

# Atlanta Geological Society Newsletter

Next meeting of the Atlanta Geological Society is  
November 26, 2013  
Fernbank Museum of Natural History (Clifton Road)  
Social begins at 6:30 pm – Meeting begins at 7:00 pm

NOVEMBER 2013

## ODDS AND ENDS

**Ben Bentkowski, Newsletter Editor**

I never know what in the geologic world will meander into my life. The unexpected theme over the last month is the interest of kids in geology. There is a six year old kid who lost his rock collection in the Moore, OK tornado six months ago. Some geologists got together and pooled some of their spare rocks (we all have some of those around) and re-established his collection. I got to meet him a couple of weeks ago and he's a cute excited six year old who just loves rocks. His parents have to check his pockets before they do his laundry. He was very excited to show off the large selenite crystal he talked his dad into getting him at the fair.

Recently at a career fair, I was rambling on about geology and where it has taken me over the years. One kid was asleep, two were on their phones but there was this one girl, né, young lady, who wanted to know where groundwater comes from and how it could be protected as a source of drinking water. This young lady is interested in a medical career but already she sees the connection between public health and geology.

Geologists make up only 0.06% of the professional work force in the US. But they all have to start somewhere. I suggest you take some time and talk rocks with those that are interested. Give a kid a mineral for Christmas. You never know where it will take them. BB

## NOVEMBER MEETING

Join us Tuesday, November 26, 2013 at the Fernbank Museum of Natural History, 760 Clifton Road NE, Atlanta GA. The meeting social starts at 6:30 pm. This month our speaker will be Randy Kath, Ph.D. speaking on "The Emerson-Talladega and Great Smoky-Cartersville Faults: One fault or separate faults, kinematic evidence from Iron Hill Campground, Lake Allatoona?" Dr. Kath is a Professor of Geology at West Georgia College and also the Director of the Center for Water Resources at West Georgia. Our sponsor for the evening will be FRx, Inc. a provider of specialty injection and delivery services in support of soil, bedrock, and groundwater remediation.

Please come and enjoy the social time, talk with our generous sponsor and adsorb the interesting presentation on Tuesday, November 26, 2013.

## **Amber Provides New Insights Into the Evolution of Earth's Atmosphere: Low Oxygen Levels for Dinosaurs Nov. 18, 2013 —**

An international team of researchers led by Ralf Tappert, University of Innsbruck, reconstructed the composition of Earth's atmosphere of the last 220 million years by analyzing modern and fossil plant resins. The results suggest that atmospheric oxygen was considerably lower in Earth's geological past than previously assumed. This new study questions some of the current theories about the evolution of climate and life, including the causes for the gigantism of dinosaurs.

Scientists encounter big challenges when reconstructing atmospheric compositions in Earth's geological past because of the lack of useable sample material. One of the few organic materials that may preserve reliable data of Earth's geological history over millions of years are fossil resins (e.g. amber). "Compared to other organic matter, amber has the advantage that it remains chemically and isotopically almost unchanged over long periods of geological time," explains Ralf Tappert from the Institute of Mineralogy and Petrography at the University of Innsbruck. The mineralogist and his colleagues from the University of Alberta in Canada and universities in the USA and Spain have produced a comprehensive study of the chemical composition of Earth's atmosphere since the Triassic period.

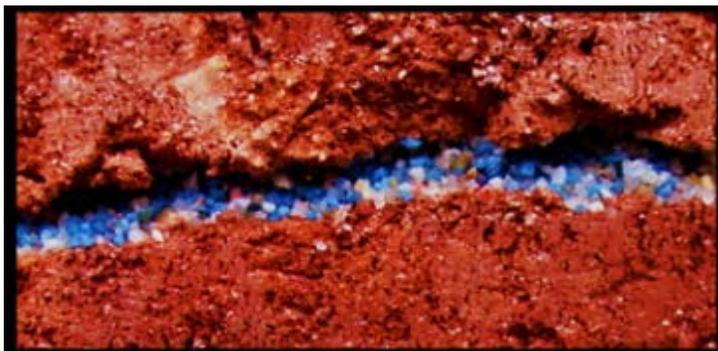
The study has been published in the journal *Geochimica et Cosmochimica Acta*. The interdisciplinary team, consisting of mineralogists, paleontologists and geochemists, use the preserving properties of plant resins, caused by polymerization, for their study. "During photosynthesis plants bind atmospheric carbon, whose isotopic composition is preserved in resins over millions of years, and from this, we can infer atmospheric oxygen concentrations," explains Ralf Tappert. The information about oxygen concentration comes from the isotopic composition of carbon or rather from the ratio between the stable carbon isotopes  $^{12}\text{C}$  and  $^{13}\text{C}$ . Atmospheric oxygen between 10 and 15 percent

The research team analyzed a total of 538 amber samples from from well-known amber deposits worldwide, with the oldest samples being approximately 220 million years old and recovered from the Dolomites in Italy. The team also compared fossil amber with modern resins to test the validity of the data. The results of this comprehensive study suggest that atmospheric oxygen during most of the past 220 million years was considerably lower than today's 21 percent. "We suggest numbers between 10 and 15 percent," says Tappert. These oxygen concentrations are not only lower than today but also considerably lower than the majority of previous investigations propose for the same time period. For the Cretaceous period (65 -- 145 million years ago), for example, up to 30 percent atmospheric oxygen has been suggested previously.

### **Effects on climate and environment**

The researchers also relate this low atmospheric oxygen to climatic developments in Earth's history. "We found that particularly low oxygen levels coincided with intervals of elevated global temperatures and high carbon dioxide concentrations," explains Tappert. The mineralogist suggests that oxygen may influence carbon dioxide levels and, under certain circumstances, might even accelerate the influx of carbon dioxide into the atmosphere. "Basically, we are dealing here with simple oxidation reactions that are amplified particularly during intervals of high temperatures such as during the Cretaceous period." The researchers, thus, conclude that an increase in carbon dioxide levels caused by extremely strong vulcanism was accompanied by a decrease of atmospheric oxygen. This becomes particularly apparent when looking at the last 50 million years of geological history. Following the results of this study, the comparably low temperatures of the more recent past (i.e. the Ice Ages) may be attributed to the absence of large scale vulcanism events and an increase in atmospheric oxygen.

Reference: University of Innsbruck (2013, November 18). Amber provides new insights into the evolution of Earth's atmosphere: Low oxygen levels for dinosaurs. *ScienceDaily*. Retrieved November 25, 2013, from <http://www.sciencedaily.com/releases/2013/11/131118081043.htm>



## *Providing In Situ Access to Contaminants Since 1994*

FRx provides specialty injection and delivery services in support of soil, bedrock, and groundwater remediation. The company founders conceived and developed many reliable techniques and technologies while serving as principal investigators for several research and development projects sponsored by the USEPA in the 1980's and 1990's. FRx was founded in 1994, and continued development and deployment of efficient, innovative, and cost-effective injection technologies has been a primary focus ever since. Particular focus is placed on injection methodologies that allow targeted emplacement of solid phase remedial substrates for well productivity stimulation, ISCO, ISCR, and/or enhanced bioremediation purposes. FRx has contributed to the successful remediation of sites in the majority of the states, as well as across the remainder of the North American continent, Europe, and South America.

**Contact Us Please feel free to contact us for more information about our services or technologies:** <http://www.frx-inc.com/index.html>

**Bill Slack**

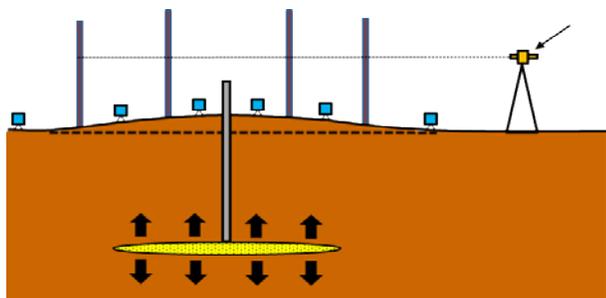
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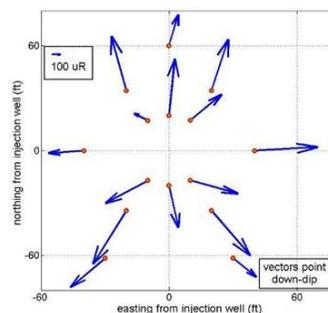
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Typical array used to measure and characterize deformation at the ground surface. Fracture thickness and surface uplift are exaggerated for illustrative purposes.



Example of surface expression results as measured by tiltmeters. Arrows point down-dip with lengths that represent tilt magnitude.

## Greenland's Shrunken Ice Sheet: We've Been Here Before

Nov. 22, 2013 — Think Greenland's ice sheet is small today? It was smaller -- as small as it has ever been in recent history -- from 3-5,000 years ago, according to scientists who studied the ice sheet's history using a new technique they developed for interpreting the Arctic fossil record. "What's really interesting about this is that on land, the atmosphere was warmest between 9,000 and 5,000 years ago, maybe as late as 4,000 years ago. The oceans, on the other hand, were warmest between 5-3,000 years ago," said Jason Briner, PhD, University at Buffalo associate professor of geology, who led the study. "What it tells us is that the ice sheets might really respond to ocean temperatures," he said. "It's a clue to what might happen in the future as the Earth continues to warm."

The study is important not only for illuminating the history of Greenland's ice sheet, but for providing geologists with an important new tool: A method of using Arctic fossils to deduce when glaciers were smaller than they are today. Scientists have many techniques for figuring out when ice sheets were larger, but few for the opposite scenario. "Traditional approaches have a difficult time identifying when ice sheets were smaller," Briner said. "The outcome of our work is that we now have a tool that allows us to see how the ice sheet responded to past times that were as warm as or warmer than present -- times analogous to today and the near future."

The technique the scientists developed involves dating fossils in piles of debris found at the edge of glaciers. To elaborate: Growing ice sheets are like bulldozers, pushing rocks, boulders and other detritus into heaps of rubble called moraines. Because glaciers only do this plowing when they're getting bigger, logic dictates that rocks or fossils found in a moraine must have been scooped up at a time when the associated glacier was older and smaller. So if a moraine contains fossils from 3,000 years ago, that means the glacier was growing -- and smaller than it is today -- 3,000 years ago. This is exactly what the scientists saw in Greenland: They looked at 250 ancient clams from moraines in three western regions, and discovered that most of the fossils were between 3-5,000 years old.

The finding suggests that this was the period when the ice sheet's western extent was at its smallest in recent history, Briner said. "Because we see the most shells dating to the 5-3000-year period, we think that this is when the most land was ice-free, when large layers of mud and fossils were allowed to accumulate before the glacier came and bulldozed them up," he said. Because radiocarbon dating is expensive, Briner and his colleagues found another way to trace the age of their fossils. Their solution was to look at the structure of amino acids -- the building blocks of proteins -- in the fossils of ancient clams. Amino acids come in two orientations that are mirror images of each other, known as D and L, and living organisms generally keep their amino acids in an L configuration. When organisms die, however, the amino acids begin to flip.

In dead clams, for example, D forms of aspartic acid start turning to L's. Because this shift takes place slowly over time, the ratio of D's to L's in a fossil is a giveaway of its age. Knowing this, Briner's research team matched D and L ratios in 20 Arctic clamshells to their radiocarbon-dated ages to generate a scale showing which ratios corresponded with which ages. The researchers then looked at the D and L ratios of aspartic acid in the 250 Greenland clamshells to come up with the fossils' ages. Amino acid dating is not new, but applying it to the study of glaciers could help scientists better understand the history of ice -- and climate change -- on Earth.

The study was funded by the National Geographic Society and U.S. National Science Foundation University at Buffalo (2013, November 22). Greenland's shrunken ice sheet: We've been here before. *ScienceDaily*. Retrieved November 25, 2013, from <http://www.sciencedaily.com/releases/2013/11/131122165523.htm>

## BENEFITS OF AN AGS MEMBERSHIP

- Location – AGS meets at the Fernbank Museum of Natural History, which is a truly awesome facility central to most of our membership.
- Cost – AGS membership (\$25 general; \$10 student) is the most inexpensive for any geological society in the SE.
- Active – AGS holds nine lectures a year and is one of the most active geological societies in the SE.
- AEG – For one of our lectures, AGS co-sponsors with the Association of Environmental & Engineering Geologists to annually present the “Richard H. Jahns Distinguished Lecturer” while in Atlanta.
- PDH – AGS is recognized by Alabama, South Carolina, and other professional state boards to provide Professional Development Hours for our lectures, as well as field trips and workshops.
- PG Classes – AGS offers nearly monthly Professional Geologist development training classes in preparation for passing the ASBOG examinations and has been recognized by the Georgia State Geologist as enhancing PG test scores for participants.
- Free Food – AGS offers free pizza and Coke at all of our regular meetings, sandwiches and hors d’oeuvres at the Jahns lecture, and a sit-down BBQ dinner at our June social.
- IMAX – As part of the June social, AGS and Fernbank present a free IMAX movie.
- Networking – AGS meetings include professionals, academics, regulators, and others who all share the same interest in geological sciences.
- Resume – AGS membership and even involvement in one of our many committees will enhance any resume.

Annual membership dues for the Atlanta Geological Society are \$25 for professional membership, \$10 for students, and \$100 for corporate sponsorship (which includes up to 4 professional memberships). Please complete the [application form](#) and submit with your payment to the AGS Treasurer. For further details about membership, please contact the AGS Membership Chairman – Ben Bentkowski  
cell -770-296-2529 [BBENTKOW@gmail.com](mailto:BBENTKOW@gmail.com)



The Cretaceous-Paleogene (K-Pg) boundary, formerly known as the Cretaceous-Tertiary (K-T) boundary, was first described in terrestrial (non-marine) rocks on South Table Mountain in Golden, Colorado back in 1943. This boundary actually isn't visually well-defined there but was recognized on the basis of fossil evidence long before the more recently applied evidence of the boundary was imagined. It occurs somewhere within the eroded slope of the badlands topography. This site was judged to be so important to the history of science that the National Science Foundation held its 50th birthday party here in 2000.

The K-Pg boundary is far more visually recognizable at a number of sites in southern Colorado and northern New Mexico. The lower photograph was taken this summer at Trinidad Lake State Park near the southern Colorado town of Trinidad. Not only is the Trinidad Lake site one of the best places in the world to view the famous K-Pg boundary layer clay, it's also one of the most accessible. A quarter-mile (0.5 km) level trail takes you from the trailhead to the site which is marked by a nice explanatory sign. Here the boundary is clearly exposed just below a layer of protective sandstone caprock. The boundary layer clay here contains abundant evidence of the catastrophic asteroid impact that likely caused the extinction of the non-avian dinosaurs along with perhaps 75 percent of all other species living at that time, roughly 66 million years ago. Such evidence includes: high levels of the rare element iridium, shocked quartz grains, glassy microtektites, a pronounced decrease in the pollen of higher plants, and a sharp spike in fern spores. Photo taken on August 24, 2013.

<http://epod.usra.edu/blog/2013/10/cretaceous-paleogene-boundary.html>

## The December 2013 AGS PG Candidate Workshop:

Date: Saturday, December 14, 2013

Time: 10:00 am to 12:00 pm

Venue: Fernbank Science Center  
<http://fsc.fernbank.edu>

Speaker: James Mayer, Ph.D., P.G.

Subject: Hydrogeology

Jim Mayer will lead a class on the fundamentals of hydrogeology. He will cover Darcy's Law, hydraulic head and groundwater flow, groundwater geology, and aquifers. He will also touch briefly on stream-groundwater interaction and groundwater flow to wells.

Jim is an associate professor in the Geosciences Department at the University of West Georgia where he teaches courses in hydrogeology, physical geology and historical geology. He received his Ph.D. in hydrogeology from the University of Texas at Austin.

Please join us and \*forward this message\* to anyone interested in becoming a Georgia Registered Professional Geologist, or anyone who might be interested in the topic. Two Professional Development Hours are available or attendees of the class.

The classes are open to all, membership in the AGS is not required, but for \$25 per year (\$10 for students) it is quite a bargain! Please consider joining, the AGS is one of the most active geological organizations in the Southeast. For more information on becoming a member please visit [www.atlantageologicalsociety.org/](http://www.atlantageologicalsociety.org/) or contact us at the addresses below.

Atlanta Geological Society  
Professional Registration Committee

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John Salvino, P.G.  
[john.salvino@bellsouth.net](mailto:john.salvino@bellsouth.net)

Please note that the Fernbank Science Center is separate from the Fernbank Museum and is located at 156 Heaton Park Drive, Atlanta, GA 30307

## **A bit more about our speaker, Randy Kath, Ph.D.**

### **Bio Stuff:**

Professor of Geology UWG

Director Center for Water Resources

Board Member/Vice-Chairman Georgia Board of Professional Geologists

ASBOG Subject Matter Expert (Geology National Examination)

ASBOG Executive Committee Member

B.S. Geology, West Georgia College

M.S. Geology, University of Tennessee, Knoxville

Ph.D. Geology, South Dakota School of Mines and Technology

Georgia Geological Society, Secretary

Georgia Geological Society, Digital Guidebook Editor

## **AGS Members... Geology Enthusiasts Needed!!**

If you are an AGS member and would like to contribute to the Professional Registration Committee by leading a lecture on one of the subjects listed below, then please contact me either by e-mail or at the monthly AGS meetings. The lecture should be for one hour followed by a Q&A session. We need different speakers for each workshop. Your volunteering to teach on one of these subjects is essential to the success of the Professional Registration Committee – we need more widespread participation by the AGS membership. Speakers can be compensated for expenses and will receive certificates to acknowledge their participation.

The following content domains are covered in the Georgia Professional Geologist exams:

- |   |   |
|---|---|
| A. General Geology  | B. Mineralogy, Petrology, & Petrography   |
| C. Sedimentology, Stratigraphy, & Paleontology              | D. Economic Geology & Energy Resources    |
| E. Structure, Tectonics, & Seismology                       | F. Hydrology & Environmental Geochemistry |
| G. Engineering Geology                                      |   |
| H. Quaternary Geology, Geomorphology, & Surficial Processes |   |

We do not "teach the test" our aim is to review fundamental concepts of the earth sciences and acquaint candidates with industry specific information not easily obtainable from the literature. Please inform anyone who might be interested in becoming a professional geologist of our workshop. Please consider joining us even if you are not a P.G. candidate. The workshops are interesting and informative.

Ken Simonton, P.G., Chair

John Salvino, P.G.

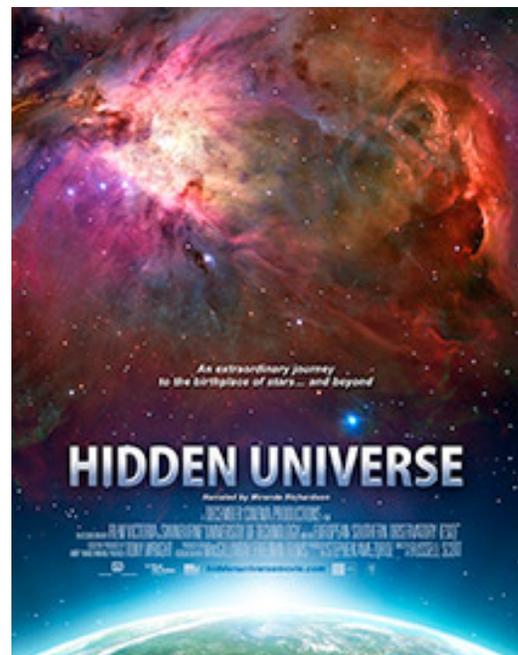
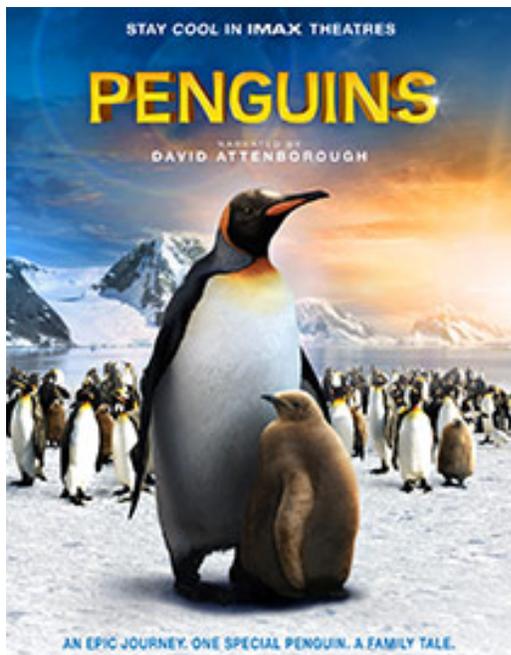
Professional Registration Committee

[www.atlantageologicalsociety.org](http://www.atlantageologicalsociety.org)


**FERNBANK MUSEUM**  
 of NATURAL HISTORY

Fernbank Museum of Natural History  
**Upcoming Public Programs and Events**  
 (All programs require reservations, including free programs)

Now Showing in the Fernbank IMAX movie theater:



*Penguins* -- Set against a backdrop of dramatic snowy peaks and glacial crags, *Penguins* follows a brave king penguin on the journey of a lifetime. Watch this breathtaking, endearing and ultimately triumphant quest unfold on the biggest screen in town, Fernbank's IMAX® Theatre.

*Hidden Universe* -- Take a breathtaking tour of deep space through images captured by Hubble and the world's most powerful telescopes. Explore galaxies and travel the terrain of Mars; witness images of celestial structures; and peer deep inside vivid clouds of nebula.

BOTH showing through January 2, 2014

## Fernbank Museum of Natural History

767 Clifton Rd, NE, Atlanta, GA 404-929-6400

Special Exhibits On View: <http://www.fernbankmuseum.org/explore-exhibits/special-exhibitions>



### Marco Polo: Man & Myth

*Experience the story of the ultimate adventure traveler.*

Follow Marco Polo's adventures along the Silk Road through a collection of more than 80 objects representing an epic journey that spanned 24 years and thousands of miles. Making its North American premiere at Fernbank Museum, this special exhibition features coins, ceramics, artworks, maps, and more.

From Marco Polo's homeland in Venice to his final destination in China, the exhibition reveals the many cultural influences and customs he observed, highlights the impact of exchanging ideas along the Silk Road, and sheds light on his encounters inside the Mongol Empire, including the Court of Kublai Khan. Along the way he became an experienced merchant, knowledgeable explorer and keen observer.

Exhibition galleries highlight the diverse landscapes and cultures encountered on his journey, which were chronicled in one of the most important travelogues of all time, *The Travels of Marco Polo*. Both man and myth today, he is forever recognized as the quintessential traveler.

Tickets for ***Marco Polo: Man & Myth*** are included with Museum admission and are [free for members](#).

Click here for Fernbank downloadable resources:

<http://www.fernbankmuseum.org/discover-and-learn/downloadable-resources/>

## AGS Officers

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**Secretary: Rob White**  
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**Treasurer: Stacey Durden-Phillips**  
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## AGS 2013 Meeting Dates

Listed below are the planned meeting dates for 2013. Please mark your calendar and make plans to attend.

November 26<sup>th</sup> AGS meeting Randy Kath, Ph.D.

December 14<sup>th</sup> P. G. Class – James Mayer,  
 Ph.D., P.G., Hydrogeology

December – no meetings - Happy Holidays

2014

January 28 AGS meeting  
 February 25 AGS meeting  
 March 25 AGS meeting  
 April 29 AGS meeting  
 May 27 AGS meeting  
 June 24 Annual Social  
 August 26 AGS meeting

## AGS Committees

**AGS Publications:** Allison Keefer  
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**Career Networking/Advertising:** Todd Roach  
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**Continuing Education:** Currently Open

**Fernbank Liaison:** Chris Bean  
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**Field Trips:** Josh Jenkins  
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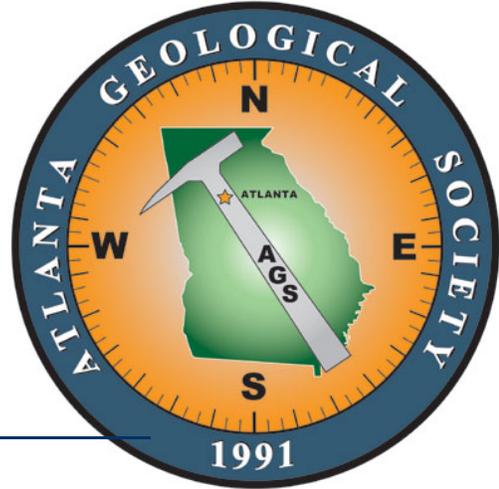
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# ATLANTA GEOLOGICAL SOCIETY

[www.atlantageologicalsociety.org](http://www.atlantageologicalsociety.org)

## ANNUAL MEMBERSHIP FORM

Please print the required details and check the appropriate membership box.



DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

ORGANIZATION: \_\_\_\_\_

TELEPHONE (1): \_\_\_\_\_

TELEPHONE (2): \_\_\_\_\_

EMAIL (1): \_\_\_\_\_

EMAIL (2): \_\_\_\_\_

STUDENT \$10

PROFESSIONAL MEMBERSHIP \$25

CORPORATE MEMBERSHIP \$100

(Includes 4 professional members, please list names and emails below)

NAME: \_\_\_\_\_

EMAIL: \_\_\_\_\_

NAME: \_\_\_\_\_

EMAIL: \_\_\_\_\_

NAME: \_\_\_\_\_

EMAIL: \_\_\_\_\_

NAME: \_\_\_\_\_

EMAIL: \_\_\_\_\_

For further details, contact the AGS Treasurer: [stacy.durden@gmail.com](mailto:stacy.durden@gmail.com).

Please make checks payable to the "Atlanta Geological Society" and remit with the completed form to:

Atlanta Geological Society, Stacy Durden-Phillips, Treasurer,  
2534 Centennial Commons View  
Acworth GA 30102.

CASH

CHECK (CHECK NUMBER: \_\_\_\_\_.)