Sigma Gamma Epsilon News and Information

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Sigma Gamma Epsilon Undergraduate Research
Geological Society of America Annual Meeting
Minneapolis, Minnesota, USA
9-12 October 2011

Beginning in 1989, Sigma Gamma Epsilon began sponsoring a poster session highlighting undergraduate research at the annual meetings of the Geological Society of America. The first SGE poster session was held on 7 November 1989 in St. Louis, MO and was organized by Austin A. Sartin, Sigma Gamma Epsilon’s national president. The 1989, poster session featured nine, student-authored presentation. The 2011, SGE poster session featured fifty-four student presentations from across the United States and three student authors from England. Abstracts for the 2011 poster session can be viewed at:

Posters submitted by active student members of Sigma Gamma Epsilon are judged by a committee of current and past national officers, who select the recipients of the National Council Best Poster Award and the Austin Sartin Poster Award.

The National Council Best Poster Award for 2011 went to Brittany Sacco of James Madison University, Harrisonburg, Virginia for her presentation on the Depth and Temperature of the Mantle Beneath Mole Hill, An Eocene Basalt Near Harrisonburg, VA (fig. 1).

The Austin Sartin Poster Award went to Abigail Williams and Aaron Hiday of Albion College, Albion, Michigan for their presentation on the Assessment of Diel Cycling in Agricultural Streams in South Central Michigan – A Focus on Turbidity (fig. 2).

The awards were presented by Dr. Erika Elswick of Indiana University and National President of Sigma Gamma Epsilon (figs. 3 and 4).

Figure 1. Brittany Sacco, recipient of the 2011 National Council Best Poster Award at the Sigma Gamma Epsilon Undergraduate Research Poster Session, Geological Society of America Annual Meeting, Minneapolis, MN.
Figure 2. Aaron Hiday (left) and Abigail Williams (right) recipients of the 2011 Austin Sartin Poster Award, at the Sigma Gamma Epsilon Undergraduate Research Poster Session, Geological Society of America annual meeting in Minneapolis, MN.

Figure 3. Dr. Erika Elswick (left), National President of Sigma Gamma Epsilon, and Brittany Sacco (right), recipient of the 2011 National Council Best Poster Award.

Figure 4. Dr. Erika Elswick (center) National President of Sigma Gamma Epsilon, and Aaron Hiday (left) and Abigail Williams (right), recipients of the 2011 Austin Sartin Poster Award.
DEPTH AND TEMPERATURE OF THE MANTLE BENEATH MOLE HILL, AN EOCENE BASALT NEAR HARRISONBURG, VA

SACCO, Brittany¹, JOHNSON, Elizabeth A.¹, and BELKIN, Harvey E.², (1) Dept of Geology and Environmental Science, James Madison University, Harrisonburg, VA 22807, saccobx@gmail.com, (2) U.S. Geol Survey, 956 National Center, Reston, VA 20192

Mole Hill is a 48 Ma basaltic neck near Harrisonburg, VA, located in the Shenandoah Valley. Mantle xenocrysts of clinopyroxene (Al-augite), olivine, spinel, and rare plagioclase are trapped within the basalt. Clinopyroxene-melt and olivine-melt geothermobarometry were used to determine the pressure and temperature at which these xenocrysts formed and, implicitly, the depth and temperature in the mantle from where they originate. Clinopyroxene and olivine compositions were determined using the JEOL 8900R Electron Microprobe at 20 kV, 20 nA and a 2 µm spot size at the USGS in Reston, VA. Whole-rock compositions were used to represent the melt composition. Olivine xenocryst rims in equilibrium with the host magma have compositions from Fo₆₄-₈₈. Clinopyroxene rims have an average composition of Wo₄₀En₄₂Fs₁₂ while clinopyroxene cores have an average composition of Wo₄₁En₄₉Fs₁₀. The clinopyroxene, olivine, and melt compositions were input into a set of geothermobarometers summarized in Putirka (2008). The average temperature calculated using clinopyroxene-melt thermometry is 1227±41 °C and using olivine-melt thermometry is 1222±62 °C. The average pressure using clinopyroxene rim compositions is 10±2 kbar. The average pressure determined for the cores of clinopyroxene xenocrysts is slightly higher, 13±1 kbar. These pressures are within the stability field of spinel peridotite (clinopyroxene cores) and at the boundary between the plagioclase and spinel peridotite stability fields (clinopyroxene rims), consistent with the observed xenocrystic mineral assemblage. The corresponding depth of ~36 km for the clinopyroxene xenocryst cores is consistent with seismic data indicating the Moho is ~40 km below the Blue Ridge region (TEENA experiment). The calculated temperature places the mantle xenocrysts close to the solidus for Al-augite for these depths. Our data places important constraints on the depth and characteristics of the mantle beneath the Shenandoah Valley.

ASSESSMENT OF DIEL CYCLING IN AGRICULTURAL STREAMS IN SOUTH-CENTRAL MICHIGAN- A FOCUS ON TURBIDITY

WILLIAMS, Abigail M., HIDAY, Aaron D., and WILCH, Thomas I., Geological Sciences, Albion College, Albion, MI 49224, amw14@albion.edu

Diel cycling of stream parameters is overlooked in typical water quality assessments. With a focus on turbidity, we analyzed cycling at multiple sites in both agricultural drains and natural tributaries of the upper Kalamazoo River watershed, Michigan. Turbidity and other water quality parameters (DO, water level, temperature, specific conductivity, pH, and total suspended solids (TSS)) were frequently monitored (mostly 10-minute intervals) during summers 2010 and 2011.

Two study sites in Rice Creek, an agricultural drain, show turbidity increases of 10 to 20 NTU at night with broad noisy peaks between 10 pm and 6 am and daytime saddles between 10 am and 7
pm. Downstream turbidity peaks lag upstream peaks by ~2 hours over a distance of 7.7km. Turbidity cycles also vary with depth in the stream. Measurements taken at 10 and 20 cm above the streambed exhibit in-phase diel cycles with the same periodicity and amplitude. Magnitudes are offset by 10 NTU, with higher turbidity closer to the streambed. A strong linear relationship ($R^2$ of 0.89) between turbidity and TSS concentration suggests that turbidity is a good proxy for TSS. Loss-on-ignition of TSS samples indicates that suspended sediment is composed of about 40% organic and 60% mineral material. Measurements in the more natural North and South Branch tributaries of the Kalamazoo River exhibit similar diel turbidity cycles but with lower amplitudes and absolute values than in Rice Creek.

Turbidity cycles are roughly anti-phase with DO and pH, which may indicate a biological control. Simulation experiments of bioturbation result in short-lived and short-traveled pulses of turbidity. Turbidity varies in-phase with groundwater levels and specific conductivity, which may indicate a groundwater sapping effect. Leveloggers measured groundwater levels in four wells in adjacent wetlands. Water table levels, driven by evapotranspiration, varied cyclically with diel amplitudes from 1 to 9cm. We anticipated that stream stage levels would co-vary with groundwater levels but they did not. Stream stage cycles were less regular, out-of-phase, and about 2cm in amplitude relative to groundwater levels. Ongoing work is investigating both biological and physical controls on the diel turbidity cycles.
Editor’s note. Dr. Walters sent two photos asking me to select one. He stated that he preferred the one in which he was camouflaged among the rocks of an end moraine (presumably in Alaska). It’s a great geology shot, but we can’t see his friendly smile, which in the many years I’ve known Jim, is one of his most constant and endearing features; therefore I thought readers of The Compass should have the opportunity to see both photos!

Dr. Jim Walters is a Professor of Geology at the University of Northern Iowa (UNI), where he has been on the faculty since 1975. From 1995 to 2010 he was Head of the Department of Earth Science, and he also served as Interim Director of Environmental Programs at UNI from 2003 to 2006. Dr. Walters completed his undergraduate degree in geology at Grand Valley State University (1970) and has his doctorate in geology from Rutgers University (1975). He is a geomorphologist specializing in glacial and periglacial processes and has spent over 30 years in various parts of Alaska investigating such processes.
Dr. Walters has been involved with SGE for many years. Although not a member as a student, he was initiated into the Society as an Associate Member when he joined the Department of Earth Science at UNI. He later became faculty advisor to Gamma Sigma Chapter at UNI and remains in that capacity as a co-advisor today. He served as Vice President of the Central Province of SGE from 1995 to 2000 and was named an Honorary Member of the Society in 2007. In 2009, Dr. Walters became National Secretary-Treasurer of SGE, and at the same time he oversaw the move of the national office of SGE from the University of Oklahoma, where it had been for over 40 years, to the University of Northern Iowa.

When not involved with SGE issues, Dr. Walters teaches courses in Geomorphology, Introduction to Geology, Oceanography, Glaciers and Glaciation, Iowa Landforms, and Geology of Iowa for Teachers on a regular basis. His current research activities involve the distribution and significance of relict periglacial phenomena in northeast Iowa, dynamics of sorted patterned ground features in central Alaska, and the distribution and degradation of permafrost in the Tanana Flats of Interior Alaska.

During his long academic career Dr. Walters has been recognized with several awards, most notably the Dean’s Award for Teaching Excellence in Departmental Programs, the Dean’s Award for Superior Achievement as a Faculty Member, and UNI’s first Commitment to C.A.R.E. (Creating A Responsible Environment) Award, which was established in 2010 to acknowledge and honor the those who have contributed significantly to enhancing sustainability efforts at the University of Northern Iowa.
Dr. Larry Davis
National Editor

Dr. Larry Davis is a Professor of Geology/Biology in the Department of Biology at the College of Saint Benedict/Saint John’s University (CSB/SJU) in Collegeville, MN. Larry received a BA in Biology from Western Washington University (1977) and a BS in Geology from Boise State University (1980). He received both his MS (1983) and PhD (1984) at Washington State University, and his research was on the carbonate sedimentology and conodont biostratigraphy of the Alaska Bench Formation in central Montana (MS) and of the lower Oquirrh Group of northern Utah and southeastern Idaho (PhD). Prior to his academic career, Larry served in the U.S. Army, including a 20-month tour of duty in Vietnam, and he left the military as a sergeant first class (SFC/E-7).

Dr. Davis was initiated into the Gamma Rho Chapter of the Society of Sigma Gamma Epsilon at Boise State University. While a student at Washington State University, Larry was a member of the Xi Chapter of Sigma Gamma Epsilon, and later, as an Associate Professor of Geology, he served as the Xi Chapter advisor. Larry was also the Western Province National Vice President from 1996 to 1998.

Larry has conducted research on the Chambered Nautilus in Palau, West Caroline Islands and Papua New Guinea, and done conodont and carbonate research in Montana, Idaho, and Utah. More recently, his research has been on stromatolites in the lower Ordovician Shakopee Formation of southeastern Minnesota. Larry, and his wife, Johanna, have led three study abroad, semester-long trips to Western Australia and have traveled extensively throughout
Australia. His favorite geological trips in Australia included seeing the stromatolites in Shark Bay and thrombolites at Lake Clifton; a helicopter flight over the superpit (gold mine) at Kalgoolie, and a helicopter flight over the Twelve Apostles (sea stacks) in southeastern Australia. In the photo, Larry and his wife were visiting volcanic White Island in the Bay of Plenty, New Zealand with its many fumaroles and an acid lake with a pH of 1.0! In additional to travels in the Indo-Pacific region, Larry has traveled to every state in the U.S.; traveled extensively in Australia and most of Canada, plus he has been to Iceland, Great Britian, Norway and Germany (where he collected fossils in the famous Solnhofen Limestone). Antarctica is still on his ‘bucket-list’.

Dr. Davis is the recepient of numerous teaching awards, including, the Washington Science Teacher’s Association Science Teacher of the Year Award, the Society of College Science Teachers Science Teacher of the Year Award, Washington State University’s President’s Award for Teaching Excellence, Washington State University’s Dean’s Award for Excellence in Science Teaching, the College of Saint Benedict’s Sister Mary Grell Teacher of Distinction Award, and the College of Saint Benedict/Saint John’s University’s Teacher/Scholar Award. He is the author/co-author on over 50 peer-reviewed articles and three geology laboratory manuals. His self-proclaimed claim to fame is that he has slept (mostly on the ground) in almost every county in the western United States.

Larry’s goals for the future include an up-coming semester-long, return trip to Western Australia (spring, 2013) and to become more involved with wood-working and nature photography.
Dr. Rick Ford (right-front w/orange ball cap) with his Fall 2009 Field Methods class mapping Plio-Pleistocene volcanic rocks in the Wildcat Hills, northwestern Utah. Note the large-scale tafoni and case hardening on the flow-banded rhyolite boulder. The class is standing on the Provo-level shoreline bench of late Pleistocene Lake Bonneville. The boulder fell from the wave-eroded cliff in the background. Don’t you just love Utah geology! Pictured (left to right): Crystal Pieraldi (SGE member); Jennifer Schaffer (SGE member); Spenser Pantone (SGE member); Eric Beard (SGE member); Brian Stearmer; Jenny Jorgensen (SGE member); Dr. Rick Ford; Sara Summers (green hat, SGE member). Photograph by Bret Hansen.

**Dr. Richard L. (Rick) Ford** is a Professor of Geosciences at Weber State University (Ogden, Utah) and the immediate Past President of Sigma Gamma Epsilon. He has been the faculty advisor to the Eta Gamma Chapter at Weber State since its installation in 1998. Rick was initiated into Beta Mu Chapter at the University of New Mexico as a graduate student and served as the Western Province Vice President from 1999 to 2005. As National President (2005-2010), he oversaw the installation of 10 new
chapters and helped manage the significant growth in SGE’s undergraduate poster session at the annual meeting of the Geological Society of America. Rick was also very involved in the transition process when SGE’s national office moved from Norman, Oklahoma (Oklahoma Geological Survey), to Cedar Falls, Iowa (University of Northern Iowa). Rick is very grateful for the opportunity to serve the Society at the national level and for the many friendships he has made along the way.

Autobiography: I was born and raised in suburban Norfolk, Virginia, and had the great fortune to have a lake, an abandoned agricultural field, and a remnant hardwood forest near my neighborhood. Romping across these varied landscapes instilled in me an early interest in natural history. A family trip to the New York World’s Fair in 1965 brought my boyhood fascination with dinosaurs and time travel into direct intersection at Sinclair Oil’s Dinoland exhibit, where life-sized dinosaur models were displayed in reconstructed Jurassic and Cretaceous habitats. My path to becoming a geologist may have begun there.

I received my B.S. in Geology from Virginia Tech in 1978. My experience as an undergraduate had a profound influence on the course of my life, as I was strongly drawn to the learning community within the Geology Department and to the overall energy and esprit de corps within higher education. I think I knew at this time that I wanted to be a professor. While I at Tech I attended Indiana University’s summer field camp in Montana, which began the second phase of my life as a westerner. I went on to earn my M.S. in Geology from the University of New Mexico in 1986, and my Ph.D. in Geography from the University of California, Los Angeles, in 1997. Between my bachelors and masters degrees, I worked for a major oil company in New Orleans, Louisiana. As a member of an onshore exploration group, I spent most of my time preparing subsurface structure-contour maps of various Oligocene and Miocene deltaic sand bodies. Thinking back to this distant experience, I am struck by the fact that we found oil without the aid of computers! I worked for the same company again between my masters and Ph.D., this time in their Los Angeles office. There I worked on the Tertiary stratigraphy of Bristol Bay, Alaska, in support of a seismically based evaluation of potential offshore leases – the federal lease sale in Bristol Bay was never held. Our western exploration office was closed during the petroleum bust of the late 1980s and I turned down a transfer to the Houston office in order to pursue a Ph.D. at UCLA.

My family and I moved to Salt Lake City, Utah, in 1992, and after several years as an adjunct instructor at the University of Utah, I began my career at Weber State University in 1996. I am the surface-processes person in my small department (6 faculty) and teach upper-division courses on geomorphology, geoscience field methods, oceanography, and Quaternary geology -- in addition to lower-division courses on meteorology and Earth science for elementary education majors. My recent research has focused on studies of star dune formation and Holocene climate change at Coral Pink Sand Dunes State Park (Kane County, Utah) and on wetland processes and
Holocene vegetation change in the Uinta Mountains. These have been collaborative efforts with wonderful colleagues at Boise State University, the University of Utah, and here at Weber State.

In addition to advising the Eta Gamma Chapter of SGE, I am also the faculty advisor for our Earth Science Teaching major, chair of the university general education committee, and President of WSU’s chapter of The Honor Society of Phi Kappa Phi. This past year I have also had the pleasure to work with the Utah State Office of Education on a revision of the curriculum for the 9th-grade Earth Systems course.
Editor’s note. Some might assume from the photo that Dr. Gibson needs a good face wash, but informed me he had smeared his cheeks with mud from a sediment sample taken from the sea floor in order to explain to students the difference between clay and silt. I found it interesting that the smear on the right cheek looked like the silhouette of a crawfish – artistic, as well as creating teaching.

Dr. Michael Gibson is a Professor of Geology at the University of Tennessee at Martin (UTM), and has served as the Southeastern National Vice President of Sigma Gamma Epsilon since 2006. He has been the Eta Alpha Chapter advisor at UTM since its inception in 1997. Michael has also been a member of the Gamma Gamma Chapter (UT-Knoxville), where he served as Secretary (1985) and Graduate Council Representative (1988) and edited a volume of the Compass, and a member of the Delta Beta Chapter (Auburn University), where he served as President (1982).
Dr. Gibson received his B.S. in Geology from the College of William and Mary in 1979, his M.S. in Geology from Auburn University in 1983. Upon completion of his M.S., Dr. Gibson served as an instructor at Auburn for the 1983 academic year. He then moved to the University of Tennessee, Knoxville where he obtained his Ph.D. in Geology in 1988. Since 1988, he has been on faculty at the University of Tennessee at Martin, currently holding the rank of Full Professor.

Dr. Gibson is a paleontologist teaching undergraduate and graduate courses in Paleontology, History of Earth, Fossils: Life Through Time, Marine Geology, Oceanography, Tennessee’s Geologic and Cultural Landscape, and Geology of Belize, Central America. His research includes: 1) Silurian - Devonian paleoecology and taphonomy; 2) Paleoecology of the Late Cretaceous of the Mississippi Embayment; 3) Floral paleoecology of the Claiborne Formation of West Tennessee; and 4) Geology and paleontology of Belize, Central America and 5) Stromatolites of Quintana Roo, Mexico. Dr. Gibson teaches marine geology during the summers, where he is an adjunct summer faculty for the Dauphin Island Sea Lab in Alabama. He is a Lead Associate Curator for the Pink Palace Museum & Coon Creek Science Center and consultant for the Discovery Park of America.

Dr. Gibson was the 2003 Tennessee Higher Education Science Teacher of the Year and the 2006 Distinguished Educator of the Year for the Tennessee Science Teachers Association. He is a two-time recipient of the Cunningham Outstanding Teacher-Scholar Award (1996 and 2008).

He has served as Southeastern President of National Association of Geoscience Teachers (2000-2003); Councilor-at-Large on the NAGT Executive Committee (2003-2006) and helped to pen the NAGT position statement on teaching evolution. He is the 2007 recipient of the NAGT Neil Miner Award for Exceptional Contributions to the Stimulation of Interest in the Earth Sciences. Dr. Gibson was Secretary (1989-1994; 2008) and President (1994-1996) of the Southeastern Section of the Paleontological Society and served as the National Chair of Education for the Paleontological Society form 2004-2010. Additionally he has served as the Southeastern Section Education Coordinator (2003-2005) for GSA; and is the Past-President of the Tennessee Academy of Science and the Geology Editor for the Journal of the Tennessee Academy of Science.

Dr. Gibson was instrumental in Tennessee establishing the Cretaceous bivalve Pterotrignia (Scabrotrignia) thoracica as the Official State Fossil of Tennessee in 1998. He helped to found the Tennessee Earth Science Teachers (TEST) and serves as one of their higher education advisors. Dr. Gibson routinely runs development programs and field trips for Tennessee educators and serves on several State of Tennessee Department of Education committees, including the committee writing the state science standards and licensure requirements. He has run numerous grant-funded teacher education programs over the years including GeoCamps, GeoTreks,
IMEGS, and participated in numerous others related to Earth science education. Dr. Gibson pioneered a dual enrollment geology course for high school. He is the director of the online Master of Education: Geoscience Education (GEDU) program at UT Martin. Gibson has published over 75 articles, 105 published abstracts, and is currently co-editing a book about Tennessee fossils.
Dr. Mark Noll is a Professor of Geology in the Department of the Earth Sciences at the College at Brockport State University of New York. Mark received a BS in Earth Science from Millersville University (1981) and a MS in Geology from the New Mexico Institute of Mining and Technology (1985) where he was initiated into the Delta Upsilon Chapter. He received his PhD (1989) at the University of Delaware, and his research was on the geochemical dynamics of cesium in soils, in particular sorption reactions on clay minerals.

Prior to returning to academia, Mark spent almost nine years working in the environmental industry, primarily in the area of soil and groundwater remediation technology development. While working for the U.S. Air Force’s to develop the
Groundwater Remediation Field Lab at Dover AFB, Mark and a team of scientists, engineers and regulators received a USEPA Special Recognition Award. After arriving at Brockport in 1997, his research focus shifted to deal more with surface water quality issues.

Over his career in geochemistry, Mark has conducted research on Late Cenozoic volcanics in Antarctica to fallout cesium contaminated soils at Bikini Atoll in the Marshall Islands. More recently, his research has been on phosphorus contamination in the streams and lakes of New York’s Finger Lakes region. He is the author/co-author on over 20 peer-reviewed articles and technical reports, and over 60 conference presentations, most with undergraduate students co-authors. Geology has given him the opportunity to visit nearly every U.S. State and 17 foreign countries.

In his spare time, Mark coaches junior olympic volleyball and also enjoys photography.