

# Atlanta Geological Society Newsletter

Next meeting of the Atlanta Geological Society is

April 24, 2012

Fernbank Museum of Natural History (Clifton Road)

Social begins at 6:30 pm – Meeting begins at 7:00 pm

## April 2012

### ODDS AND ENDS

**Ben Bentkowski, Newsletter Editor**

As I type this on a glorious spring day, it is the 42<sup>nd</sup> anniversary of Earth Day. In 1970, I believe the Earth's problems were more observable. There were industrial smokestacks billowing who knows what and rivers caught on fire. Now, 42 years later, our problems seem harder to pin down, harder to visualize as 'bad'. Consider the idea that CO<sub>2</sub> has increased to the point where it is causing climate change. While that may be scientifically true, it is hard for the average citizen to get alarmed and activated by a chemical that our body produces. I believe it points to the complexity of our modern problems. For example, you buy an electric plug in car here in Georgia. So you would be doing your part by having zero carbon emissions while you drive. But, isn't most of the electricity in Georgia produced from coal fired power plants? Does that make it a net benefit or not? I live 32 miles from work. Would that car make the round trip? How do you get home if you run out of power?

I'm reminded of a TED talk where Bill Gates talked about society needing a modern miracle to make a CO<sub>2</sub> free power technology implementable nation-wide; something with the societal impact of the transistor.

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### APRIL MEETING

Join us Tuesday, April 24, 2012 at the Fernbank Museum of Natural History, 760 Clifton Road NE, Atlanta GA. The pre-meeting social starts at 6:30 pm and the meeting will start at 7 p.m.

The speaker for the evening is Dr. Tim Long, Emeritus Professor of Geophysics, Georgia Institute of Technology. He will be speaking on a book that he is working on with co-author Ronald Kaufmann of Spotlight Geophysical Services titled *The Acquisition and Analysis of Terrestrial Gravity Data*. Dr. Long has been working on and teaching about collecting gravity data since the early 1970's.

Details of Dr. Long's biography are included on pages 4 and 5.

Please come and enjoy the social time and the interesting presentations on Tuesday, April 24, 2012.

## Volcanic 'Plumbing Systems' Exposed: Step Closer to Predicting Large Eruptions With Study of Mid-Ocean Ridge Magma Chambers

*ScienceDaily* (Mar. 30, 2012) — Two new studies into the "plumbing systems" that lie under volcanoes could bring scientists closer to predicting large eruptions.

International teams of researchers, led by the University of Leeds, studied the location and behavior of magma chambers on Earth's mid-ocean ridge system -- a vast chain of volcanoes along which Earth forms new crust. They worked in Afar (Ethiopia) and Iceland -- the only places where mid-ocean ridges appear above sea level. Volcanic ridges (or "spreading centers") occur when tectonic plates "rift" or pull apart. Magma (hot molten rock) injects itself into weaknesses in the brittle upper crust, erupting as lava and forming new crust upon cooling. Magma chambers work like plumbing systems, channeling pressurized magma through networks of underground "pipes."

The studies, published in *Nature Geoscience*, reveal new information about where magma is stored and how it moves through the geological plumbing network. Finding out where magma chambers lie and how they behave can help identify early warning signs of impending eruptions. Scientists used images taken by the European Space Agency satellite *Envisat* to measure how the ground moved before, during and after eruptions. Using this data, they built and tested computer models to find out how rifting occurs.

Data in one study showed magma chambers that fed an eruption in November 2008 in the Afar rift of Northern Ethiopia were only about 1 km below the ground. The standard model had predicted a depth of more than 3 km. It is highly unusual for magma chambers to lie in shallow depths on slow spreading centers such as the Afar rift, where tectonic plates pull apart at about the same speed as human fingernails grow. Dr Carolina Pagli from the University of Leeds' School of Earth and Environment, who led the study, says: "It was a complete surprise to see that a magma chamber could exist so close to the Earth's surface in an area where the tectonic plates move apart so slowly. The results have changed the way we think about volcanoes."



University of Leeds (2012, March 30). Volcanic 'plumbing systems' exposed: Step closer to predicting large eruptions with study of mid-ocean ridge magma chambers. *ScienceDaily*. Retrieved April 21, 2012, from <http://www.sciencedaily.com/releases/2012/03/120330111023.htm>

## 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  
Professional Registration Committee

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

## ODDS AND ENDS continued

Towards the end of World War II, President Roosevelt met with Premier Stalin and Prime Minister Churchill to plan the end of the war. At the end of that meeting in February 1945, our President met with King Saud and came to an understanding of the USA providing military defense for Saudi Arabia in return for secure access to oil. I believe that meeting has been the basis of American energy policy in the 67 years hence. That meeting did provide a societal change. We have gotten quite used to this arrangement and we have much of our energy infrastructure in support of this energy policy. There have been some technical advances and I believe that society keeps trying to make that conversion and needs to keep trying to make that conversion. There seem to be so many people who profess to know *the* answer but H. L. Mencken wrote 'Every complex problem has an answer that is clear, simple and wrong'. In the meantime, I'll keep recycling my grocery bags, take the bus to work and work on the problems I can get my average citizen mentality around.

Hope you had a great Earth Day, however you celebrated.

B. B.  
Keep on Rockin'

## SPEAKER'S BIOGRAPHY

# Leland Timothy Long

*Emeritus Professor of Geophysics  
School of Earth and Atmospheric Sciences,  
Georgia Institute of Technology,  
Atlanta, GA 30332-0340  
([timlong@eas.gatech.edu](mailto:timlong@eas.gatech.edu))*

### Education:

B. S. Geology 1962 University of Rochester  
M. S. Geophysics 1964 New Mexico Institute of Mining and Technology  
(Thesis Topic: Short Period Microseisms)  
Ph.D. Geophysics 1968 Oregon State University  
(Thesis Topic: Transmission and Attenuation of the Primary Seismic Wave, 100 to 600 km.)

### Employment History:

2005-Present, Professor Emeritus, Georgia Institute of Technology  
1981-2005 Professor, Georgia Institute of Technology  
1972-1981 Associate Professor, Georgia Institute of Technology  
1968-1972 Assistant Professor, Georgia Institute of Technology  
1978 to present, Consultant and Professional Geologist, State of Georgia #455, specializing in earthquake seismology, blast vibration analysis, and environmental geophysics.

### Awards:

The Jesuit Seismological Association Award, 2006. Honoring outstanding contributions to observational seismology.

Listed in Who's Who in: America, Science and Engineering, American Education, the South and Southwest, the Southeast, and Georgia,

### Current Topics of Interest:

The application of seismic wave propagation in environmental problems including:

- Surface waves tomography for shallow soil structure.
- The interpretation and inversion of scattered waves in environmental applications.
- Surface wave monitoring of fluid-induced temporal variations shear-wave velocity in soils.

The monitoring and study of earthquakes in the southeastern United States including:

- The promotion of earthquake recording as a tool to enhance k-12 education.
- The design of low-cost seismic recorders.
- The analysis of the fractal nature of the statistics of earthquakes and fracture spacing.
- Studies of SOC in the mechanism for shallow earthquakes in the Piedmont province, including reservoir induced seismicity.

Acquisition and analysis of gravity data (book in preparation)

### Recent Consulting and Informational Topics Include: (Detailed list available on request)

- Monitoring for explosions and the location of blasts in underground mines.
- Evaluation of the likelihood that quarry blasts have or could exceed damage thresholds.
- Design of museum displays for education in earth science and seismology.
- Review of K-12 Earth Science textbooks for technical accuracy.

**SPEAKER'S BIOGRAPHY****Leland Timothy Long**Refereed Publications (recent and relevant):

Peng, Zhigang, L. T. Long, and Peng Zhao, (2011). The Relevance of High-frequency Analysis Artifacts to Remote Triggering, *Seismological Research Letters*, Vol. 82, No. 5. 656-662.

Long, L. T. (2009). The Central Georgia Seismicity, *Georgia Geological Society Guidebook*, Volume 29, pages 65-70.

Toteva, T. and L.T. Long, (2007). A Seismic Inversion Experiment to Identify Scatterers in a Granite Outcrop. *Journal of Environmental and Engineering Geophysics*, Vol. 12, No. 4, pp. 337-351

Long, L.T. and T. Toteva, (2005). Differential Surface Wave Detection of Changes in Fluid Saturation in Soils, in *Proceedings of the Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP)*, The Environmental and Engineering Geophysical Society April 2005

Long, L.T. (2004). Earthquakes in Northwest Georgia, *Georgia Geological Society Guidebook*, Volume 24, 25-30.

Long, L.T., (2002) Group Velocity Inversion Using Synthetic Surface Waves in Proceedings of the Symposium on the Application of Geophysics to Engineering and Environmental Problems, The Environmental and Engineering Geophysical Society, February, 2002. (SAGEEP02)

Long, L.T., and A. Kocaoglu (2001) Surface-Wave Group-Velocity Tomography for Shallow Structures, *Journal of Environmental and Engineering Geophysics*, Vol. 6, No. 2, pp. 71-82.

Chen, Xiuqi, and L.T. Long (2000). Spatial distribution of relative scattering coefficients determined from microearthquake coda. *Bulletin of the Seismological Society America*, 90, 2, pp. 512-524.

Chen, Xiuqi, and L.T. Long (2000). Hypocenter migration as an explanation for temporal changes in coda Q. *Journal of Geophysical Research*.105, B7, pp. 16151-16160.

Long, L.T., A. Kocaoglu, W.E. Doll, X.Q. Chen, J. Martin. Surface-Wave Group-Velocity Tomography for shallow structures at a waste site, SEG Expanded Abstract, Annual Meeting, Houston, October 1999.

Long, L.T., and A. H. Kocaoglu (1999). Surface-Wave Group-Velocity Tomography for Shallow Structures, in Proceedings of the Symposium on the Application of Geophysics to Engineering and Environmental Problems, The Environmental and Engineering Geophysical Society. (85%)

Long, L.T. (1998). Shallow Earthquakes in the Eastern United States: implications for hazard evaluation, Proceedings, 6th U.S. National Conference on Earthquake Engineering, (June 1998) (100%)

Boadu, Fred, and L.T. Long (1996). Effects of fractures on seismic velocity and attenuation, *Geophysical Journal International*, Vol. 127, No. 1. October 1996, 86-110. (25%)

Kaufmann, R, and L. T. Long, (1996). Velocity structure and seismicity of southeastern Tennessee, *Journal of Geophysical Research* Vol. 101, No. B4, 8531-8542. {55% }

Long, L.T., A. Kocaoglu, R. Hawman, and P.J.W. Gore, (1994). The Norris Lake earthquake swarm of June through September, 1993; preliminary findings, *Seismological Research Letters*, Vol. 65, No. 2, 167-171. {80% }

## Here are the details for the April 28th PG Class:

Date: Saturday, April 28, 2012

Time: 10:00 am until 12:00 pm

Place: Fernbank Science Center  
156 Heaton Park Drive, NE  
Atlanta, Georgia 30307  
[678-874-7102](tel:678-874-7102)  
<http://fsc.fernbank.edu>

Lecturer: Dr. Tim Chowns  
Subject: Stratigraphy and Sedimentation

In this AGS PG Candidate workshop, Dr. Tim Chowns will show the way in which accommodation space and sedimentation rate influence the progradation and retrogradation of facies and how this is used to interpret depositional environments. He will first introduce the basics and then have the group work some exercises.

Tim is a professor-emeritus of Geology at the University of West Georgia and has received several teaching awards, including many accolades from students. He was educated in England (BSc University of Leicester, PhD University of Newcastle upon Tyne) and immigrated to the USA in 1968. After teaching at the University of Georgia he moved to the University of West Georgia (West Georgia College in those days) in 1973.

Tim's main interests are in sedimentation and stratigraphy and especially the geology of Georgia. He continues to teach courses in Sedimentology, Stratigraphy and Optical Mineralogy. Some areas of research include the origin of geodes, Pre-Cretaceous rocks below the Georgia Coastal Plain, the stratigraphy and depositional environment of the Birmingham iron ores, and changes in the location of inlets on the Georgia coast related to Holocene transgression.

Please join us!  
For more information contact:

John Salvino at [johnsalvino@bellsouth.net](mailto:johnsalvino@bellsouth.net) or  
Ken Simonton at [kws876@gmail.com](mailto:kws876@gmail.com)



**Fernbank Museum of Natural History**

**Upcoming Public Programs and Events**

**(All programs require reservations, including free programs)**

**UPCOMING EVENTS:**



**Tadpole Tales**

Saturday, April 28 at 11:30am Join us inside [Fernbank NatureQuest](#) for this monthly event. Preschoolers will enjoy a story with a Fernbank educator along with a special activity or song. April's story is The Hungry Hummingbird by April Pulley Sayre

**Pirate & Princess Weekend May 12 & 13**

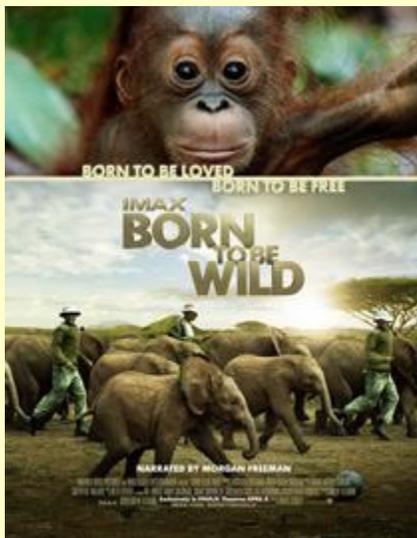
Well, blow me down! Those scallywag pirates and poised princesses are once again taking over Fernbank Museum during a fun-filled weekend adventure. Join us in your favorite pirate or princess costume for hands-on activities, games and much more.

Please follow the link for details on the many activities for both days:

<http://www.fernbankmuseum.org/calendar-of-events/pirate-princess-weekend-may-12/>

**Now Showing in the Fernbank IMAX movie theater:**

(Check our website for special screenings)



## 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>

### *Wildlife Rescue*

Through May 6, 2012

Immerse yourself in compelling stories of animal rescue from around the world. Explore the efforts of everyday people who dedicate their lives to helping animals survive. Fly in an ultra-light plane to lead whooping cranes to their wintering grounds. Discover how waterfowl are being saved from oil spills to how orphaned elephant calves and baby orangutans are being raised and released back into the wild. Join the rescue efforts and experience the innovative science supporting these achievements.

[Learn more.](#)

### *Georgia Natural The LAST FEW DAYS!!*

Through April 29, 2012

Witness the natural beauty and diversity of Georgia's landscapes in this of 35 framed photographs (a mix of black-and-white and color photos) by local artist Diane Kirkland.

[Learn more.](#)

### Coming Soon

***The Scoop on Poop*** Opens May 26, 2012

For tickets and details on exhibits, films, and events, please visit the website at [www.fernbankmuseum.org](http://www.fernbankmuseum.org) Follow us on Facebook or Twitter for the latest news and updates! Please see the website for details about Martinis and IMAX on Friday nights.

## AGS Officers

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## AGS 2012 Meeting Dates

Listed below are the planned meeting dates for 2012. Please mark your calendar and make plans to attend.

April 24 AGS –Poster Session

April 28 P.G. Study Group – Dr. Tim Chowns Sedimentation and Stratigraphy

May 26 No P.G. Study Group, Memorial Day Holiday

May 29 AGS

June 26 AGS Annual Social

June 30 Dr. Julian Grey, Mineralogy

## Oldest-Ever Reptile Embryos Unearthed

*ScienceDaily* (Apr. 11, 2012) — Dating back 280 million years or so, the oldest known fossil reptile embryos have been unearthed in Uruguay and Brazil. They belong to the ancient aquatic reptiles, mesosaurs. The study of these exceptionally well-preserved fossils suggests that mesosaurs were either viviparous[1] (pushing back this mode of reproduction by 60 million years) or that they laid eggs in advanced stages of development.

Although the oldest known adult amniote[2] fossils date back some 315 million years, very few collections of fossil eggs and embryos are available to paleontologists. The discovery by an international team including Michel Laurin, from the Centre de Recherche sur la Paléobiodiversité et les Paléoenvironnements (CNRS/Museum national d'histoire naturelle/UPMC), of fossilized embryos of mesosaurs, ancient aquatic reptiles that lived ca. 280 million years ago, sheds light on these animals' reproductive mechanism.

In Brazil, the team uncovered a fossil specimen in gestation, which revealed that mesosaur embryos were retained in the uterus during most of their development. These reptiles, therefore, were probably viviparous<sup>1</sup>.

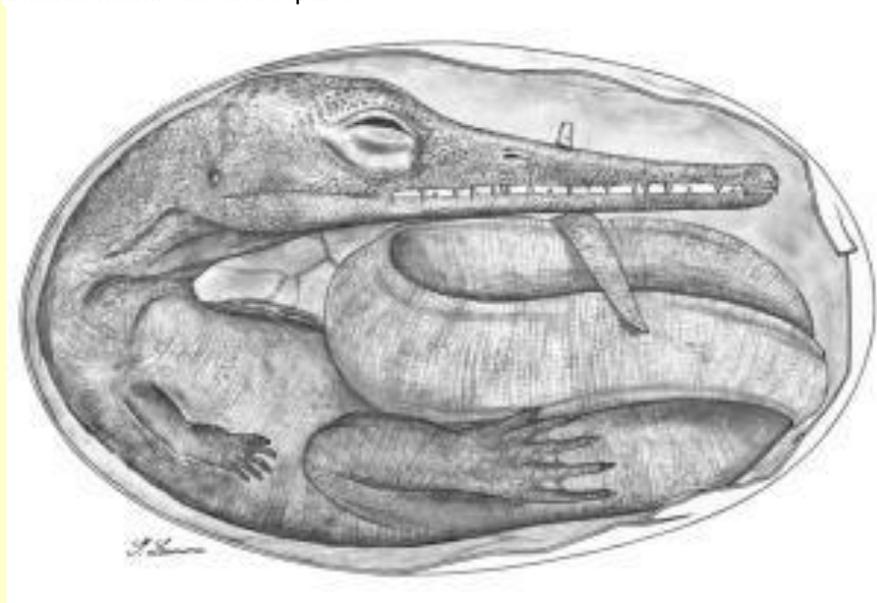
In addition, the same researchers unearthed 26 adult mesosaur specimens in Uruguay, all of which were associated with embryos or very young individuals, dating from the same period as the Brazilian fossil. Although these more or less disarticulated specimens are difficult to interpret, most of them are probably embryos in the uterus, thus backing up the hypothesis that mesosaurs were viviparous. The largest of these fossils may be young animals that were looked after by at least one of the parents, pointing to the existence of parental care. However, one isolated mesosaur egg (see *photograph below*) was also found at the Uruguayan site. This find casts doubt on the hypothesis of viviparity (which, in theory, excludes the laying of eggs). It suggests that the Uruguay mesosaurs laid eggs at an advanced stage of development, which then hatched shortly afterwards (several minutes to days later).

This research therefore reveals the oldest known fossil amniote embryos from the Paleozoic (543 to 250 million years BP) and the first examples of embryo retention (and perhaps viviparity), pushing back this reproductive mechanism by some 60 million years. But do the reproductive characteristics of mesosaurs highlighted in this study reflect their aquatic way of life (since viviparity is frequent in aquatic reptiles), or was it rather a fairly widespread condition among early reptiles?

Notes:

(1) : Animals that keep their embryos inside their bodies and give birth to their offspring.

(2) : Amniotes are vertebrates whose embryo is surrounded by a membrane called the amniotic membrane: they include mammals and reptiles



# 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: \_\_\_\_\_

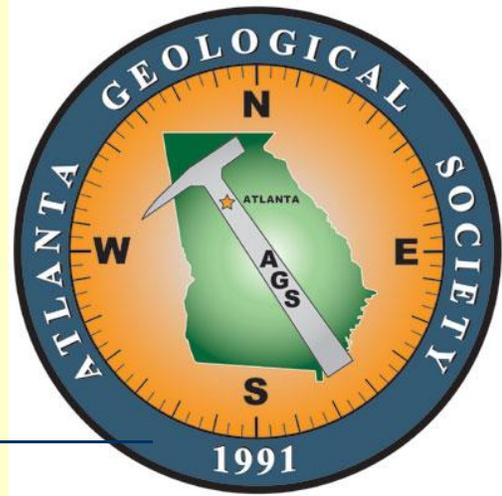
ORGANIZATION: \_\_\_\_\_

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,  
1925 Vaughn Road NW, Suite 100, Kennesaw, GA 30144-4560.

CASH

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