Atlanta Geological Society Newsletter

Next meeting of the Atlanta Geological Society is
March , 29, 2016
Fernbank Museum of Natural History (Clifton Road)
Social begins at 6:30 pm – Meeting begins at 7:00 pm

March 2016

ODDS AND ENDS

Dear AGS members,

As the big wheel goes around, it will once again be my turn to present at the P.G. Study Group on geophysical logs. There is a short section in the study guide that seems pretty basic. I come out of the oil industry 30 years ago and I did look at over 700 logs as part of my Master's work, so, I'm the guy. One of the things I do durng this presentation is cover downhole sensors that can be attached to direct push rigs (think Geoprobes). So much of my work is in the very shallow part, the first 50' or so, I see a lot of this kind of information. Recently, I saw a webinar that discussed a new tool that identifies chlorinated solvent DNAPL. For those of you that won't be there Saturday, here are a few details. The folks at Dakota Technologies that have the TARGOST tool for identifying creosote have developed a way to inject a hydrophobic red dye Ahead of the sensor. That dye is sorbed into the DNAPL and fluoreseses when the tool shines its laser on it. All that is calibrated and there you have a log of your DNAPL with centimeter resolution. This was tested in a DOD ESTCP project andI think it will catch on as soon as the word gets out.

This has been a moment of technology transfer and I'll be there Tuesday if you would like to talk more about it.

Ben Bentkowski,
Newsletter Editor

March Meeting

Join us **Tuesday, March 29, 2016** at the Fernbank Museum of Natural History, 760 Clifton Road NE, Atlanta GA. The meeting social starts at 6:30 pm and the lecture starts shortly after 7 p.m.

This month the speaker will be **Steven J. Stokowski, P.G., Principal Petrographer, TEC Services, Inc.**
His presentation will be:
Geology and Evolution of Aggregate Supply to Boston, Massachusetts

The Speaker's biography and the abstract for thepresentation are presented on the following pages.

Please come out, enjoy a bite to eat, the camaraderie, and an interesting talk.

As a reminder, next Saturday is the P.G. Study group where a different Ben (Bentkowski) will discuss borehole geophysics and downhole sensors.

MARCH SPEAKER'S INFORMATION

Biography
of
Steven J. Stokowski, PG

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cell: 508-259-3536 email: sstokowski@tecservices.com

Principal Petrographer with TEC Services, Lawrenceville, GA. TEC provides concise, timely, and accurate petrographic analyses of aggregates, concrete, mortar, tile, stone, and similar construction materials. Steve was previously the President of Stone Products Consultants in Massachusetts and Virginia, the Aggregate Technologist/Petrographic Laboratory Expert at the Turner-Fairbank Highway Research Center (FHWA), McLean, VA, the Research Scientist and Manager of the R & D Lab for Vulcan Materials in Birmingham, AL; the Research Engineer for Genstar Stone Products Company in Baltimore, MD, and with Martin Marietta Laboratories and the U.S. Geological Survey. He has a MS in Geology from the South Dakota School of Mines and Technology. Member of AGS, AIPG, AEG, GSA, and SME. Registered or Certified as a Geologist in Georgia, Tennessee, Virginia and other states.

A message from Bob Atkins:

Perry Shelnutt is looking for a geologist to evaluate a granite reserve on his property.

Perry Shelnutt
910 Duncan Rd.
Oxford, GA 30054
678-862-6354

Thanks,
Bob Atkins

If you are interested, please contact Mr. Shelnutt directly. Ed.

Steven J. Stokowski, P.G.
Principal Petrographer
TEC Services, Inc.

Geology and Evolution of Aggregate Supply to Boston, Massachusetts

Abstract:
The Boston metro area is a classic example of the relationship between aggregate use, availability, transportation methods, adaptive reuse, and government studies to manage preemptive land development vs. aggregate availability.

Boston is a port city that is geologically sited on both extensive glacial natural aggregates and quality unweathered rock. Glacial sand & gravel (S&G) and a few rock quarries shipped aggregate by rail, wagon, and, later, truck into Boston for decades. Water transport was uncommon, but did occur with small sailing vessels. Most of the classic aggregate mining locations within 25 miles of Boston, often in unusual geomorphic features or rock types, are now adaptively reused into commercial or residential properties.

Because of the great construction demands of Boston, aggregates were often in local short supply until development of innovative transportation methods. In the mid 1800's, Boston became aggregate poor because most transport was by wagon. Then, rail supplied the needs of Boston – a large portion of Boston is on a large fill of rail-transported S&G. The development of trucks at the beginning of the 1900's changed the method of supply. When local, truck-served sources began being depleted in the 1960's, a distant source in Ossipee, NH began supplying S & G by rail. This was a very innovative solution to the trucking distance dilemma, even if the method of transport was not new. The Ossipee rail site is the current largest producer and has extensive reserves that may result in it being the primary aggregate supply to Boston for over 100 years. However, there are potential, lower cost competitors who may be able to supply crushed stone by sea.

In the early 1990's, the New England Governor's Conference contracted for regional assessments of the demand and supply of aggregate. This study used clever methodology, but failed to provide clarity on the aggregate resources available for Boston. As a result, generations of political leaders were misled by the reports.

GEMS & GEMOLOGY, WINTER 2015, VOL. 51, NO. 4

Rubies from a New Deposit in Zahamena National Park, Madagascar

Author: Vincent Pardieu, Supharart Sangsawong, and Stanislas Detroyat

Figure 1. Rough rubies from Zahamena National Park with a combination of good shape, transparency, and attractive color. Photo by Vincent Pardieu/GIA

In July 2015, news circulated through the trade about a ruby discovery south of Andilamena, near Lake Alotra (figure 1). Photos of clean, attractive stones of over 10 carats were shared on social media by Malagasy and Sri Lankan gem merchants. Several thousand unlicensed miners quickly descended on the area, creating serious conservation concerns as the new deposit was located inside Zahamena National Park. In August 2015, the Malagasy government sent soldiers to close the mining site. But because the area is very remote, they could not maintain their presence longer than a month. As soon as the soldiers departed, the miners returned in numbers.

Gem-quality rubies and sapphires are not unknown in northeastern Madagascar: They were first found in 2000, east of Andilamena and west of Vatomandry (Summer 2001 GNI, pp. 147–149). These discoveries were followed by a blue sapphire deposit near Andrebabe, a few kilometers south of Andilamena, in 2002 (www.ruby-sapphire.com/madagascar_ruby_sapphire.htm). Ruby mining was limited until 2004, when demand for the heavily fractured material from Andilamena dramatically increased with the advent of the lead-glass filling treatment developed in Thailand between 2001 and 2004. Visiting the deposit in June and September 2005, author VP could see that more than 10,000 miners were living and working in the jungle (www.rwwise.com/madagascar1.html). In 2011 and 2012, two new discoveries occurred in the region. The first was a pink and blue sapphire deposit near Mandraka village, north of Toamasina. In 2012, a deposit was discovered east of Didy (www.giathai.net/pdf/Didy_Madagascar_US.pdf). That deposit produced some large, clean, and attractive rubies and blue sapphires. More discoveries followed—near Bemainty, north of Didy, for instance—but either the gems were ordinary or the rush was short-lived. In 2015, a new blue sapphire rush occurred near Andrebabe in February, followed by a ruby discovery near Ambodivoangy village in July

http://www.gia.edu/gems-gemology/winter-2015-gemnews-rubies-new-deposit-zahamena-national-park-madagascar

From September 23 to October 6, 2015, a GIA field expedition team collected samples at the mines. After three days of walking in the jungle, the team was able to visit the new mining sites (figure 2), located about four hours' walking distance from Ambodivoangy. There they witnessed some illegal ruby mining activity by artisanal miners at two different sites, located in a valley at 17°37'60"S 48°52'19"E and along a creek in a forested area at 17°38'26"S 48°52'38"E. They confirmed that the deposit was indeed located inside Zahamena National Park. Approximately 500 people were seen at the lower mining site, while about the same number worked in the forest along a stream where ruby-rich gravels were collected (figure 3).

Figure 2. A young Malagasy miner searches for rubies in Zahamena with simple homemade tools: a pierced plastic oil can used as a sieve and an empty water bottle to store his gems. Photo by Vincent Pardieu/GIA.

The local trading center was in Andrebakely, with mainly Malagasy buyers, while foreign buyers (typically from Sri Lanka) waited for local miners and businessmen at Tanambe and Andilamena. In both towns, more than 20 Sri Lankan buying offices were visible, mostly in houses with painted signs for the different companies.

The new deposit is located about halfway between the old ruby deposit in the jungle east of Andilamena (discovered in 2000) and the rush that occurred at Didy in 2012 (www.giathai.net/pdf/Didy_Madagascar_US.pdf). The rubies from Zahamena share obvious similarities with those from Andilamena, such as their inclusions (mainly zircon and rutile crystals associated with rutile needles) and trace-element composition. Therefore, it is likely that these deposits are related, and a huge ruby and sapphire deposit could be hidden under the jungle in northeastern Madagascar.

Back at GIA's Bangkok lab in October 2015, the samples were fabricated and data was collected from them; a more extensive study is in progress. At this point it is interesting to note that the rubies from the Zahamena deposit have a very similar aspect to those from amphibole-related African deposits such as Montepuez in Mozambique, Chimwadzulu in Malawi, and Winza in Tanzania. Their iron content is indeed much higher than that of the marble-type rubies mined in Myanmar, Vietnam, Afghanistan, or Tajikistan. The shape of the crystals is generally tabular but not as flat as what is commonly found in Mozambique, meaning that faceted stones with good proportions can be produced. The new material is on average more included than the ruby from Montepuez. But ultimately the limiting factor for this deposit is its location inside Zahamena National Park, where gem mining is illegal.

Announcement for the next Atlanta Geological Society PG Candidate Workshop:

Date: March 26, 2016
Time: 10:00 am to 12:00 pm
Venue: Fernbank Science Center Annex
156 Heaton Park Drive,
N.E. Atlanta, GA 30307 678-874-7102 http://fsc.fernbank.edu/ Map to Fernbank

Speaker: Ben Bentkowski, P.G.
Subject: Borehole Geophysics

Ben will demonstrate several methods of investigating boreholes including: caliper, temperature, gamma ray, conductivity, SP, borehole flow, etc. Additionally, the use of down hole sensors attached to direct push tools will be covered.

Ben is a charter member of the AGS and has served the Society as treasurer and is currently the newsletter editor. He presently works for EPA as a hydrogeologist providing technical support to groundwater investigations, remediation and vapor intrusion throughout EPA Region 4. In an earlier lifetime, he worked seven years in the petroleum exploration industry. The last 31 years of Ben's career has been focused on contaminant hydrogeology at sites throughout the Southeast. Ben has earned a B.S and M.S in Geology.

Check with the receptionist as you come in Fernbank Science Center for directions to the classroom we will be using. The Center is approximately 1-mile north off East Ponce deLeon Avenue from the Fernbank Museum Of Natural History where the AGS monthly meetings are held. Also, please forward this message to anyone interested in becoming a Georgia Registered Professional Geologist, or anyone who might be interested in the topic. The classes are open to all. Membership in the AGS is not required, however, $25 per year ($10 for students) is quite a bargain for one the most active geological groups in the Southeast.

If you have any questions, go to the AGS web site at http://www.atlantageologicalsociety.org or contact us below. We hope to see you there!

Ken Simonton, P.G. Ginny Mauldin-Kinney
kws876@gmail.com ginny.mauldin@gmail.com
Atlanta Geological Society
Professional Registration Committee

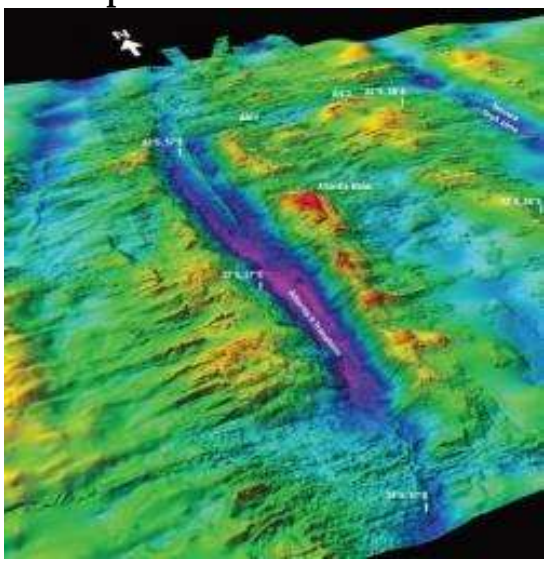
http://joidesresolution.org/node/4253 Expedition 360: SW Indian Ridge

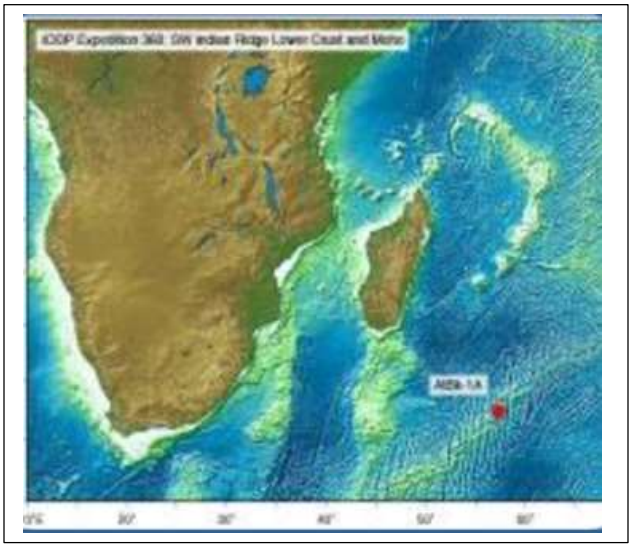
Dates: 30 November 2015 to 30 January 2016

Ports: Colombo, Sri Lanka to Port Louis, Mauritius

Co-chief Scientists: Henry Dick and Chris MacLeod **Staff Scientist:** Peter Blum

Our Expedition





The Indian Ridge Moho Expedition will drill approximately 1500 meters into the Atlantis Bank*gabbro*ic massif. Gabbro is an intrusive *igneous* rock that forms when magma is trapped beneath Earth's surface and cools slowly.

Our first objective is **to recover gabbros and crust-mantle transition** to understand the processes that creates *mid-ocean ridge* *basalt*. We also aim to resolve the controversy as to whether the boundary between Earth's mantle and crust, or Moho, at slow spreading ridges can be a serpentinization front. Serpentine contains minerals that give it a green color.**The results will profoundly affect our understanding of magma generation and the linkage between the mantle, melt, and crust.**

Other objectives include testing the nature of magnetic reversals in plutonic rock, or intrusive igneous rock, and documenting the stress-strain evolution of a plate boundary undergoing asymmetric seafloor spreading.

Ed. Note: Click on the link and see all the details of this ocean-going drill rig' projects and a game called 'Secrets of the Core'.

Geothermal gradients of the northern continental shelf of the Gulf of Mexico

Cory H. Christie* and Seiichi Nagihara

+Author Affiliations

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Abstract

A wide, systematic variation of sedimentary geothermal gradients has been previously observed along the northern continental shelf of the Gulf of Mexico. From east to west, geothermal gradients change from 25 to 30 °C/km off Alabama to lower values (15–25 °C/km) off eastern Louisiana and to higher values (30–60 °C/km) off Texas. In order to assess the mechanism responsible for this variation, the present study first compiled an extensive bottom-hole temperature database from over 6000 wells in the northern continental shelf and constructed a more detailed geothermal gradient map than those published previously. Second, basin models were then constructed for three areas within the continental shelf (off Texas, Louisiana, and Alabama) that show differing geothermal gradients. A basin model is a mathematical model that simulates the heat transport through the crust and the sediments of a basin in the context of its geologic evolution. Previous researchers proposed two possible causes for the observed geothermal gradient variation in the northern continental shelf. The first was the thermal effect of sedimentation: areas with faster sediment accumulation result in low geothermal gradients, and vice versa. The second was that basal heat flow (heat flow that enters from the igneous crust to the bottom of the sediments) varied across the continental shelf. The present study finds that sedimentary geothermal gradients in these areas are primarily impacted by two competing mechanisms associated with sediment accumulation. One is the radiogenic heat production within the sediment that adds to the total heat budget upward through the sedimentary column. The other is the transient effect of fast sediment accumulation, which results in reduction in the upward heat flow. Off Louisiana, the transient effect prevails, and hence the area shows the lowest geothermal gradients. Off Texas, due to slower sedimentation, the positive contribution by radiogenic heat is most significant. Off Alabama, because the sediments there are not as thick, the overall contribution of radiogenic heat is less. The models show that the thermal effects of sedimentation are large enough to explain the observed variation in geothermal gradients. Therefore, corresponding variation in basal heat flow is not required.

Received 10 December 2014. Revision received 13 August 2015. Accepted 28 October 2015.

http://geosphere.gsapubs.org/content/12/1/26.abstract

Helium: A byproduct of the natural gas industry

Contributor: Hobart King
http://geology.com/articles/helium/

Where Does Helium Come From?

The helium that is produced commercially is obtained from the ground. Some natural gas fields have enough helium mingled with the gas that it can be extracted at an economical cost. A few fields in the United States contain over 7% helium by volume. Companies that drill for natural gas in these areas produce the natural gas, process it and remove the helium as a byproduct.

Why is Helium in Some Natural Gas?

Most of the helium that is removed from natural gas is thought to form from radioactive decay of uranium and thorium in granitoid rocks of Earth's continental crust. As a very light gas it is buoyant and seeks to move upward as soon as it forms. The richest helium accumulations are found where three conditions exist: 1) granitoid basement rocks are rich in uranium and thorium; 2) the basement rocks are fractured and faulted to provide escape paths for the helium; and, 3) porous sedimentary rocks above the basement faults are capped by an impermeable seal of halite or anhydrite. When all three of these conditions are met, helium might accumulate in the porous sedimentary rock layer.

Helium has the smallest atomic radius of any element, about 0.2 nanometers. So, when it forms and starts moving upward it can fit through very small pore spaces within the rocks. Halite andanhydrite are the only sedimentary rocks that can block the upward migration of helium atoms. Shales that have their pore spaces plugged with abundant organic materials (kerogen) sometimes serve as a less effective barrier.

Where is Natural Gas Rich in Helium?

Most unprocessed natural gas contains at least trace amounts of helium. Very few natural gas fields contain enough to justify a helium recovery process. A natural gas source must contain at least 0.3% helium to be considered as a potential helium source. In 2010, all of the natural gas processed for helium in the United States came from fields in Colorado, Kansas, Oklahoma, Texas, Utah and Wyoming as shown on the map at right. The Hugoton Field in Oklahoma, Kansas and Texas; the Panoma Field in Kansas; the Keyes Field in Oklahoma; the Panhandle West and Cliffside Fields in Texas and the Riley Ridge Field in Wyoming account for most of the helium production in the United States. During 2010, the United States produced 128 million cubic meters of helium. Of that amount, 53 million cubic meters of helium was extracted from natural gas and 75 million cubic meters was withdrawn from the National Helium Reserve. Other countries with known production amounts were: Algeria (18 mcm), Qatar (13 mcm), Russia (6 mcm), and Poland (3 mcm). Canada and China produced small but unreported amounts of helium.

Map showing the natural gas fields that serve as important sources of helium in the United States. The natural gas produced from these fields contains between 0.3% to over 7% helium. The helium is removed from the gas for commercial sale. Image by Geology.com using location data from the United States Geological Survey.

Helium Gluts and Helium Shortages

In 1925 the United States established the National Helium Reserve to serve as a strategic supply of helium for use in airships and for other defense purposes. At that time the country was producing much more helium than was being consumed. After World War II the amount of helium used as a lifting gas declined, but demand for helium as a purging gas when refueling rocket engines and as a coolant in nuclear weapons facilities surged. Still, more helium was being produced than consumed.

In 1995, Congress decided that the National Helium Reserve was not essential and initiated a program to sell the helium as part of the Helium Privatization Act of 1996. [4] For almost two decades Congress allowed the helium to be sold at an enormous discount to free market prices. Up to 1/2 of the world's helium demand was being met through sales from the National Helium Reserve. In some years more helium was exported out of the United States to other countries than was consumed domestically. [2] Those who purchased helium from the government got a fantastic deal and those who purchased helium in the free market paid a much higher price.

Dumping of National Helium Reserve stock into the market depressed the price of helium so much that it was being used as a cheap substitute for argon and other gases that have a much less limited supply. Because commercial helium production was not rewarded or heavily utilized, the market was undersupplied when National Helium Reserve sales were replaced by an auction system in 2014. In the first auction, two bidders purchased the entire yearly allocation of 93 million cubic feet of helium at more than double the previous year's market price. After the auction another 1 billion cubic feet was sold to the same two bidders.

Since the first auction, the price of helium continued to rise because production of new helium falls short of consumption. The price increase has triggered investment in new helium processing plants. However, helium can only be produced from natural gas fields with salt or anhydrate as a trap rock. These only occur in a few parts of the world. Under current law, the National Helium Reserve will be sold-out by 2021. Hopefully the rising investment in helium recovery plants will be adequate to meet the needs of helium consumers when that important source of helium is gone.

Wish I had this rock. Ed. Thanks, Matt.

An exerpt from:

The Weird Stories Behind America's Official State Fossils

From fights with creationists to dinosaurs that might not exist

ED YONG

http://www.theatlantic.com/science/archive/2016/03/the-weird-stories-behind-the-official-state-fossils/474117/

…Still, their choice makes loads of sense compared to Georgia, which picked the shark tooth. Not the tooth of any particular species or genus of shark, like the monstrous megalodon, as chosen by North Carolina. Nope, just a generic "shark tooth." That's like picking "dinosaur leg" as your state fossil, or "bird" as your state animal. It's even worse because shark jaws are conveyor belts that continually jettison old teeth, and so fossil teeth are extremely common. Georgia is the kid that didn't really understand the assignment. (Kentucky was even less specific when it chose brachiopods, a large group of animals that look like clams but aren't; that's like choosing "molluscs" or "back-boned animals".)

At least Georgia and Kentucky are in the game. Seven states have so far failed to choose a state fossil altogether. It feels churlish to shame them, but let's say that their names rhyme with Arkansas, Hawaii, Indiana, Iowa, Minnesota, New Hampshire, and Rhode Island.

Florida narrowly escaped this fate by designating agatized coral as the official state stone, and thus accidentally getting a state fossil in the process.

Editor's note: If you click on one of the highlighted states you are redirected to: http://www.statesymbolsusa.org/ where you can find links to all the States' chosen icons, like Arizona's State Firearm and the State Soil of Michigan. Who knew?

FERNBANK MUSEUM of NATURAL HISTORY

Wild Music On view February 6 – July 31, 2016
Whales compose, bullfrogs chorus, songbirds greet the dawn, and people everywhere sing and dance. What do we all have in common? Music is all around us. Explore sound and music in nature and in life through whimsical, hands-on activities.
Learn more

Humans in Space Youth Art Competition Now on View
See an inspiring selection of winning entries from the international Humans in Space Youth Art Competition. Youth ages 10-18 were asked to visually communicate their vision of the future of space science, travel and exploration. The competition is part of the Humans in Space Art Program and received more than 2,000 entries from 52 countries. Fernbank's display will feature 30 of the winning entries. This temporary exhibition located in ***The Star Gallery***, Lower Level.
Learn More

Coming Soon

Creatures of Light: Nature's Bioluminescence
On view March 26 – August 14, 2016
Explore the extraordinary organisms that produce light, from the flickering fireflies found in backyards around the world to the alien-like deep-sea fishes and other fantastic creatures that illuminate the perpetually dark depths of the oceans. Learn how, where, and why scientists study this amazing natural phenomenon.
Learn more

FERNBANK MUSEUM of NATURAL HISTORY

Fernbank Museum of Natural History

(All programs require reservations, including free programs)

Now Showing in the Fernbank IMAX movie theater:

Wild Africa

Showing through April 28, 2016*

Travel from enchanted forests to the boiling edge of the underworld, from celestial ice-capped mountains and lava-spewing volcanoes, to crashing waterfalls and deep fantastical seas. And experience some of the greatest gatherings of wildlife ever captured on film with up-close-and-personal animal encounters and absolutely stunning scenery.

Learn more

National Parks Adventure

Showing through June 16, 2016*

Experience the ultimate off-trail adventure into the nation's awe-inspiring great outdoors and untamed wilderness. Follow modern-day explorers as they explore spectacularly wild and beautiful places, including Yellowstone, the Everglades and the Redwoods. This new film will inspire the adventurer in all of us while celebrating the majesty of our national parks and treasures landscapes.

Learn more

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AGS 2016 Meeting Dates

Listed below are the planned meeting dates for 2016. Please mark your calendar and make plans to attend.

2016 Meeting Schedule

March 29
Steven J. Stokowski, P.G.
Principal Petrographer
TEC Services, Inc.
Geology and Evolution of Aggregate Supply to Boston, Massachusetts

April 26

May 31	June 28
August 30	September 27
October 25	November 29

PG Study Group meetings

last Saturday of the month.
March 26
Ben Bentkowski, P. G.
Geophysical Logs

April 30
May 28

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ATLANTA GEOLOGICAL SOCIETY

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ANNUAL MEMBERSHIP FORM

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

DATE:_____

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ORGANIZATION:_____

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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: Lucy Mejia: telephone: 404-438-9584; Lucytaylor360@gmail.com

Please make checks payable to the "Atlanta Geological Society" and remit with the completed form to:
Atlanta Geological Society, Attn: Lucy Mejia
2143 Melante Drive, Atlanta, GA 30324

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