be held Thursday, November 29 - Saturday December 1, 2018 in Charlotte. This conference usually attracts thousands of teachers from North Carolina, the Southeast and from across the country.

### **2017 Outstanding Earth Science Teacher (OEST) and Educator (OESE) award winners**

The two awards were presented during the NCSTA-PDI's annual conference in October. The 2017 North Carolina OEST winner is Annette Bartlett, from Harris Road Middle School in Cabarrus County. Annette was also chosen, from among other state winners in the Southeastern Section of the National Association of Geoscience Teachers (NAGT), as the Southeastern Section winner of the OEST award. This year's N.C. OEST winner made it to the highest level of this program by winning the section-wide award. Bartlett said, *“As a teacher, it is nice to be recognized for all the hard work, I put into my classroom so the students can have a Global Project Based Learning Environment which will allow them to see how Earth Science connects to the world.”*



*Left-right: 2017 N.C. OESE winner Jennifer Brooks; 2017 N.C. and Southeastern Section OEST winner Annette Bartlett*

Thanks to the Board for the additional support of the OESE award this year. The additional funding was much appreciated and permitted the two award packages to remain equal. The 2017 North Carolina OESE winner is Jennifer Brooks, from the Durham County Soil and Water Conservation District. Brooks said, *“As an Earth Science Educator, and like all others in this field, I do this job because of a passion to connect people with nature, not for prizes and awards. But when one is recognized for their hard work and dedication with an honor such as this one, it gives validation that what you do is appreciated and celebrated. Thank you for providing such recognition and opportunities to me and all Earth science educators throughout the state of North Carolina.”*

### **Carolinas Chapter of AEG grant to support teachers attending the NCSTA-PDI**

For the first time, the Carolinas Chapter of the Association of Environmental and Engineering Geologists (AEG) offered grants to assist teachers in attending the N.C. Science Teachers Association Professional Development Institute (NCSTA PDI). This is the annual statewide professional development institute specifically for science teachers. The grants provided registration for three teachers to attend the PDI. Three teachers were competitively chosen from fifteen applicants to receive a grant.

The grant recipients all teach the high-school Earth/Environmental Science course in addition to classes in other sciences. Two of the grantees, Lia Biscardi, a second-year teacher at South Central High School in Pitt County, and Chase Smith, an early career teacher at Pisgah High School in Haywood County, were first-time attendees at the NCSTA PDI. The third grantee, Mark Case, is an experienced teacher serving Title I students at Southern Guilford High School, in Guilford County. The three grantees geographically represent the entire state from the mountains to the sea.

The three grantees sent thank-you letters to the Board Members of the Carolinas Chapter. Here are excerpts:

Case wrote: *"My attendance also allowed me to meet with educators from elementary to high school, and network how to include geology in every aspect of science. It does not have to be solely taught in Earth science. Geology is included in every part of our lives. Making those connections for educators was inspirational."*

Biscardi wrote: *"I cannot thank you or your chapter enough for allowing me to attend the NCSTA conference. It was my first NCSTA conference and I truly enjoyed my experience. You allowed me to expand my knowledge of vocabulary strategies and advancing my career by networking with other professionals. I hope everyone can receive this generosity and appreciate the value of continuous education for educators. It is a blessing to have an organization support our educators and appreciate what we would like to do to help our students."*

Smith (right) wrote: *"I am a third-year science teacher at Pisgah High School in Haywood County. This was my first time attending the conference, and I was thrilled to connect with so many colleagues from across the state and learn so much from the events. I normally teach chemistry and physics, but this spring I'll have 2 sections of earth/environmental science [EES], so this allowed me the opportunity to plan ahead and get some great resources to be better prepared to give EES my best."*



AEG grantees, Mark Case and Lia Biscardi, at the 2017 NCSTA-PDI.



As the N.C. Geological Survey Education Geologist, I would like to thank the AEG Carolinas Chapter for its continuing sponsorship and support of the N.C. Outstanding Earth Science Teacher (OEST) award, the N.C. Outstanding Earth Science Educator (OESE) award, and for the additional support of the OESE award this year. I would also like to thank the Chapter for offering grants to assist teachers in attending the N.C. Science Teachers Association Professional Development Institute (NCSTA PDI). Teachers and Educators face many challenges, and the support of the Carolinas Chapter, as you can see from the quotes above, is really appreciated.

**Puerto Rico** (State Representative position open)

**South Carolina** (submitted by Gwen Daley, State Representative)

**South Carolina Academy of Science Meeting April 14**

The South Carolina Academy of Science and Junior Academy of Science (<http://scasannualmeeting.com/>) will have its annual meeting April 14, 2018 at Presbyterian College in Clinton.

### **Groups Meet in Fall**

The 79<sup>th</sup> meeting of Carolina Geological Society (CGS) will be in Boone, NC in September; more information is at: [http://carolinageologicalsociety.org/CGS/Next\\_Meeting.html](http://carolinageologicalsociety.org/CGS/Next_Meeting.html)

The Science Council of South Carolina will have its annual meeting in November in Columbia (<http://www.scscience.org/sc2-conference>).

### **Other News**

Offshore drilling has become a political hot potato in the Palmetto State, with the governor demanding that South Carolina get the same exemption to seismic exploration and drilling as Florida (<http://www.thestate.com/news/politics-government/article195211234.html>). Oil (and gas) plays on the South Carolina continental shelf are possible, but by no means proven (<https://www.bna.com/oil-potential-off-n73014474706/>). Thus far, South Carolina's state government is backing tourism over oil speculation.

The South Carolina Geologic Survey has improved its educational resources, including access to various interactive maps about geology, groundwater, and earthquakes in South Carolina (<http://www.dnr.sc.gov/geology/index.htm>).

Clemson's Bob Campbell Museum of Geology has been closed recently due to frozen sprinkler pipe damage. They would appreciate donations and volunteers to get the museum back in shape (<https://www.clemson.edu/public/geomuseum/index.html>).

### **Recent Publications About South Carolina**

Bossenecker, T.W., E. Ahmed, and J.H. Geisler. 2017. New records of the dolphin *Albertocetus meffordorum* (Odontoceti: Xenorophidae) from the lower Oligocene of South Carolina: Encephalization, sensory anatomy, postcranial morphology, and ontogeny of early odontocetes. Plos One: <https://doi.org/10.1371/journal.pone.0186476>.

Godfrey, S.J., T.E. Weems, and B. Palmer. 2017. Turtle Shell Impression in a Coprolite from South Carolina, USA. Ichnos: <https://doi.org/10.1080/10420940.2017.1386662>.

Ogg, C.M., C.D. Gulley, J.M. Reed, C.A. Ferguson. 2017. Soil property trends and classification of alluvial floodplains, South Carolina Coastal Plain. Geoderma 305: 122-135. <https://www.sciencedirect.com/science/article/pii/S0016706116310801>

Williams, T.M., D.C. Shelley, B. Song. 2017. GIS analysis of historical maps: A case study from an 1885 survey of the Congaree River. Mathematical and Computational Forestry and Nature Resource Sciences 9: 3-16. [http://mcfns.net/index.php/Journal/article/view/9.2\\_2](http://mcfns.net/index.php/Journal/article/view/9.2_2)

**Tennessee** (submitted by Michael A. Gibson, University of Tennessee at Martin, and Ann E. Holmes, University of Tennessee at Chattanooga, Co-State Representatives)

**SE NAGT Sponsored Teachers Field Trip at the Knoxville SE GSA Meeting.**

Drs. Michael A. Gibson (UT Martin) and Don Byerly (UT Knoxville) will co-lead a field trip targeting K-12 science educators and university faculty working with teacher training. **Lessons from Limestone: How to Teach All Sciences with Limestone** is a day-long field trip scheduled for Saturday, April 14 in the Knoxville area. Tennessee's official state rock, Limestone, is the centerpiece of a STEM-oriented trip designed to provide educators with a common theme for integrating all sciences. **Apply by March 5** for funding to reimburse registration for this trip; see the lead article in this newsletter and the flyer at <http://georgiarocks.us/nagt/LessonsLimestone2018.pdf> for details.

### **University of Tennessee Knoxville**

The Department of Earth and Planetary Sciences (EPS) at UT-Knoxville moved into its new building, Strong Hall, last summer (right). It's a striking seven story structure, with adjoining rotunda style lecture halls, an attractive atrium and outdoor features including a large rock garden. EPS shares the building with the Anthropology and some undergraduate teaching labs for Chemistry and Biology. The EPS space includes eight teaching laboratories, most with adjoining prep-labs. Graduate assistant offices are all on an outer wall, just a few steps from the research labs. Faculty, staff and students are delighted with the new building, which replaces our nearly one-hundred-year-old former home. It is a great place for teaching and research. We welcome our colleagues and prospective students to come for a visit, perhaps this spring, when we host the SE GSA regional meeting. You'll enjoy a great view of the campus, downtown and the Smoky Mountains.



Sadly, Professor Lawrence A. Taylor passed away on September 18, just after his 79th birthday and following his recent retirement after 46 years of service on the UTK faculty. Larry was founder and director of the Planetary Geosciences Institute and was named a University Distinguished Professor in 2004. He was a consummate scientist and indisputably the Department's (and likely the University's) most prolific faculty member ever, with a staggering 760 publications in peer-reviewed scientific journals. Much of his research focused on the petrology and magmatic evolution of the Moon, stemming from his involvement with the Apollo program early in his career. Major contributions include the discovery of the oldest mare basalts and the role of liquid immiscibility in the lunar magma ocean. He also made significant contributions to the evaluation and use of resources on the Moon and Mars, and he held six patents for engineering processes such as microwave paving of roads using lunar regolith. His terrestrial research also helped elucidate the nature and composition of the Earth's mantle, by studying rocks formed at great depths and the diamonds that they carry.

Larry taught numerous geology courses, and introduced generations of students to his favorite tool, the electron microprobe. He directed 7 M.S. and 8 Ph.D. students, and supervised 41 postdoctoral associates. He was UT's point man for the Tennessee Space Grant Consortium and did lots of outreach for the public and local schools. Larry was always an aggressive proponent of the Department, and it is a much stronger program because of his many contributions. The electron probe laboratory in our new building will carry his name, and his generous contribution has also funded the Larry Taylor Professorship.

### **East Tennessee State University.**

**Summer 2018 Geosciences Field Experience : New Zealand** - ETSU Department of Geosciences faculty Dr. Chris Gregg will offer GEOL/GEOG 3700 Field Experience (3 credits) course in summer 2018 to New Zealand. The country straddles the Pacific and Australian plate boundary, forms the tip of an eighth continent (Zealandia), and is dominated by geo-hazards linked to subduction, continental rifting and continent-continent collision. It is a world leader in hazards and environmental policy, and is site of Peter Jackson's *Lord of the Rings*! The trip will include access to braided rivers, glaciers, active faults, and volcanoes; geothermal, wind, hydro power plants; TePapa National Museum; alpine hike on the Tongariro Crossing, and a tour of White Island volcano.

**Summer 2017 Geosciences Field Experience: Pacific Northwest** - Eighteen students and two faculty (Dr. Ingrid Luffman and Dr. Mick Whitelaw) spent 10 days studying the geography and geology of the Pacific Northwest. The first week was devoted to volcanoes and associated landforms and processes. They hiked part of Mt. Rainier and saw glaciers and meltwater streams, and viewed Mt. St. Helens from multiple angles, including a hike through a lava tube south of the volcano. At Crater Lake, students traveled by boat to Wizard Island, a small volcano-within-a-volcano, and had the opportunity to swim in the cold, clear waters of the lake.



*Left: Students at John Day Fossil Beds National Monument, Oregon.*



*Right: Students at Mt. Rainier.*

The return to Seattle was along the Oregon and Washington coast, beginning with an opportunity to visit the redwoods of northern California. During the drive, students examined coastal landforms shaped by both erosional processes (cliffs, sea stacks, arches) and depositional processes (dunes, sand bars). The final days were spent in Seattle, where students visited the Space Needle, Pike's Place Market, and various museums, and sampled the local seafood.

**Hazard Mitigation Plan for the ETSU campus** - ETSU Department of Geosciences faculty Dr. Andrew Joyner received a grant from Federal Emergency Management Agency (FEMA) and Tennessee Emergency Management Agency (TEMA) to develop the first ever Hazard Mitigation Plan (HMP) for the ETSU campus, beginning in the summer of 2016. HMP's help to identify long-term, broadly supported strategies for risk reduction and align resources on the greatest risks and vulnerabilities. In conjunction with the grant, a new lab in the Department of Geosciences has been created – the Geoinformatics and Disaster Science (GADS) Lab. We work closely with multiple staff and faculty members across campus to develop a map- and GIS-intensive HMP that will include extensive geospatial databases, modeling, analysis, open-source GIS solutions and products, interactive/mobile web map services, and UAV (i.e., drone)-derived products that include aerial photos and building assessments. Assessed hazards include drought, extreme temperatures, flooding/extreme precipitation, thunderstorms (incl. hail, lightning, and wind), tornadoes, tropical cyclones, wildfires, winter weather, earthquakes, landslides, and subsidence/sinkholes.





*Left: Working group meeting in the GADS Lab.*



*Right: GPS data collection on the ETSU main campus*

**Gray Fossil Site & Museum.** The ETSU Don Sundquist Center of Excellence in Paleontology oversees the Gray Fossil Site & Museum. The fossil site and museum has a mission to present paleontological treasures from our region to the world. With the leadership of Dr. Blaine Schubert, Executive Director, and Dr. Chris Widga, Head Curator, over the past two years, the Center has logged the following accomplishments:

- Developed a partnership with the Hands On! Regional Museum, a well-known regional children's museum. Hands On! completes its move to the fossil site this year and will install new STEM-related exhibits at the Gray Fossil Site, creating a more diverse experience for visitors.
- Discovered the most complete skeleton of an early mastodon in North America. This is also one of the largest elephant-like mammals ever discovered, and Site scientists are estimating a weight of around 16 tons (thus, they have nicknamed it Tennessee Ernie).
- Greatly reduced the range in the age estimate for the Gray Fossil Site, homing in on 400,000 years (4.5 -- 4.9 million years ago) from the previous 2.5-million-year range (4.5 – 7 million years ago). This is based on the discovery of a wide variety of well-dated animals.
- Supported a volunteer program averaging >12,000 hours per year. These dedicated citizen-scientists assist Gray Fossil Site staff with fossil excavation, preparation, and curation.
- Led research projects that involved students and other scientists within the region and around the world. This includes ongoing investigations of Ice Age animals in Saltville, VA, and a current National Geographic project exploring the paleontology of underwater caves in the Yucatan of Mexico.
- Organized the 10th Annual Southeastern Association for Vertebrate Paleontology Meeting, June 14-17, 2017. Over the course of three days, over 80 registrants contributed 35 oral presentations and 14 poster presentations on active vertebrate paleontological research across the region. The meeting also included tours of the Gray Fossil Site and active excavations in Saltville, VA.

### **University of Tennessee at Martin**

The geosciences are housed within the Department of Agriculture, Geosciences, and Natural Resources. We have had significant changes over the past year. Dr. Benjamin Hooks, who taught structural geology, mineralogy, igneous and metamorphic petrology, and field methods, abruptly left the geology program at the end of the Fall semester to follow his wife Kassie Hughes Hicks (B.S. Geology) to her new job in Nashville, where Dr. Hooks now also works with a local environmental firm. After a quick search, we hired Ms. Angela Van Boening as a three-year replacement, at which time a national tenure-track search will be implemented. Ms. Van Boening is in the final stages of her PhD from the Texas A&M at College Station, where she conducted groundbreaking and innovative geoscience education research related to the use of hand gestures to evaluate student understanding in geologic education. We anticipate her being an active member of SE NAGT. She also has field experience in the petrogenesis and tectonic implications of mafic rocks in the Precambrian core, rocks over 700 million

years old, of the Black Hills, South Dakota, which is work she completed while at the University of Missouri, Columbia. Geology lab instructor Claire Landis Davis is also following her spouse to a new job and the department hired Tennessee native, Ms. Audrey Pattat to take the helm as lab instructor. Ms. Pattat is a graduate of Tennessee Tech for her bachelor's degree and holds her master's from Texas Tech University. Our meteorology position has been temporarily filled with bridge moneys by Mr. Tim Wallace, who came to us from Mississippi State University. UTM geology will be traveling to Costa Rica for spring break in April. The trip will traverse the width of the country, visiting forearc, arc, and backarc tectonic settings. The trip includes snorkeling both Pacific and Caribbean waters with field sediment studies, as well as a visit to the Arenal volcano, coffee plantations, and much more.

### **Middle Tennessee State University**

MTSU professor Al Ogden has compiled a list of Tennessee karst publications. For more information, contact him at [Albert.Ogden@mtsu.edu](mailto:Albert.Ogden@mtsu.edu). Additionally, the Albert and Ethel Ogden Undergraduate Research Scholarship in Geology and Geography was established to encourage small scale karst research by geology and geography undergraduate students in Tennessee. The award is in its second year, and \$1,000 award is available for spring or summer research. Applicants must be a member of the National Speleological Society. Example projects include dye tracing, spatial analysis of karst landforms, water quality of springs and cave waters, cave sediment analyses, etc. Applications describing the proposed research are limited to two pages of text. Send or email your application to John Hoffelt, 208 Cheatham Ave., Smyrna, Tennessee 37167-4766; mossyguy@comcast.net. A letter of recommendation by the professor overseeing the research should be included in the proposal. Although the 2018 award has already been made, it isn't too early to begin the application process for 2019. The application deadline for 2019 awards should be submitted by December, 2018 for awarding in January 2019.

### **University of Memphis**

The University of Memphis Earth Sciences program is doing well, with a recent upswing in geology concentration majors. There have been no faculty or staff changes to report. For geoscience majors looking for a summer field camp, the University of Memphis will be again offering its 4.5-week Geology Field Camp course in June, 2018 in Wyoming. Interested students can download the information brochure at:

<http://umdrive.memphis.edu/dlarsen/Geology%20Field%20Camp%20Information%202018.pdf> .

### **Science Saturday at the Discovery Park of America, March 3**

The Discovery Park of America in Union City is continuing its popular program aimed at introducing science to middle school age kids and including family participation in learning. On the first Saturday each month a different science discipline is highlighted, with demonstrations and activities designed by professors and student groups from UT Martin. The next geoscience program, scheduled for March 3, has a meteorological theme. Dr. Mark Simpson (and the UT Martin chapter of the American Meteorological Society) will be demonstrating the science behind extreme weather phenomena. The next geology program will coincide with Earth Science Week in October. The programs are free to the public. For more about the geology exhibits and programs at the Discovery Park of America visit:

<http://www.discoveryparkofamerica.com/>.

### **Pink Palace/Coon Creek Science Center 2018 Season Begins**

The Coon Creek Science Center, located in McNairy County, begins its 2018 season in March. The site is the home of the Late Cretaceous Coon Creek Formation, which contains hundreds of fossil species, including the State Fossil of Tennessee (*Pterotrigonia thoracica*), mosasaurs, sharks, bivalves, gastropods, turtles, and much more (<http://www.memphismuseums.org/coon-creek-science-center/>).

Groups are encouraged to attend and can receive programs through the Pink Palace Museum, located in Memphis. For more information on day programs or to schedule a visit contact:

<http://www.memphismuseums.org/>. Though a long-standing agreement with UT Martin, university groups can arrange overnight visits. For information on an overnight university visit, contact Michael Gibson at UT Martin ([mgibson@utm.edu](mailto:mgibson@utm.edu); 731.881.7435).

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