

Volume 28
Number 1

Alabama Geological Society

March 2015

President's Message



I want to first take this opportunity to say happy 2015 from the Board at AGS. The Society remains financially sound and professionally active as the Board had its 1st quarter meeting of 2015 on January 21 at the Geological Survey of Alabama's offices in Tuscaloosa. We are excited about some new business adopted including accepting requests to compensate registered students with taking the ASBOG Fundamental of Geology Examination. The examination is offered this fall on Friday October 2, 2015 in Montgomery. The deadline to sign up for the ASBOG is August 14. Students are asked to submit a letter to the Board specifying their intention to take the examination. Upon completion of the examination, and with proof of taking the examination, students will be compensated for the \$150.00 registration fee. This decision was made to support one of our new mission goals that states: *to act as a bridge between students and early career professionals by providing support through these stages of career development.* We are scheduled to conduct our 2nd quarter Board meeting to take place in April. We are on track to hold at least 4 Board meetings this year.

It is with deep appreciation that I formally thank Dr. Mark Puckett (University of North Alabama) and Dr. Andy Rindsberg (University of West Alabama) for hosting the Society's 51st annual field trip entitled: *Stratigraphy and Depositional Systems in the Mississippian Strata of the Appalachian Plateau, Northwest Alabama.* The event took place on December 11-13, 2014 and was one of the better attended field trips we have had in recent years. The weather, while a bit cold, cooperated for both days. We all got some much needed exercise and

The Alabama Geological Society News is published approximately three times per year. Manuscripts, news, and notes should be directed to the Newsletter Editor. The AGS also welcomes announcements of meetings, conferences, lectures, field trip, short courses, personnel changes, and social events of geological importance. Submit copy by e-mail.

accomplished some "geo-shop-talk." I want to thank Richard Carroll and Chris Hooks (Geologic Survey of Alabama) for shadowing us, at all times, with excellent junk food and hot coffee. I want to also thank the Alabama Stone Company and their



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Lewis Dean Travel Grants

The Alabama Geological Society was pleased to help the eight students attend professional meetings in the fall of 2014. Presenting at the 2014 GSA Annual Meeting in Vancouver were Elizabeth Bollen (UA), Rajesh Dhungana (UA), Ziaul Haque (AU), Erik Heider (AU), Hillary Slettern (UA). Jack Partlow (UA) presented at AGU in San Francisco, Daniel Martin (UA) presented at the Radiobioassay and Radiochemical Measurements Conference in Knoxville, and Lynn Harrell (UA) presented twice at the Southeastern Association of Vertebrate Paleontology in Jackson Mississippi.

Shallow Geological Transect of Wetumpka Impact Structure, Alabama

Erik Heider & David T. King, Jr.

Access to key public rights of way and recent core drilling affords the opportunity to construct a shallow geological transect across the ~ 5 km, Late Cretaceous, marine-target impact structure at Wetumpka, Alabama. From northwest to southeast, the transect encountered deformed crystalline rim terrain, vertically stacked sedimentary target megablocks, sedimentary target megablocks in impactite matrix, stacked and faulted sedimentary target megablocks, interior polymict impact breccia, resurge chalk deposits, and steeply inclined, deeply weathered (saprolitic) crystalline rim terrain. Core drilling near the transect indicates that sedimentary target megablock deposits are lateral facies equivalents, whereas the resurge chalk deposits and interior impact breccia unit rest upon those two facies. The relative age of the resurge chalk deposits and the interior impact breccia is not known at this time. The formative events that generated the units seen in the geological transect are all related to late stage modification of the Wetumpka impact structure and likely represent the last few minutes in Wetumpka's sequence of events.

Determination of Radium Levels in Formation Waters from the Black Warrior Basin, Alabama

Daniel Montiel Martin, Katie Kingry and Natasha Dimova

Natural gas is stored in coal primarily in adsorbed state. To produce gas, the coal must be depressurized to release the gas from the coal matrix. Depressurization is accomplished by dewatering and as a result, large volumes of formation water are commonly co-produced with the natural gas. The coalbed methane industry in the Black Warrior Basin of Alabama has up to date produced more than 7.4×10^{10} m³ of gas and 4.5×10^7 barrels of water. The disposal of co-produced water (formation water) ranges from nearly potable sodium-bicarbonate water to hypersaline sodium-chloride water. The Geological Survey of Alabama (GSA) has characterized these formation waters for water chemistry in light of the regional geologic framework and to evaluate the full range of water management options for the Black Warrior coalbed methane industry. However, to our knowledge analyzes of naturally occurring radioisotopes of these formation waters have never been performed. Produced waters contain levels of dissolved radium and its decay products that are concentrated. Radioactivity levels are site-specific and vary from site to site. In this preliminary data set we present results from determination of ²²⁶Ra ($t_{1/2}=1600y$) from 39 samples collected from production wells in the Black Warrior Basin, Alabama. Analyses of raw waters were performed using radon emanation technique via RAD H2O set up (Durrige Inc).

New P-T Paths for Metamorphism of Amphibolite from the Salmon River Suture Zone, Idaho

Elizabeth M. Bollen, Harold Stowell, Joshua J. Schwartz, and Matthew P. McKay

The Salmon River Suture Zone (SRSZ) in west-central Idaho marks the earliest stages of terrane accretion along the Mesozoic margin of cratonic North America. East-dipping, N-S trending thrust faults parallel the suture. The thrust faults separate rocks of different metamorphic grades, with higher grade rocks in the hanging wall. Of these faults, the Pollock Mountain fault, juxtaposes two structural thrust sheets, the upper greenschist-grade Rapid River and amphibolite-grade Pollock Mountain plates.

Amphibolite from the Pollock Mountain plate containing hornblende, biotite, garnet, quartz, plagioclase, ilmenite, rutile, and \pm clinozoisite was modeled using THERIAK-DOMINO to construct a detailed P-T path. Garnet is texturally and compositionally zoned with cores containing abundant rotated helicitic inclusions and inclusion free rims. Overall, asymmetrically from garnet core to rim, Mn and Ca decrease, while Fe and Mg increase. The boundary between inclusion density corresponds with a fluctuation in Fe, Mn, and Mg. Garnet core compositions coupled with observed inclusions indicate that garnet growth initiated at ca. 6 kbar and 700°C. Peak metamorphism for this rock occurred at 7.5 kbar and 700°C, based on the observed mineral assemblage and garnet rim compositional isopleths. This isothermal loading path is compatible with rapid thrust loading after heating.

Previous geochronologic and petrologic studies interpreted the sharp textural and compositional discontinuity between core and rim as multi-stage growth from distinct accretion events at 144 and 128 Ma (Getty & Selverstone, 1993) or protracted growth during a single, long-duration (>10 Ma) metamorphic event caused by thrust loading (McKay, 2011). Comparisons of phases included in garnet with those in the matrix, coupled with exchange thermobarometry, are being used to evaluate the single event hypothesis. Preliminary results are being used in conjunction with garnet Sm-Nd ages and a P-T-t path for the Rapid River plate (McKay, 2011) which shows similar near isothermal loading.

High-Resolution Replicated Records of Mid-to-Late Holocene Hydroclimate Variability From Stalagmites at DeSoto Caverns (Alabama, USA)

Rajesh Dhungana and Paul Aharon

We report here the results of a recently completed investigation of two cored stalagmites from DeSoto Caverns (33°18'N, 86°17'W) in the inner Gulf Coast of the Southeast USA region. The study aims to provide a better understanding of past hydroclimate variability in North America during the mid-to-late Holocene transition. The two stalagmites (DSSG5 and DSSG6) were deposited continuously from 5.8 to 1.1 and 5.4 to 0.9 cal ka BP based on closely spaced U/Th age determinations (n=33) and (n=15), respectively. Significant oxygen and carbon isotope positive excursions at 5 cal ka BP and negative isotope excursions at 4.6 ± 0.1 and 4.2 ± 0.05 cal ka BP are observed in the coeval rainfall proxy time-series. On the basis of a long term monitoring study of the cave drip waters and local rainfall variability we interpret the ^{18}O and ^{13}C enrichment excursions (-2.2‰ and -3.2‰) at ~5 cal ka BP as the result of an abrupt mega-drought of a 300 yrs duration, synchronous with the termination of the African Humid Period in North Africa and a weakening of the Asian summer monsoon. Conversely, ^{18}O and ^{13}C abrupt depletions (-4.7‰ and -9.1‰, -4.9‰ and -9.8‰) at 4.6 and 4.2 cal ka BP are interpreted to represent unusually high rainfall events that are synchronous with the "Akkadian" drought events. The nature and abruptness of the hydroclimate switches documented in the two stalagmites from the DeSoto Caverns and their synchrony with drought events elsewhere, point to the North Atlantic variability as the dominant factor controlling the mid-to-late Holocene abrupt climate events. Power spectra analysis of the oxygen isotope time series reported here reveals a prominent periodicity of 66 ± 4 yrs that is consistent with the 60-70 yrs periodicity of the Atlantic Multidecadal Oscillation (AMO).

Continental Rifting in the Woodlark Basin, Papua New Guinea: A Comparison of Different Estimates of Extension at the Rifting-Spreading Transition

Jack Partlow and Andrew M. Goodliffe

The Woodlark Basin is one of few places where it is possible to investigate an active transition from continental rifting to seafloor spreading. The Papuan Peninsula began N-S extension at 8.4 Ma, followed by seafloor spreading at 6 Ma. To date, seafloor spreading has propagated west 500 km. In the proximity of the modern rifting to spreading transition the northern margin has subsided 2-3 km with minor brittle faulting. The southern margin has subsided a similar amount but is characterized by large faults. Previous work shows that the observed continental extension is half the amount resolved by seafloor-spreading kinematics. It has been proposed that this discrepancy is due to mid-crustal decoupling, where the mantle lithosphere and lower crust are detached.

The N-S profile across the current rifting to spreading transition is a natural laboratory for extensional environments. The work herein presented is a continuation of prior studies, but incorporates a new approach to extensional modeling, specifically the use of the Move software. The profile presented includes ODP Leg 180 wells. Structural and stratigraphic interpretations originate from nearby seismic lines. Biostratigraphy and paleomagnetism data are the basis for age-depth relationships. Interpreted sedimentary packages permit backstripping and decompaction models that assume Airy Isostasy. Extension is estimated through the restoration of fault heaves and back rotation of fault blocks. From previous studies we know the width of the Papuan Peninsula to be 320 km in the vicinity of the profile presented. Furthermore, those studies estimate 220 km of extension across the margin based on Euler pole kinematics. This gives an original margin width of about 100 km, and Beta greater than 3. We present herein an extension estimate based on 2-D kinematic modeling, and contrast this with prior extension estimates of 111-115 km.

Detrital History of the Conglomerate Measures of the Pottsville Formation in the Cahaba Synclinorium, Southern Appalachians, Alabama

Ziaul Haque, Ashraf Uddin, Willis E. Hames, and Jack C. Pashin

The Cahaba Synclinorium of Alabama contains >2.5 km of Pennsylvanian synorogenic clastic wedge sediment in the Pottsville Formation. The upper 800 m of the formation consists of coarse conglomerate with lesser amounts of sandstone, shale, and coal. Known as the conglomerate measures, this magnafacies was deposited in a series of stacked braidplain-anastomosis cycles, possibly at the distal fringes of giant piedmont fans. Aggradation of widespread bedload-dominated fluvial systems may have led to the development of anastomosed fluvial systems with peatlands, which are represented by thick, low-sulfur coal seams. A total of 36 conglomerate and 10 sandstone samples were collected from cores. Petrographic analysis reveals the source of this coarse-grained, synorogenic sediment.

Clasts within the conglomerate units consist mainly of chert, sedimentary and metamorphic lithoclasts and lesser amount of volcanic lithoclasts. Medium-to-high grade metamorphic lithic fragments are dominant. Carbonate clasts are present, along with large fragments of chert that appear to be derived principally from the Cambrian-Ordovician Knox Group. Both rhyolite and basalt clasts are present in the conglomerate, as are argillaceous lithic fragments. Clast composition indicates a proximal orogenic source that includes elements of the Appalachian thrust belt and the crystalline core of the Appalachians. The low abundance of heavy minerals and abundance of ultra-stable minerals in the upper Pottsville sandstone reflects intense chemical weathering, which is consistent with an equatorial paleolatitude. The presence of rutile and garnet further suggests a medium- to high-grade regionally metamorphosed source in the southern Appalachians. Ongoing research on detrital geochronology and mineral chemistry will provide additional information on provenance of the upper Pottsville Formation.

Preliminary Growth and Trace Elemental Characterization of Rhodoliths (*Lithothamnion Sp.*) from the Gulf of Panama, Panama

Hillary R. Sletten, C. Fred T. Andrus, David P. Gillikin, and Jochen Halfar

Rhodoliths, free-living forms of coralline red algae, are an important proxy resource for understanding short and long-term environmental trends in tropical to arctic oceans. Coralline algae produce accretionary, high-Mg skeletons which contain no ontogenetic growth trends, thus permitting the measurement of time series elemental data profiles that may serve as useful proxies for a range of environmental variables. Tropical rhodoliths (n=196) of the *Lithothamnion sp.* were collected near the southern extent of the Archipelago de Las Perlas, Gulf of Panama via SCUBA diving to test how elemental uptake changes with altered conditions in pH and other environmental parameters related to skeletal growth. For the total sample population, rhodoliths were highly branched and classified as predominantly spheroidal (30.61%) and spheroidal-discoidal (29.08%) with the remaining 40.31% falling into variable categories of spheroidal-ellipsoidal according to the Sneed and Folk (1958) classification scheme. Sizes ranged from 1.5-6.65 cm and average wet weight was 14.4 g. Alizarin Red S (ARS) stain was used to study growth rates for 60 samples randomly selected for mesocosm experiments. Algal growth post-ARS has offered insight into growth rates, sample age, and increment periodicities. To date, samples PRE-028 and PRE-006 have been measured with growth rates of $1.92 \mu\text{m d}^{-1}$ and $1.95 \mu\text{m d}^{-1}$, respectively, and total sample ages of ca. 13.4 yrs BP and 16.0 yrs BP. Initial tests using LA-ICP-MS indicate that measurable trace elemental patterns (e.g. P and Mn) are present and were analyzed to assess potential environmental variations.

Possible Thermoregulation in the Late Cretaceous Billfish *Protosphyraena* (Actinopterygii: Pachycormidae) Indicated by Oxygen Isotope Analysis of Fossils from the Mooreville Chalk (Campanian) of Alabama, USA

T. Lynn Harrell, Jr., Alberto Pérez-Huerta, and Celina Suarez

In classic biological thought, thermoregulation was believed to be restricted to the "higher vertebrates", which consisted only of mammals and birds. More recently, it has been discovered that other groups of organisms also possess the ability to control their internal temperature through a variety of physiological adaptations. Among these newly discovered thermoregulating forms are some larger bony fish, such as tuna and billfish, which warm portions of their bodies by means of countercurrent blood flow and masses of specialized muscle tissue. The present study examines the oxygen isotope content of biophosphates in tooth enamel from the Late Cretaceous fish *Enchodus* and *Protosphyraena* to determine the temperature at which they formed. Using the salmon-like *Enchodus* as a proxy for smaller, ectothermic fish, which would reflect the average temperature of the surrounding seawater, the *Protosphyraena* billfish specimens are compared against this proxy to determine if they were ectothermic like *Enchodus*, or were capable of higher thermoregulation as in some modern billfish. Results show that the average temperature ($28.3 \pm 1.23 \text{ }^\circ\text{C}$; n=8) for *Protosphyraena* was 2 – 3 °C higher than the average temperature ($25.7 \pm 0.94 \text{ }^\circ\text{C}$; n=6) for *Enchodus* and thus the presumed ambient water temperature. This is similar to the degree of thermoregulation observed in some modern billfish, which typically have cranial temperatures of 3 – 5 °C higher than the average ambient water temperature, although they can have temperatures up to 15 °C higher depending on the temperature of the environment. This suggests that thermoregulation in some primitive billfishes may have evolved as early as the Campanian, approximately 82 mybp.

Unusual Feeding Traces on a *Pteranodon longiceps* (Reptilia: Pterosauria) Bone from the Late Cretaceous (Campanian) Mooreville Chalk in Dallas County, Alabama, USA

T. Lynn Harrell, Jr. and Dana J. Ehret

Pterosaur remains are exceptionally rare in the Late Cretaceous marine chinks of Alabama and the few specimens in the Alabama Museum of Natural History and McWane Science Center collections are very fragmentary. Here we report the occurrence of a proximal phalanx of digit IV (wing finger) of *Pteranodon longiceps* from the Mooreville Chalk (early Campanian, ca. 81 ma) near Harrell Station, Dallas County, Alabama. This bone preserves evidence of unserrated tooth marks unlike those of any contemporary shark species, and of *post mortem* feeding by marine scavengers indicated by serrated tooth marks typical of *Squalicorax*-like sharks. The unserrated tooth marks compare favorably with the tooth spacing and morphology of a small to moderate-sized saurodontid fish. Because of the biting/feeding habits of modern osteichthyan fish, it is believed that this unusual feeding trace represents an inadvertent strike on the pterosaur by a predatory fish made while both were simultaneously hunting smaller prey fish. If confirmed, this would be the first reported occurrence of an osteichthyan bite mark on a pterosaur from the Late Cretaceous of North America.

Lewis Dean Student Travel Grants for Spring 2015

The Alabama Geological Society is pleased to announce the availability of the Lewis Dean Student Travel Grants for Spring 2015 in the amount of \$200 per grant. These grants are meant to offset the cost of travel for students who would like to attend professional conferences and present research.

To qualify for the travel grant:

1. The applicant must be a member of AGS (note: may apply for membership at the time of application by completing the membership form and submitting dues).
2. The student must be the first and presenting author on an accepted presentation (oral or poster) at a professional meeting such as GSA or AGU. (Student events, such as the AAPG student Expo, do not qualify).
3. The meeting must begin between February 15, 2015, and August 31, 2015.
4. The applicant needs to state clearly the name of the professional meeting, the location, and the dates of the meeting.
5. A copy of the abstract ACCEPTANCE (in .pdf format), as well as a copy of the final abstract including authorship (in Word format), must be submitted. If acceptances have not yet been distributed, an applicant may be awarded the grant conditionally until proof of acceptance is received.

Applications will be accepted no earlier than 8am, Monday, March 23, 2015, through no later than 5pm, Friday, March 27, 2015. Only applications received during the application window will be considered. Announcement of recipients will take place on or about April 3, 2015.

Only complete applications submitted via email, to Denise Hills, AGS secretary (dhills@gsa.state.al.us), will be considered. Subject line must read "AGS Travel Grant Application."

Failure to follow these instructions will disqualify the applicant.

If you have questions, please contact Denise Hills, AGS Secretary, at dhills@gsa.state.al.us.

Student Opportunities

The Alabama Geological Society has several benefits and funding opportunities for student members.

- Reduced rate for the annual fieldtrip.
- Spring and Fall Travel Grants – Grants are awarded to presenters at professional meetings; award amount is \$200, the number of grants available varies based on funding; applications are usually accepted in February and September; submission requirements are listed on our website, submission dates will be posted at least two weeks prior to the deadline.
- Newton and Winefordner Scholarships – these two scholarships are awarded each spring to students enrolled in a geosciences program in Alabama to help offset the cost of research; award amount is up to \$1000 each; for more details please visit our website and watch for the forthcoming announcement via email.
- Reimbursement of ASBOG Fundamentals of Geology exam fee. See President's message and website for more details.

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hospitality for allowing us access into their Rockwell Limestone Quarry. The staff at the quarry really made us all feel welcomed to be at the site. Keep in mind that participants can receive up to 15 Professional Development Hours (PDHs) toward continuing education requirements associated with [professional geological licensure](#) in Alabama. I would be remiss to not mention that we are off to a good start in planning our 2015 field trip and more details on that event will come on forward in the next few months.

We will continue to recognize the excellent geology students we have here in the State of Alabama with travel grant, awards, and scholarships in 2015 and we are in the process of sending out the travel grants for this year. We also welcome miscellaneous funding requests such as for educational teaching materials, workshops, and special events. We will also be announcing planned workshops, to be lead by Larry Rheams, in the next few months.

Our Annual Awards Banquet and Slide Show is scheduled to take place in April or May and will likely be held in Tuscaloosa. The event is a dinner featuring presentations by members and guests of the Alabama Geological Society who have traveled to the distant reaches of the globe. The highlight of the banquet each year is the presentation of scholarships to deserving students, who are the future of geology in the region. Please stay tuned for more information about the date and location for the 2015 event coming soon.

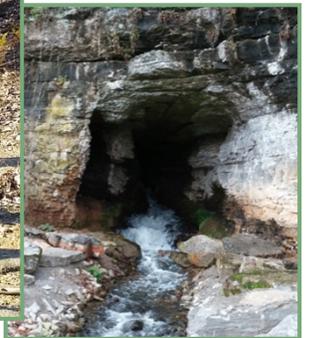
Finally, please keep in mind that we invite everyone who is interested to take a larger role in our society. If you have an idea for an event, field trip, or workshop, please let us know. Seeing the participation and fellowship at the field trip last December left me with the feeling that the common bond of the geosciences is strong in our organization as well as throughout the State of Alabama.

Cheers and best regards,

- Dr. Richard A. Esposito, PG



2014 Fieldtrip



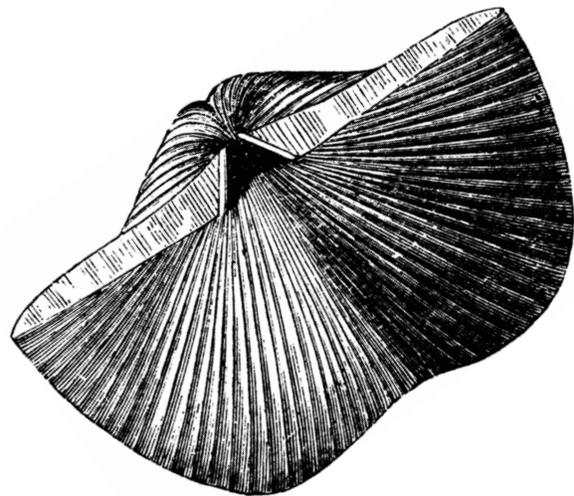
Opportunities within AGS

Are you interested in serving your society? Would you like to gain valuable leadership experience? Or, do you know someone who fits these criteria?

We are now accepting nominations for various committees' chairs and members, including:

- Meetings, Workshops, & Social Events
- Membership
- Web
- Election
- Awards & Scholarships
- Education
- Constitution & Bylaws

Contact Richard Esposito, AGS President, or Denise Hills, AGS Secretary, for more details.



Introducing Your Newest Board Member



If you have participated in an AGS fieldtrip or workshop in the past 20 years, you most likely already know our newest addition to the Board. A long time AGS member and friend of field-trippers everywhere, **Larry Rheams** has consented to be the **Workshop Committee Chair**. He has previously served on the Board in many other capacities, including Vice President and President. You may remember Larry as the guy with the hot coffee and doughnuts on numerous fieldtrips or the herder of cats at the workshops he has organized. Now Larry will take his experience to lead the Workshop Committee. This Committee identifies topics of interest, finds leaders/instructors for those topics, and plans workshops for the benefit of Alabama geoscientists and the AGS mission. Contact Larry if you have workshop ideas!

Future Annual Field Trips of the Alabama Geological Society

Call for Proposals and Nominations

The Field Trip Committee of the Alabama Geological Society invites proposals and nominations for future Annual Field Trips, beginning with the 2015 Annual Field Trip.

Format and procedures for field trips:

- Two-day field trip, beginning with a pre-trip welcoming/information session
- Leaders are responsible for all aspects of planning the field trip, preparing an announcement for distribution by the Society, preparing the guidebook for publication, and making local arrangements for housing and meals, as well as conducting the field trip
- Assistance from the Society includes circulating the announcement, printing the guidebook, setting the budget and fees, collecting and managing registration fees and other budget items, contracting and directly paying for busses, directly paying for lunches, and directly paying other budgeted expenses
- The Annual Field Trip generally is scheduled on the first Friday and Saturday after the end of football season (usually the second weekend in December)

Proposals and nominations must include the following:

- Topic and approximate title of the field trip
- Names of the primary leader(s)
- Base location (town) for housing for the trip
- Brief summary of theme of the trip and geologic features to be displayed
- Proposer(s) must indicate willingness to be leader(s) of the trip
- Nominator(s) must name prospective leader(s) but need not assure that the nominated leader(s) have agreed to accept the responsibility
- Proposals/nominations are for field trips for the years: 2015, 2016, 2017, 2018, and 2019

The objective is to establish a five-year plan of identified future Annual Field Trips and field-trip leaders.

Proposals and nominations should be sent to:

Bill Thomas, Chair of Field Trip Committee,

E-mail: geowat@uky.edu

USPS: Geological Survey of Alabama, P.O. Box 869999, Tuscaloosa, AL 35486-6999

Alabama Geological Society Field Trip Committee:

Bill Thomas

Ed Osborne

Richard Esposito

Mark Steltenpohl

Meet Your Board Members



Richard Esposito, President, holds a B.S. ('84) and M.S. ('87) in geology from Auburn and a PhD (2012) in Engineering from UAB. After working for ADEM for 4 years, he began working at Southern Company. He is currently the Southern Company's Principal Geologist. Richard is an adjunct faculty member at Samford University in the Environmental Management Master's program. Additionally he serves on the Alabama Board of Licensure for Professional Geologists and Department of Geology and Geography Advisory Board at Auburn University.

Charlsa Sewell, Vice President, is a graduate of Arkansas Tech University (B.S. 2012), where she was honored in 2010 with a Geology Senior Fellowship. Additionally she received the "Fort Smith Geological Society Scholarship" in 2010. After graduation she returned home to Tuscaloosa and now works at PELA GeoEnvironmental. Charlsa works on a variety of projects dealing with geology and hydrogeology. She obtained her GIT license in January and looks forward to becoming a licensed Professional Geologist within 2 years.



Denise Hills, Secretary, holds a B.S. from the College of William and Mary and an M.S. from the University of Delaware, in geology and geophysics. Additionally she carried out further studies at the University of Hawaii's School of Ocean Earth Science and Technology. Denise joined the Geological Survey of Alabama in 2006 and was made Director of the Energy Investigations Program in 2012. She is actively involved in numerous professional and community organizations. Denise has served as Secretary of the Alabama Geological Society since 2008.

Richard Carroll, Treasurer, graduated with his B.S. and M.S. in Geology from Brigham Young University and received his PhD from Michigan State University where he studied paleobotany and palynology, applying these to the coal-bearing units of eastern Utah and western Colorado. Richard began working as the coal geologist for the Geological Survey of Alabama in 1991 and has studied the coals and lignites in Alabama, contributing to general coal-related studies. He has served as the AGS's newsletter editor and VP and has been the treasurer since 2010.



Marcella McIntyre-Redden, Newsletter Editor, holds a B.S. ('98) and M.S. ('04) in geology from the University of Alabama. Before entering graduate school she worked for CDG Engineers and Associates in Andalusia, AL, working primarily on underground storage tank investigations and sourcewater protection assessments. Marcella joined the Geological Survey of Alabama in 2006, where she has worked on several unconventional oil & gas and carbon storage projects. Marcella has been the newsletter editor for the Alabama Geological Society since 2011.

Bill Thomas, Field Trip Committee Chair, graduated from the University of Kentucky (B.S. and M.S.) and Virginia Tech (PhD, '60). He has spent much of his career focused on the southern Appalachian orogen, and has applied what he learned there to other orogenic belts across the Americas. Now officially retired, Bill volunteers at the Geological Survey of Alabama in the geologic mapping division. Bill's long association with the AGS began with being a charter member and now he has graciously agreed to be the inaugural Field Trip Committee Chair.



Recent Guidebooks of the Alabama Geological Society

GB#	Year	Title	Qty	Price	Total
32	1995	Timing and tectonic mechanisms of the Alleghanian Orogeny, Alabama Piedmont; Oct. 95		\$10.00	
33	1996	Coastal deposition and ecosystems of Alabama; June 1996		\$10.00	
34	1997	Geology of the Coosa coalfield; Dec. 1997		\$10.00	
34a	1997	Industrial minerals and rocks of NE Alabama; SE Geo. Soc. Am., Mar. 1997		\$10.00	
34b	1997	Comparison of the Pine Mtn. block basement-cover sequence with the Lower Cambrian clastic-carbonate sequence of the Talladega slate belt; SE Geo. Soc. Am., Mar. 1997		\$10.00	
34c	1997	The Wetumpka impact structure and related features; SE Geo. Soc. Am., Mar. 1997		\$10.00	
35	1998	Sequence Stratigraphy and Biostratigraphy of Upper Cretaceous Strata of the Alabama Coastal Plain; Oct. 1998		\$10.00	
36	1999	Geology of the Cahaba Coalfield; Oct. 1999		\$10.00	
36a	1999	Carbonate rock at work: The cement and lime manufacturing process at the Blue Circle Cement and Lime plant;		\$2.00	
37	2000	The Conasauga Formation and equivalent units in the Appalachian thrust belt in Alabama; Nov. 2000		\$10.00	
38	2001	Comparison of the Pine Mtn. basement-cover sequence with the Lower Cambrian to Lower Ordovician clastic-carbonate sequence of the Talladega slate belt; Dec. 2001		\$10.00	
39	2002	The geology, mining methods, and processing of selected industrial minerals in northeastern Alabama; Dec. 2002		\$10.00	
40	2003	Post-Knox Group, pre-Pottsville Formation stratigraphy of the Helena thrust sheet and the Coosa deformed belt, St. Clair, Calhoun, and Talladega Counties, Alabama; Dec. 2003		\$10.00	
40a	2003	Geology and operation at National Cement Company's Ragland quarry; Alabama Geological Society Workshop, Feb. 2003		\$4.00	
41	2004	Geology and Hydrology of the Alabama Gulf Coast; Nov. 2004		\$10.00	
41a	2004	The Cretaceous geology of west-central Alabama and fossils of the Bluffport Marl - A fieldtrip guide for students; 2004		\$3.00	
42	2005	New Perspectives on Southernmost Appalachian Terranes, Alabama and Georgia, Dec. 2005		\$20.00	
42a	2005	The Coker Formation of the Tuscaloosa Group in the Cottondale 7.5-minute quadrangle, Tuscaloosa County, Alabama; Alabama Geological Society Workshop, Mar. 2005		\$9.00	
42b	2005	Southernmost Appalachian Terranes, Alabama and Georgia; Southeastern Section Geological Society of America, 2005		\$13.00	
43	2006	Birmingham Ironstone; Sequences, Deposition & Mining History; Dec. 2006		\$10.00	
44	2007	Locating, Permitting, and Operation of Construction Aggregate Mining Operations in Alabama, Dec. 2007		\$10.00	
45	2008	Alternative interpretations of the Talladega slate belt, Alabama and Georgia, Dec. 2008		\$10.00	
46	2009	Emplacement of gold deposits in the Eastern Blue Ridge and Brevard Zone, Alabama Piedmont, Dec. 2009		\$10.00	
47	2010	Sequence Stratigraphy, Biostratigraphy, and Chronostratigraphy of Paleogene Strata, Southwest Alabama, Oct. 2010		\$10.00	
48	2011	Mushwads and Mayhem: Disharmonically Deformed Shale in the Appalachian Thrust Belt, Dec. 2011		\$18.00	
49	2012	The Talladega Slate Belt and Eastern Blue Ridge: Laurentian Plate Passive Margin to Back-Arc Basin Tectonics in the Southern Appalachian Orogen, Dec. 2012		\$15.00	
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