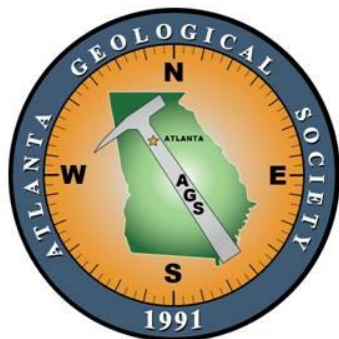




Atlanta Geological Society Newsletter

ODDS AND ENDS

Dear AGS members,

I trust you have enjoyed the break and the very brief taste of winter, those few days of cold weather and that head-fake of a snow storm. My daffodils are up and apparently Spring is here. What is definite is the AGS is starting its 26th year and we have a full slate of officers. The newly elected officers are:

President	Ben Bentkowski
Vice President	Steven Stokowski
Treasurer	John Salvino
Secretary	Rob White

While there are familiar names, the newest officer is Steven Stokowski in the role of Vice President. One of Steven's main duties is the secure our speakers but I know that can be a difficult task. If you have any contacts or ideas for speakers, please pass them on to Steven as he endeavors to fill out our 2017 calendar.

With the new year, I am working on an operating plan to address a number of issues big and small to improve the Society. For example, growth in our membership is a good thing and we should work on ways to make it easier to join. To that end, we are working on a way to take credit cards at the meetings and on our website to join the Society or renew your membership. And, oh yes, AGS membership renews on a calendar basis starting again in January.

Hope to see you Tuesday the 31st of January!
Ben Bentkowski, President

January Meeting

Join us **Tuesday, January 31, 2017** at the Fernbank Museum of Natural History, 760 Clifton Road NE, Atlanta GA. The meeting/dinner starts at 6:30 pm and the meeting starts approximately 7 p.m.

This month our speaker is Kendall B. Fountain, Ph. D., P. G. and he will give a presentation titled "Finding Value Below the Trees: Mineral Resource Management on 13.2 Million Acres of Timberlands" Please find Dr. Fountain's bio on the next page.

We all have driven past miles and miles of managed forests but here is a chance to learn a bit about the riches that lie underneath all those pines.

Please come out, enjoy a bite to eat, the camaraderie, an update on the 2017 AGS Operating Plan, an interesting presentation on unseen mineral resources.

February Speaker



Kendall B. Fountain, Ph.D., P. G.
General Manager - Minerals at Weyerhaeuser
Industrial minerals specialist with broad experience in natural resource management and planning, mineral processing technologies, and mineral exploration and development. Interested in working with large private or corporate landowners to develop mineral resource opportunities in a way that considers sustainability, environmental stewardship, and long-term planning. Graduate of the University of Florida.

Dr. Fountain contributed to the Guidebook for Field Trip to Central Florida's Sand Mining District on September 13, 2010 Edited by: Marc V. Hurst, P.G. AIPG 47th Annual Meeting & Conference with an article titled DEPOSITIONAL AND FACIES CHARACTERISTICS OF THE CYPRESSHEAD FORMATION IN NORTH-CENTRAL FLORIDA. A related abstract is reprinted below.

http://users.clas.ufl.edu/adamsp/Outgoing/Pubs/Hurst_EtAl_2010_AIPGftg.pdf

Isostatic uplift driven by karstification and sea-level oscillation: Modeling landscape evolution in north Florida

[Peter N. Adams](#), [Neil D. Opdyke](#) and [John M. Jaeger](#)

Department of Geological Sciences, University of Florida, Gainesville, Florida 32611, USA

Abstract

Isostatic uplift of tectonically stable, passive margin lithosphere can preserve a record of paleo-shoreline position by elevating coastal geomorphic features above the influence of nearshore wave activity. Conversely, depositional ages and modern elevations of these features can provide valuable information about the uplift history of a region. We present a numerical model that combines sea-level oscillation, subaerial exposure, a precipitation-karstification function, and isostatic uplift to explore the dynamic geomorphic behavior of coastal carbonate landscapes over multiple sea-level cycles. The model is used to estimate ages of coastal high stand depositional features along the Atlantic coast of north Florida. Numerical simulations using current best estimates for Pleistocene sea-level and precipitation histories suggest ages for Trail Ridge (1.44 Ma), the Penholoway Terrace (408 ka), and the Talbot terrace (120 ka) that are in agreement with fossil evidence. In addition, model results indicate that the rate of karstification (void space creation or equivalent surface lowering rate) within the north Florida platform is ~3.5 times that of previous estimates (1 m/11.2 k.y. vs. 1 m/38 k.y.), and uplift rate is ~2 times as high as previously thought (0.047 mm/yr vs. 0.024 mm/yr). This process has implications for landscape evolution in other carbonate settings and may play an underappreciated role within the global carbon cycle. <http://geology.gsapubs.org/content/38/6/531.abstract>

A discovery about the movement of tectonic plates will have scientists rewriting textbooks

[Lindsay Dodgson](http://www.businessinsider.com/what-moves-tectonic-plates-2017-1) <http://www.businessinsider.com/what-moves-tectonic-plates-2017-1>
<http://advances.sciencemag.org/content/2/12/e1601107>

Scientists have wondered for many decades whether the plates are being passively moved around by the mantle, or are the active drivers of movement themselves, dragging the mantle along with them. A new study, [published in the journal Science Advances](#), has shown the additional force of heat drawn from Earth's core plays a part in plate dynamics. The team observed the East Pacific Rise, which is a divergent tectonic plate boundary which lies along the Pacific Ocean floor, and also made models of the mantle flow beneath the surface.

During their observations, they concluded that the movement of the East Pacific Rise could not be completely explained by subduction — when one plate moves under the other — and other forces had to be at play. In the paper, they state that buoyancy is created by heat rising up from deep within the Earth's core.

The estimate is 50% of plate tectonic movement is driven by this heat, and about 20 terawatts of heat flows between the core and the mantle. That's just [slightly more than the average total power consumption of humans](#) on Earth every year.

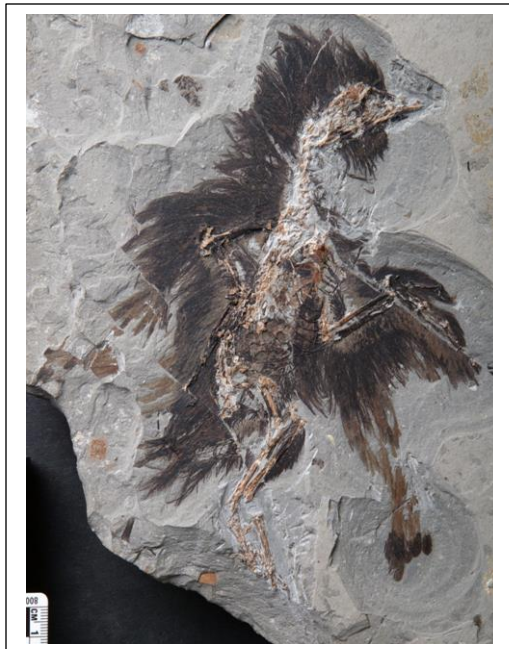
"We see strong support for significant deep mantle contributions of heat-to-plate dynamics in the Pacific hemisphere," said Professor David B. Rowley, an expert of geophysical sciences at the University of Chicago and lead author of the paper, [in a statement](#). "Heat from the base of the mantle contributes significantly to the strength of the flow of heat in the mantle and to the resultant plate tectonics."

When the case on the mantle is heated, this reduces the density of the material, making it buoyant, which causes it to rise through the mantle. Plates also cool at the surface, creating something called negative buoyancy, which is another way of describing an object that sinks. These two forces move the plates around.

In other words, hot parts rise and cool parts sink, creating a sort of churning movement in the mantle that the plates ride on. "Based on our models of mantle convection, the mantle may be removing as much as half of Earth's total convective heat budget from the core," Rowley said. "The implication of our work is that textbooks will need to be rewritten."

See Page 7 for a figure. Ed.

Keratin and Melanosomes Preserved in 130-Million-Year-Old Bird Fossil



New research from North Carolina State University, the Chinese Academy of Sciences and Linyi University has found evidence of original keratin and melanosome preservation in a 130-million-year-old *Eoconfuciusornis* specimen. The work extends the timeframe in which original molecules may preserve, and demonstrates the ability to distinguish between ancient microstructures in fossils.

Eoconfuciusornis, crow-sized primitive birds that lived in what is now China around 130 million years ago, are the earliest birds to have a keratinous beak and no teeth, like modern birds. Previous studies argued that the feathers of these and other ancient birds and dinosaurs preserved small, round structures interpreted to be melanosomes - pigment-containing organelles that, along with other pigments, give feathers their color. However, without additional evidence, it was not possible to prove that these structures weren't just microbes that had coated the feather during decomposition and fossilization.

Yanhong Pan, associate research fellow at the Chinese Academy of Sciences and corresponding author of a paper describing the research and co-author Mary Schweitzer, NC State professor of biology with a joint appointment at the North Carolina Museum of Natural Sciences, examined feathers from an *Eoconfuciusornis* specimen taken from the Jehol Biota site in northern China, which is renowned for excellent fossil preservation.

"If these small bodies are melanosomes, they should be embedded in a keratinous matrix, since feathers contain beta-keratin," Schweitzer says. "If we couldn't find the keratin, then those structures could as easily be microbes, or a mix of microbes and melanosomes - in either case, predictions of dinosaur shading would not be accurate."

Pan, Schweitzer and their team used both scanning and transmission electron microscopy to get microscopic details of the feather's surface and its internal structure. They also utilized immunogold labeling - in which gold particles are attached to antibodies that bind to particular proteins in order to make them visible in electron microscopy - to show that filaments within the feathers were keratin.

Finally, they mapped copper and sulfur to these feathers at high resolution. Sulfur was broadly distributed, reflecting its presence in both keratin and melanin molecules in modern feathers. However copper, which is only found in modern melanosomes, and not part of keratin, was only observed in the fossil melanosomes. These findings both support the identity of the melanosomes and indicate that there was no mixing or leaching during decomposition and fossilization.

"This study is the first to demonstrate evidence for both keratin and melanosomes, using structural, chemical and molecular methods," says Pan. "These methods have the potential to help us understand - on the molecular level - how and why feathers evolved in these lineages."

This article can be found at <https://phys.org/journals/proceedings-of-the-national-academy-of-sciences/>

New prehistoric bird species discovered



A team of geologists at the University of Rochester has discovered a new species of bird in the Canadian Arctic. At approximately 90 million years old, the bird fossils are among the oldest avian records found in the northernmost latitude, and offer further evidence of an intense warming event during the late Cretaceous period.

"The bird would have been a cross between a large seagull and a diving bird like a cormorant, but likely had teeth," says John Tarduno, professor and chair of the Department of Earth and Environmental Sciences at the University and leader of the expedition.

Tarduno and his team, which included both undergraduate and graduate students, named the bird *Tingmiatornis arctica*; "Tingmiat" means "those that fly" in the Inuktitut language spoken in the central and eastern Canadian Arctic (Nunavut territory).

Their findings, published in *Scientific Reports*, add to previous fossil records Tarduno uncovered from the same geological time period and location in previous expeditions. Taken together, these fossils paint a clearer picture of an ecosystem that would have existed in the Canadian Arctic during the Cretaceous period's Turonian age, which lasted from approximately 93.9 to 89.8 million years ago.

"These fossils allow us to flesh out the community and add to our understanding of the community's composition and how it differed from other places in the world," says Donald Brinkman, vertebrate paleontologist and director of preservation and research at the Royal Tyrrell Museum in Alberta, Canada.

Building historic climate records further helps scientists determine the effects of climate on various communities, ecosystems, and the distribution of species and could help predict the effects of future climatic events.

"Before our fossil, people were suggesting that it was warm, but you still would have had seasonal ice," Tarduno says. "We're suggesting that's not even the case, and that it's one of these hyper-warm intervals because the bird's food sources and the whole part of the ecosystem could not have survived in ice."



From the fossil and sediment records, Tarduno and his team were able to conjecture that the bird's environment in the Canadian Arctic during the Turonian age would have been characterized by volcanic activity, a calm freshwater bay, temperatures comparable to those in northern Florida today, and creatures such as turtles, large freshwater fish, and champsosaurs—now-extinct, crocodile-like reptiles.

"The fossils tell us what that world could look like, a world without ice at the arctic," says Richard Bono, a PhD candidate in earth and environmental sciences at the University and a member of Tarduno's expedition. "It would have looked very different than today where you have tundra and fewer animals."

New prehistoric bird species discovered (continued)

The *Tingmiatornis arctica* fossils were found above basalt lava fields, created from a series of volcanic eruptions. Scientists believe volcanoes pumped carbon dioxide into the Earth's atmosphere, causing a greenhouse effect and a period of extraordinary polar heat. This created an ecosystem allowing large birds, including *Tingmiatornis arctica*, to thrive.

Tarduno's team unearthed three bird bones: part of the ulna and portions of the humerus, which, in birds, are located in the wings. From the bone features, as well as its thickness and proportions, the team's paleontologist, Julia Clarke of the University of Texas, was able to determine the evolutionary relationships of the new birds as well as characteristics that indicate whether it likely was able to fly or dive.

"These birds are comparatively close cousins of all living birds and they comprise some of the oldest records of fossil birds from North America," Clarke says. "Details of the upper arm bones tell us about how features of the flightstroke seen in living species came to be."

Previous fossil discoveries indicate the presence of carnivorous fish such as the 0.3-0.6 meter-long bowfin. Birds feeding on these fish would need to be larger-sized and have teeth, offering additional clues to *Tingmiatornis arctica*'s characteristics.

Physiological factors, such as a rapid growth and maturation rate, might explain how this line of bird was able to survive the Cretaceous-Paleogene mass extinction event that occurred approximately 66 million years ago and eliminated approximately three-quarters of the plant and animal species on Earth.

These physiological characteristics are still conjecture, Tarduno emphasizes, but he says the bird's environment gives clear indications as to why the bird fossils were found in this location.

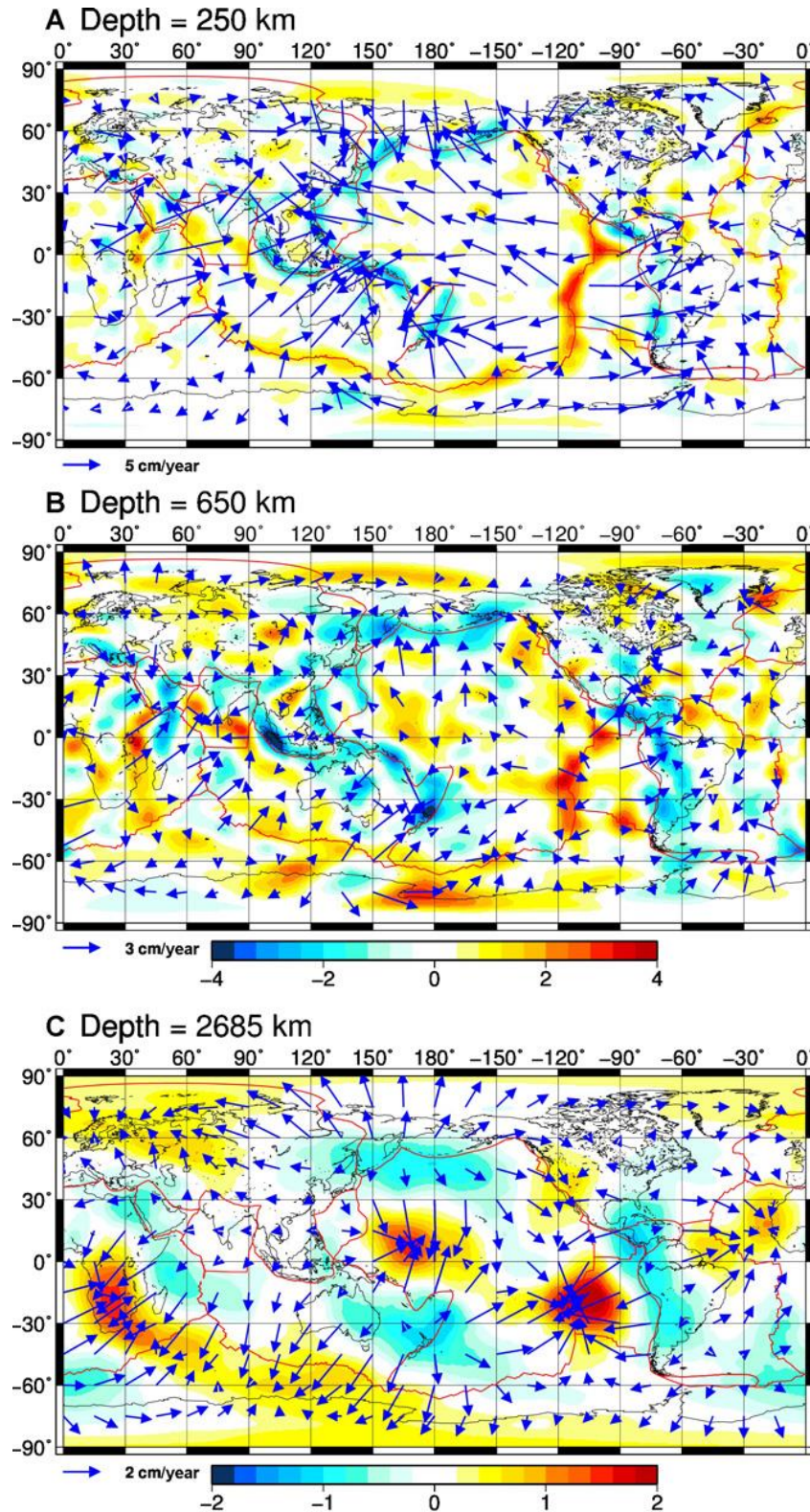
"It's there because everything is right," Tarduno says. "The food supply was there, there was a freshwater environment, and the climate became so warm that all of the background ecological factors were established to make it a great place." This article can be found at <https://phys.org/news/2016-12-prehistoric-bird-species.html#jCp>



Just west of Kingman, Arizona, along highway I-40, a road cut beautifully exposes a [fault](#) that has displaced the [Miocene-Oligocene volcanic ash](#) deposits by about one ft. (0.3 m) vertically. This is a [normal fault](#), meaning that this section of rock is being pulled apart horizontally. When the rock is compressed horizontally, one section over runs the other and is called a [reverse fault](#). Along this section of the highway a number of normal faults are exposed, textbook illustrations of the Earth's [tectonic activity](#) in motion. Photos taken on November 21, 2016. <http://epod.usra.edu/blog/2016/12/fault-in-road-cut-near-kingman-arizona.html>

Kinematics and dynamics of the East Pacific Rise linked to a stable, deep-mantle upwelling, Figure 7

<http://advances.sciencemag.org/content/2/12/e1601107.figures-only>



Predicted present-day convective flow at three different depths in the mantle.

(A) Asthenosphere. (B) Base of the transition zone. (C) Top of the seismic D'' layer. The mantle buoyancy distribution is given by model TX2008, obtained from joint seismic-geodynamic inversions by Simmons *et al.* (40). The viscous response of the mantle is calculated on the basis of the "V2" viscosity profile (39), derived from the joint glacial isostatic adjustment convection inversions (41) shown in Fig. 6. The flow calculations are described in detail by Forte *et al.* (39).

Fernbank Events & Activities



Tadpole Tales

Saturday, January 21, 2017

Featuring story time with a Fernbank educator, along with a special activity or song.

[Learn more](#)



Fernbank Forest Animal Traces Tour

Sunday, January 22, 2017

Look for traces of animals throughout the forest and learn more about animal habitats during this guided tour.

[Learn more](#)



Wild Weather Day

Saturday, February 4, 2017

Explore the sciences of severe weather during a hands-on, family friendly event.

[Learn more](#)



Wild Weather Day

Friday, February 10, 2017

Don't miss the debut of Fernbank's new monthly series featuring Museum access for ages 21+ with hands-on science activities.

[Learn more](#)



FERNBANK MUSEUM

of NATURAL HISTORY



Wildwoods and Fernbank Forest

WildWoods features 10 acres of lush woodlands, highlighted by hands-on exhibits for all ages, tree pods suspended in the canopy, a nature gallery, immersive adventures, and meandering trails emphasizing dramatic slopes and stunning views. This interpretive nature experience serves as the new entrance into Fernbank Forest.

[Learn more](#)



Wild Weather

On view January 28 – May 7, 2017

Wild Weather investigates some of nature's more powerful and destructive forces as you put yourself directly in the path of a tornado, inside the eye of a hurricane and in the midst of a raging winter storm. Get drawn into the science behind tornadoes, hurricanes, heat waves, thunderstorms and winter storms through interactives, multimedia experiences, models and large-scale graphics.

[Learn more](#)

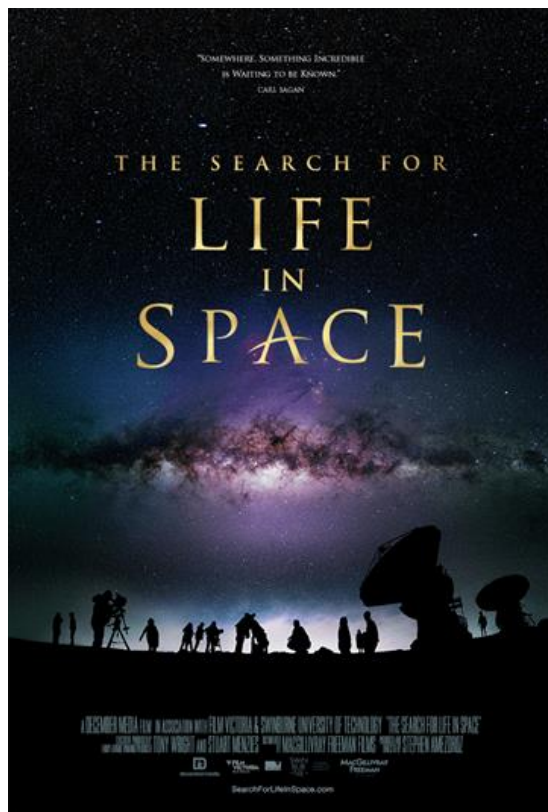


FERNBANK MUSEUM

of NATURAL HISTORY

Fernbank Museum of Natural History
(All programs require reservations, including free programs)

Now showing in the Fernbank IMAX movie theater:



[The Search for Life in Space](#)

Opens February 4, 2017

A new era of space exploration has begun. It's the search to find something that changes everything — signs of life somewhere else in the universe. Journey from the depths of the Pacific Ocean, to the ice moons of Jupiter and Saturn, beyond our solar system and out into the far reaches of space in search of planets like ours.

[Extreme Weather 3D](#)

Opens February 4, 2017

Weather is one of the most dynamic forces shaping our planet, but now it's more extreme and complex than ever. *Extreme Weather* takes us to the frontlines where few have gone. Travel to the edge of 300-foot-tall glaciers collapsing, to the front lines of massive wildfires, directly in the path of deadly, yet mesmerizing tornadoes. Follow researchers and everyday heroes as they uncover surprising connections to help us understand and adapt to our ever-changing weather.

AGS Officers

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bbentkow@gmail.com

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sstokowski@tecservices.com

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robeth@bellsouth.net

Treasurer: John Salvino, P.G.

Phone: 678-237-7329

johnsalvino@bellsouth.net

Past President Shannon Star George

AGS 2017 Meeting Dates

Listed below are the planned meeting dates for 2017. Please mark your calendar and make plans to attend.

2017 Meeting Schedule

January 31

February 28

March 28

April 25

May 30

June 27

PG Study Group meetings

January 28 is the data of the RegReview course being held in Atlanta. Contact Ken for the details

February 25

March 25

April 29

May 27

June 24

AGS Committees

AGS Publications: Open

Career Networking/Advertising: Open

Continuing Education: Open

Fernbank Liaison: Kaden Borseth

Phone (404) 929-6342

Kaden.Borseth@FernbankMuseum.org

Field Trips: Open

Georgia PG Registration: Ken Simonton

Phone: 404-825-3439

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Ginny Mauldin-Kenney,

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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.

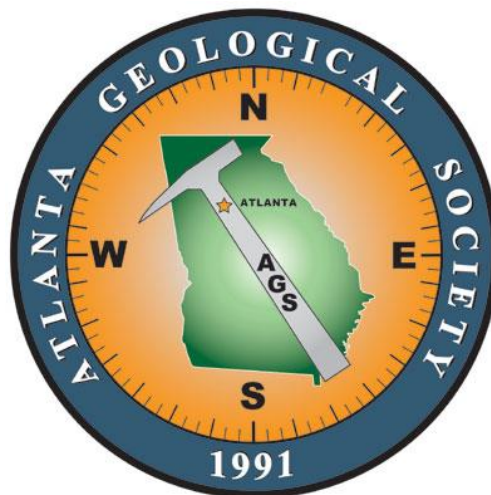
DATE: _____

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:

John Salvino johnsalvino@bellsouth.net

Please make checks payable to the "Atlanta Geological Society" and bring them to the next meeting or remit with the completed form to:

Atlanta Geological Society, Attn: John Salvino
3073 Lexington Avenue
Woodstock, Georgia 30189

CASH ☐ CHECK (CHECK NUMBER: _____)