

GeoSpectrum

News from the Geoscience Community

SPECIAL: Geoscience Gives Back

A Chat with Geoscientist & Colorado Governor John Hickenlooper

**Cakes, Improv and Contests*:
Geoscience Community Building**

In This Issue

Summer 2014

News	7
In Memoriam	35
Workforce	36
Education	48
Special Insert: Geoscience Gives Back	61
Geoscience Policy	70
Awards & Leadership	78
Meetings	86

GeoSpectrum

4220 King Street
Alexandria, VA 22302-1502, USA
Phone: 703-379-2480

www.americangeosciences.org/GeoSpectrum
geospectrum@americangeosciences.org

Publisher

P. Patrick Leahy

Editor

Maureen N. Moses

Contributing Editor

Christopher M. Keane

On the Cover

GSL: The Great Geo-BakeOff!	7
Improv Training for Scientists	14
Special Insert: Geoscience Gives Back	61
Hickenlooper Working to Bridge the Gap	70

* Stories related to contests, and contest winners are featured throughout this issue of GeoSpectrum



AGI Executive Committee

Dr. Berry H. (Nick) Tew Jr., President
Geological Survey of Alabama

Dr. Eric M. Riggs, President Elect
Texas A&M University

Mr. Richard J. Lambert, Treasurer
Roscoe Postle Associates, Inc.

Ms. Dorian E. Kuper, Secretary
Kuper Consulting

Dr. Sharon Mosher, Past President
Jackson School of Geosciences

Ms. Katharine Lee Avary, Member at Large

Dr. John G. Parrish, Member at Large
California Geological Survey

Dr. Jacqueline E. Huntoon, Member at Large
Michigan Technological University

Mr. Richard M. Powers, AGI Foundation Chair
Consultant/AMEC-BCI -- retired

P. Patrick Leahy, Executive Director
The American Geosciences Institute

Member Societies & Council Representatives

American Association of Geographers - Dr. Douglas Richardson
American Association of Petroleum Geologists - Ms. Laura C. Zahm
Association of American State Geologists - Mr. Laurence R. Becker
The Palynological Society - Dr. Fredrick J. Rich
Association of Environmental & Engineering Geologists - Ms. Becky Roland
Association of Earth Science Editors - Mr. John R. Keith
American Geophysical Union - Dr. Melanie Harrison
American Institute of Hydrology - Dr. Neven Kresic
American Institute of Professional Geologists - Mr. Robert Stewart
American Rock Mechanics Association - Mr. Peter H. Smeallie
National Association of State Boards of Geologists - Ms. Sam Christiano
Association for the Sciences of Limnology and Oceanography - Dr. Adrienne Froelich Sponberg
Association for Women Geoscientists - Ms. Aimee Scheffer
Clay Minerals Society - Ms. Debora Berti
Council on Undergraduate Research - Dr. Lee Phillips
Environmental & Engineering Geophysical Society - Ms. Catherine Skokan
Friends of Mineralogy - Dr. Nelson R. Shaffer
Geo-Institute of the American Society of Civil Engineers - Dr. Roman D. Hryciw
Geochemical Society - Dr. Barbara Sherwood Lollar
Geological Society of America - Dr. Suzanne Mahlburg Kay
Geological Association of Canada - Mr. Brian Pratt
Geoscience Information Society - Ms. Suzanne T. Larsen
Geological Society of London - Mr. Edmund Nickless
History of Earth Sciences Society - Dr. Warren A. Dym
International Association of Hydrogeologists/U.S. National Chapter - Dr. Leonard F. Konikow
International Medical Geology Association - Dr. Robert B. Finkelman
Karst Waters Institute - Mr. Harvey R. DuChene
Mineralogical Society of America - Dr. J. Alexander Speer
National Association of Black Geologists & Geophysicists - Mr. Michael J. Carroll
North American Commission of Stratigraphic Nomenclature - Dr. Norman P. Lasca Jr.
National Association of Geoscience Teachers - Dr. Susan M. Buhr
National Cave and Karst Research Institute - Dr. George Veni
National Earth Science Teachers Association - Dr. Roberta Johnson Killeen
National Speleological Society - Mr. David Decker
Petroleum History Institute - Dr. William R. Brice
Paleontological Research Institute - Ms. Elizabeth Brando
Paleontological Society - Ms. Sandra Carlson
Paleobotanical Section of the Botanical Society of America - Dr. Robert A. Gastaldo
Society of Economic Geologists - Dr. Brian G. Hoal
Society for Sedimentary Geology - Dr. Howard E. Harper Jr.
Society of Exploration Geophysicists - Dr. Louise Pellerin
Society of Independent Professional Earth Scientists - Mr. C. Al Taylor
Society for Mining, Metallurgy, and Exploration, Inc. - Dr. L. Harvey Thorleifson
Society of Mineral Museum Professionals - Ms. Penny Williamson
Seismological Society of America - Ms. Susan Newman
Soil Science Society of America - Dr. Jan Hopmans
Society of Vertebrate Paleontology - Mr. Ted J. Vlamis
The Society for Organic Petrology - Dr. Prasanta K. Mukhopadhyay
United States Permafrost Association - Dr. Julie Brigham-Grette

International Associates

Canadian Federation of Earth Sciences
Geological Society of Africa
The Young Earth Scientists Network (YES Network)



All images and text included in this document are considered the property of the respective organization that provided them, and have reprinted here with their permission. Please contact these organizations before reproducing any material seen in geospectrum. American Geosciences Institute, its member organizations and GeoSpectrum Sponsors thank you for reading this publication.

The American Geosciences Institute thanks
these sponsors of the GeoSpectrum newsletter:

- **ThermoFisher Scientific**
- **Enviro-Tech Services**
- **WH Freeman & Co.**
- **Elements Magazine**
- **Elsevier**

Photo of Whitehaven Beach, Queensland, Australia.
©Shutterstock.com/Cristina Muraca.



I'm a
geoscientist

I'm-a-Geo-sci-en-tist *n.* **1** The proud declaration of someone dedicated to the geosciences. **2** A really cool 1.75" x .5" lapel pin!!!

Go to

www.americangeosciences.org/be-a-part
for a free pin, and **join the community.**



USGS: A Landsat 8 Yearbook: Earth Images for Everyone

JON CAMPBELL
USGS



The volcanic blast from Mount St. Helens on May 18, 1980, devastated nearly 400 km² (150 square miles) of forest within a few minutes. The 2013 image shows that much of the forest in the area has recovered. A small section on the northern slope of the volcano is still dominated by ash. Left: Landsat 2 from August 19, 1980. Right: Landsat 8 from August 20, 2013. See more image pairs like this at the [Landsat 8 Yearbook website](#).

Landsat 8 has been [on the job](#) for a year now — since May 30, 2013, when NASA [transferred ownership](#) and operation of the satellite to the U.S. Geological Survey.

About 100 days before that, NASA [launched](#) Landsat 8 from Vandenberg Air Force Base in California on February 11. It is the latest in the Landsat series of remote-sensing satellites that have provided a continuous record of change across Earth's land surfaces since 1972.

Scientists, land management professionals, and space enthusiasts already know that Landsat 8 is stocked with a 10-year supply of fuel, that it carries two highly sensitive observation instruments operating more precisely than before, and that the USGS now operates Landsat 8 along with older sister [Landsat 7](#). With two Landsat satellites on orbit, the USGS can provide data every eight days for any spot on the Earth's land masses, supporting water managers, agricultural commodities markets, and scientists around the globe.

To mark an extremely successful first year of space operation for Landsat 8, the scientists and imagery experts at the USGS Earth Resources Observation and Science (EROS) Center have selected 10 sets of images that demonstrate the broad range of changes on the land that Landsat 8 has observed in its first year and compiled them in a special collection — the Landsat 8 Yearbook.

See the [Landsat 8 Yearbook](#) [here](#).

It features “before” and “after” sets of images that you can manipulate with a digital slider bar to see change over time. Some of the images also show the enhanced technical capabilities of the Landsat 8 spacecraft.

The interval of time between the “before” and “after” (i.e. “present”) images allows us to see and study critical changes that have occurred and continue to occur on the land. This extended time frame is made possible by the 42-year Landsat archive of continuous and comparable Earth imagery.

Since 2008, all Landsat data are [freely available](#) to anyone on Earth.

GSL: The Great Geo-BakeOff!

Sarah Day, GSL Blog

A few weeks ago, we set you a challenge. With Easter on the way, and a blog post about Silurian Death Assemblage cupcakes proving popular, we gave birth to the Great Geo-bakeoff. Nearly 100 entries later, what have we learned?

Well, mostly, we've learned that cake and geology go really, really well together.

Before we announce the results, here's a run down of the entrants – sincere apologies if we've left anyone out. By the end of this, we couldn't really move for pictures of cake.

*warning: the following blog post contains multiple images of cakes. If you don't have any cake near you, you may not wish to continue.

10 points: Sandstone layer cake

We asked for uninspiring, flat yellowy cakes, and you did not let us down.

Some of you went above and beyond, introducing a variety of colours and some interesting stratigraphy...

We also received two Grand Canyon entries, which we were slightly confused by, until we realised you were simply taking a more interesting spin on the whole sandstone layer concept, and promptly awarded you both 10 points.



Karina Judd
@bucketscientist
Starting off small for the #geobakeoff with a golden Australian Hawkesbury Sandstone Banana Cake.

Sandstone banana cake



Above and beyond Sandstone layer cakes.



Grand Canyon Sandstone cake entries.

20 points: Graptolite cake

Perhaps unsurprisingly, given our description, we didn't receive a huge number of graptolite cakes. There was one stand out example:

Geological Society @geolsoc
Slight overexcitement prevails in the Geology Castle today, as the #geobakeoff entries roll in. You are all magnificent. 22 Apr

Liz Laycock
@longrat
Follow

@geolsoc #geobakeoff day 1 first completion: spiraliform graptolites from 2002 paper Jones, Zalasiewicz & Richards
pic.twitter.com/kh3vq4N6mA

11:36 AM - 23 Apr 2014



Graptolite cake entry winner.



Graptolite 'cool fossil' honorable mentions

An impressive number of you took the initiative and exploited our graptolite loophole, courtesy of Flo [GSL Writer]: 'if you're going to make a fossil cake it could at least be interesting.' So we've decided you all get graptolite points too, for creatively interpreting the brief.



Geological Society
@geolsoc

Well done to @longrat, the only person to take on Hutton's Unconformity. Are those cereal bars? #geobakeoff

6:13 AM - 9 May 2014

Hutton's Unconformity Cake. (And we're reliably informed they're not cereal bars, but home made chocolate rice crispy cakes.)



Mid-Atlantic Ridge Cake

30 points: Hutton's unconformity cake

Again, not a hugely popular choice, everyone's favourite unconformity is not everyone's favourite baking challenge. * Applause * for our one intrepid unconformity baker.)

40 points: Mid Atlantic Ridge cake

Again, a solitary entry for this slightly obscure of bakeoff challenges, but what an entry!*



Sinkhole cakes: One of these cupcakes is not a cupcake.



Rehemat
@livelovesurf24

@geolsoc One of my #geobakeoff entries - presenting: the sinkhole cake :D with a hammer for scale!

Sinkhole cake. Particular applause here for the use of monopoly houses, and the callous looking playmobile onlookers. Fabulous.

*At this point, you might be noticing a pattern – yes, all the solitary entries so far have come from one entrant, who heroically baked her way through the entire list. *rapturous applause *

50 points: Sinkhole cake

Some beautiful recreations of the Great Blue Hole, the example we posted, including creative use of jelly!



Ring of Fire cakes



Durdle Door cakes



Durdle Door cake suffering "coastal erosion"




 Haydn Orme
 @cahaydn

[Follow](#)

@geolsoc my entry for the #geobakeoff, edible revision is the future!

Durdle Door cake

60 points: Pacific ring of fire cake

It's all getting a bit serious now. Ring of fire was a tricky challenge – we had some volcanoes, some globes, some edible maps, and some subducting sponge layers. You all get 60 points for not copping out and just icing 'Ring of fire' onto a sponge.

70 points: Durdle Door cake:

A construction nightmare, but some of you pulled it off!

Without ever forgetting the point of all this, of course...
erosion happens.



Panecotta Giant's Causeway cake

80 points: Giant's Causeway cake

Some delightfully creative attempts to solve this particular baking conundrum. We particularly enjoyed panecotta Giant's Causeway.

By the same author, even more ingenious biscuit Giant's Causeway:

Meanwhile, others went down the slightly more traditional cake-based route:



Liz Laycock
@longrat
@geolsoc #GeoBakeOff Day 3. Giant's Causeway mark 2. Much better in biscuit than panna cotta! #happy

Giant's Causeway cake



Giant's Causeway cakes



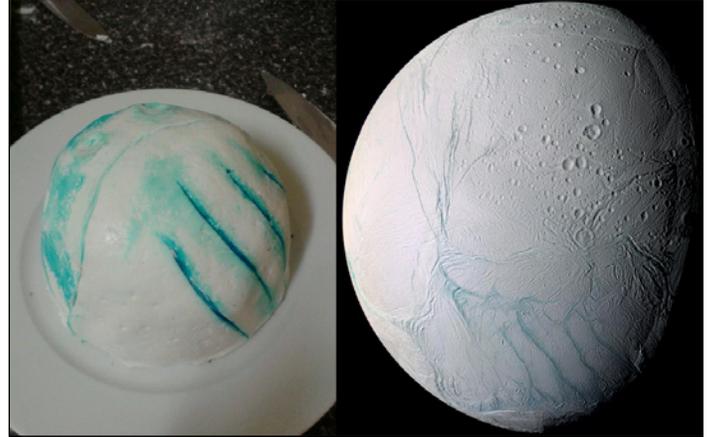
Enceladus cake

90 points: Globe cake

Some truly sterling efforts here, from all around the solar system. Particular standouts – the Marzipan Rover...

...and the incredibly accurate (though if you've never seen Enceladus, slightly confusing looking) Enceladus cake:

And a round of applause to the good people at GeoBus, who managed to bake their entire logo along



Enceladus Cake



GeoBus
@GeoBus_StA
#geobakeoff After a weekend of baking we have a few entries, starting with the GeoBus logo in cake form!

Geobus Globe cake



Globe cakes

with quite a few entries, including a rather fetching globe cake.

So many amazing globe cakes. High fives and 90 points to you all!



Hatching velociraptor cakes

100 points: Jurassic Park hatching velociraptor cake

What could we post, we asked ourselves, for 100 points, that would be so ridiculous, so utterly unbakable, that no one but the most committed of geobakers would take it on? The answer was simple. The results were unexpected.

Hatching velociraptor bakers, we salute you all, for your geobaking prowess, your vision, and for the fact that there is now a file on the Geological Society's servers entitled 'hatching velociraptor cake montage.' Cue theme tune:

The winners

And so to our winners, and to the all important question of who is to become the proud owner of our much coveted rock hammer USB sticks.

- 100 points for some fabulous velociraptor baking, Hannah Moss-Davies (@Hannah_MD24) and Rachel (@Rachisaurus)
- 130 points and tied sixth place to Catherine Kenny (only fitting, as her blog inspired the geobakeoff phenomenon), Leanne Roden (@leanneroden90) and Dheyne (@dheyne_x) for hatching velociraptors with added USB sticks!

- Fifth place with 140 points to Rehemat (@livelovesurf24) for a brilliant Ring of Fire cake and that playmobile sinkhole cake.
- Fourth place and 160 points to St Andrews' GeoBus project (@Geobus_StA), who not only completed three challenges, but baked their entire logo in the process. Bravo!
- In third place, with 310 points, Gwenno Talfryn who baked four of the ten challenges...
- Second place to Carrie Soderman (@carriesoderman) for completing an impressive six of the challenges...

- But the undisputed Queen of the bakeoff, with 580 points, is Liz Laycock (@longrat), who baked every single one!

Congratulations to all our winners, and to everyone who took part! If you haven't had enough geology cake, all the entries are on our Flickr page for your perusal..

Shared by AAG: How to Succeed in Business with a degree in Geography

James Chan

JamesChan@AsiaMarketingManagement.com

There are many business opportunities for people with



geography degrees. I have three degrees in geography and 33 years of working experience in the business world. I'd like to share my real-life experience and hope that it will offer insights and incentives to those who contemplate a career in business. Let me present my story in a question-and-answer format:

Did you plan to have a career in business?

I never thought of having a career in business. After I got my doctoral degree, I taught world regional geography and urban geography at Boston University in 1977 and then in 1978 and 1979 at the State University of New York at Cortland. Both teaching positions were short-term and non-tenured. Tenure-track positions were hard to find. I needed to think of alternatives.

How did you select a career in business?

In late 1979, China opened up to doing business with the West. Many American companies were very interested in entering the Chinese market but didn't know how. Since my specialty was China, I thought I could help them open some doors in the new Chinese market.

How did you find your first job at a company?

I sent more than 500 letters to companies across the United States, telling people I could help them develop the Chinese market. I got a dozen interviews, and I landed a job as the China Area Manager at Academic Press, Inc., a wholly-owned subsidiary of a Fortune 500 publishing company called Harcourt Brace Jovanovich (HBJ).

How much did the job pay compared to your previous academic positions?

My business position paid me twice as much as my first full-time academic position. I also got to learn a business and how things work, including global expansion skills.

Why would a Fortune 500 firm hire you with no background or experience in business?

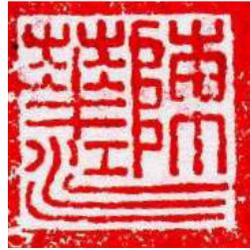
The chairman of the company traveled to Beijing, China to drum up new business, but he had a hard time getting along with the Chinese and vice versa. One of the 500 letters that I had mailed out landed on his desk. He told the senior vice president to hire me. The company needed my geographic knowledge of China and my language skills to help them navigate that market.

What happened next?

I succeeded in getting my first prepaid order for my company (\$150,000 in 1982 - \$330,000 in today's value). Sales to Southeast Asia tripled. Two years into my job, the company wanted to relocate from New York City to Orlando, Florida. I didn't want to go to Florida. I quit my job and started my independent consultancy in May of 1983.

Why did you start a consultancy?

Since I had succeeded in opening the Chinese market for Academic Press, I sent 300 letters to publishers across the country. Within 3 months, I had 3 paying clients, including Rand McNally & Co., the map-making publisher who wanted me to sell maps and globes to China.



Logo of Asia Marketing and Management, Dr. Chan's consultancy business

How much is your success in consulting related to your degrees in geography?

I apply what I know about Chinese geography and cultural geography to day-to-day problems in business. I've worked with more than 100 U.S. manufacturers, trade associations, and service organizations. Businesses need people with geographical and cross-cultural knowledge.

Could you give an example of how you applied geography to a business problem?

A company spent \$1,000,000 on postage each year to mail catalogs worldwide. I looked at its bloated mailing list and found that there were many duplicate records. This means that quite a number of people received multiple copies of marketing materials. Many names on the list were misspelled and out-of-date. I surveyed our worldwide customer base and eliminated duplication and waste. Management was very happy because I reduced their costs.

Could you give another example of applying geography in business?

As a cultural geographer of China, I know that there will be misunderstandings between American managers and their Asian counterparts. One time, K-Mart wanted

our company to import 100,000 Santa Claus dolls. Our manager asked our Taiwan representative to send in a sample. I looked at the sample and found that the torso had a piece of wood inside. This was not good because if a doll body had a solid core, we had to pay \$1 per doll in import duty. I sent the sample back to our office in Taiwan and asked them to replace the wood with fabric so that we could import the dolls duty free.

Do businesses really appreciate geography?

They do. They need people with geographical knowledge and perspective to get things done. In 1996, the American Management Association (AMA) commissioned me to create and teach a three-day course titled "Business Skills for the China Market" to executives from Fortune 1000 companies who wanted a crash course on China. I became the first person in the United States after 1949 to do this. Recently, Lockheed Martin asked me to create and teach a one-day course on China. Such needs are there. Companies may not think of solutions for their needs coming from geography. It is up to people with geography degrees to create solutions and make them relevant and resonant.

What advice would you give to someone with a geography degree about succeeding in business?

Start at an entry level and learn a business. Geography is not a trade. It is an academic discipline. Once you know enough of a business, you can apply your unique training as a geographer to look at things in a way that people trained in other disciplines may not come up with. This is how you differentiate yourself and become competitive. Few businesses pay us to teach them geography. They just want us to solve their problems and get things done. It's up to us to invent ourselves.

Author's note: I wrote this piece to commemorate my long-time friend and personal mentor, Forrest ("Woody") R. Pitts, an accomplished geographer, who passed away on January 8th, 2014. When he was alive, Woody kept telling me that geography had benefited me professionally, even though I never conducted research as an academic. Woody

was right. I was wrong. I am grateful to geography and the life journey which it inspired me to take.

Editor's note: You can contact Dr. Chan at JamesChan@AsiaMarketingManagement.com; to view his profile in detail, see <http://www.AsiaMarketingManagement.com>.

Link to Original Article including all images: <http://www.geog.ucsb.edu/events/department-news/1425/how-to-succeed-in-business-with-a-degree-in-geography/>

Improv Training for Scientists

**Brian Palermo,
Actor and Improv Comedy Instructor
Redondo Beach, CA, pimo@verizon.net**

In my experience working with scientists, they are dogged in their pursuit of the facts; testing theories, poring over the scientific literature, attending related talks at conferences... These are all part of the process of science. But something most probably have not considered, but perhaps should, is Improvisation. Improvisation, which is very creative, playful and sometimes even nonsensical tends to be a disconnect for those in the sciences. And I've seen it make a major difference for scientists in several ways.

I'm a professional actor. I have only a dilettante's interest in the sciences. But I am passionate about helping others communicate their often fascinating subjects more effectively.

Improv can do that. And a whole lot more.

There's a tiny wave of awareness for improv training for scientists building right now. Besides my own work with Randy Olson, there is the Alan Alda Center for Communicating Science at Stony University and an organization called Improvscience. Both offer improv training for scientists, as we do - albeit with slightly different agendas.

I'm sure all of our workshops have the goal of helping scientists become better communicators. And I've found the science world to be fairly accepting of the need for this.

But our improv training goes a step further by helping scientists collaborate with each other. And there is an increasing need for cooperative efforts now as there

is definitely a trend moving more in the direction of team science.

Have you ever bristled at a partner's insistence to do it their way, ignoring what you know would be a very solid contribution from you? Collaboration introduces more brainpower to your science. And the addition of another brain (or more than one) can produce creative ideas exponentially.

At its core, improv is about creating something completely new, together with another person or group. In improv, you must work WITH your partners. You MUST build on each other's contributions or you do not have collaboration; you have one writer forcing the others to say his or her words.

The most elemental skill in improvisation is called "Yes, And." This refers to the process of agreeing with whatever your partner says (very difficult for science types!) and then adding to it.

Working together and supporting your partners' ideas are the very fabric of improvisation. And that is why it can be so beneficial to scientists. Collaboration doesn't go anywhere unless co-workers say "Yes, And." It creates a vast approach to generating ideas.

There is a very simple improv game that teaches this skill called "Yes, And..."

If you're interested, here's a quick video example of "Yes, And" hosted online by Expert Village <https://www.youtube.com/watch?v=Qe2a3ppacUk>. Note: I don't know these guys, I chose it because its only 90 seconds long.

Scientists are trained to negate. So by forcing them to reply in the affirmative (saying "Yes") you automatically get them to shift gears into a more innovative way of thinking. This often yields more inspired hypotheses. And it generates actual teamwork. You can only progress the improvised story by adding to each other's last statement. Saying "No" or "But" will derail any true allied effort. I've seen this uncomplicated exercise truly bring awareness to participants who had no idea they were sometimes not easy to work with. And that awareness brought about better communication and collaboration.

Another great exercise is called "Last Letter." This forces the participants to actively listen to their partners before contributing any other thoughts. It's a simple back and forth game where each player

says a word that begins with the last letter of the preceding word. Here's a link to another Expert Village teacher giving a bit more detailed example. <https://www.youtube.com/watch?v=VifzHThoMKc>

The requirement to determine the last letter of the current word prevents the other player from pre-planning their next word. You cannot tune out your partner and just wait for them to stop talking so you can add your next item. You MUST actively listen to them before you speak. This is a very simple exercise yet it resonates deeply with my science trainees. It teaches you to bring this sort of focus on the other to your collaborative work. And you see very quickly and clearly how the connection breaks down if the participants aren't listening to each other.

These two exercises alone can bring great advancement to your cooperative endeavors making the work easier and more productive.

And there are many other improv exercises that can teach great benefits to everyone – especially those who may be somewhat introverted. I get that improvising may sound nerve-wracking. But I promise a big payoff!

AAPG Annual Convention & Exhibition

An outstanding and comprehensive technical program complemented by an extensive exhibits hall that boasted the latest in industry technology and professional services combined to make the recent 2014 AAPG Annual Convention and Exhibition one of the largest gatherings in AAPG history.

The 2014 ACE, held in early April at Houston's George R. Brown Convention Center, attracted 9,386 attendees, making it largest AAPG gathering ever held in Houston and the third largest meeting in AAPG history. The only larger meetings were the 1981 convention in San Francisco (12,152) and the 1980 event in Denver (9,475).

The meeting's theme was "Ideas and Innovation: Fuel for the Energy Capital," which was explored by more than 800 oral and poster presentations.



ACE highlights included:

- AAPG President Lee Krystinik's address to the opening session, in which he discussed the global implications of the industry's "unconventional resources revolution," and AAPG's role in those developments.
- The latest installment of AAPG's Discovery Thinking forums – this year expanded to an all-day session as eight geoscientists discussed new reserves, unconventional resources, payoffs from persistence and the application of highly specialized technology.
- A new special forum, titled "Communicating Our Science," featuring a panel of high-profile experts who discussed what and how to communicate with the public and media about sensitive topics in energy and science.
- The presentation of AAPG honors and awards, including a stirring tribute to Ernest A. Mancini, a renowned educator and leading researcher in stratigraphy and petroleum geology of the Gulf of Mexico region, as he received the Sidney Powers Memorial Medal, AAPG's highest honor.

Informative and compelling luncheon speeches by a variety of speakers covering a wide-range of subjects, including:

- Kirk Johnson, Sant Director of the Smithsonian's National Museum of Natural, who spoke on "Evolution, Time, Tectonics, Asteroids, Climate and the Trajectory of Earth Science."

- Susan Cunningham, senior vice president of the U.S. Gulf of Mexico, Africa and Frontier Region for Noble Energy, speaking on "Exploration and the Oil and Gas Industry: Having a Positive Impact on People and the World."
- Scott Tinker, director of the Bureau of Economic Geology and state geologist of Texas, speaking on "The Future of U.S. Shale."
- Anthony R. Fiorillo, with the Perot Museum of Nature and Science, speaking on "A Perspective from Dinosaurs on Climate Change."



The 2015 ACE will be held May 31-June 3 in Denver.

GSA is Heading North

Registration is open for The Geological Society of America's Annual Meeting & Exposition, to be held on 19 to 22 October 2014 at the Vancouver Convention Centre in beautiful Vancouver, British Columbia, Canada.

Geoscientists from around the world, representing more than 40 disciplines, will present new findings that enlarge the body of geoscience knowledge and define directions for future study.

Invited speakers in [five Pardee Keynote Symposia](#) will address earthquake hazards in the Cascadia subduction zone; mechanisms at play during Earth's major mass extinction events; energy development as it relates to groundwater resources; the modern legacy of the Cordilleran Ice Sheet; and the key role of the mineral apatite in bio-systems.

247 topical sessions promise unparalleled access to the thought-leaders that are shaping earth sciences today. The abstracts deadline is 29 July. [Submit an abstract](#).

Representatives of the media and public information officers from universities, government agencies, and research institutions are cordially invited to attend and participate in technical sessions, field trips, the exhibit hall, and other special events. Eligible media personnel receive complimentary meeting registration and are invited to use GSA's newsroom facilities while covering the meeting. Journalists and PIOs must pay for any short courses or field trips in which they wish to participate. Review requirements for [media eligibility](#). Apply for [media registration](#).

The 10th North American Paleontological Convention Post-Conference Report

Michał Kowalewski and Troy Dexter
Florida Museum of Natural History



Despite an unwelcome spell of bad weather that paralyzed many airports, close to 500 paleontologists from 28 countries assembled in February on the University of Florida campus for the 10th North American Paleontological Convention. NAPC 2014 was hosted by the Florida Museum of Natural History (University of Florida) and organized under the auspices of the Association of North American Paleontological Societies. A considerable support was provided by diverse sponsors and exhibitors ensuring the financial viability of this event.

As the organizing hosts, we have been both thrilled and gratified by the widespread voluntary support of many paleontologists who contributed to the success of

this meeting. Many of you volunteered to organize and convene topically diverse symposia and worked with us in a forgiving and accommodating manner. Many of you volunteered as judges of student presentations. And many of you persevered against the winter storm: unfazed by last-moment flight cancellations, you had braved icy and congested roads, often driving 15 hours or more just to attend the conference.

In the end, only 6.5% of registered participants were unable to attend the conference. Your widespread support and your dedication bode well for the future of our profession.

The 2014 NAPC demonstrates that paleontology remains a worldwide discipline with a vibrant research agenda, lofty educational goals, and well-articulated outreach. A total of 471 participants attended this year's NAPC, including ~15% of international guests. NAPC presentations (305 talks and 75 posters) covered all fields of paleontology, from cyanobacteria to whales and from Archean to Anthropocene. The strong presence of students (126) was particularly uplifting, as was the increasing participation of avocational paleontologists and K-12 educators. To learn more about the content of the meeting, you can download the abstract volume free of charge at http://www.flmnh.ufl.edu/index.php/download_file/view/1679/.

As hosts, we have also been very fortunate to attract outstanding keynote speakers who delivered thought-provoking and insightful presentations. During the opening ceremony, Sandra J. Carlson, the outgoing President of the Paleontological Society, delivered an inspiring talk on the future of our discipline ("Where do we go from here?"). She was followed by Shanan E. Peters, the current coordinator of the Paleobiology Database, who talked about the thrilling future of paleontological databases ("Bringing paleontology's 'dark data' to light"). During the closing ceremony, Kirk Johnson, the Director of the Smithsonian Institution, energized and challenged the audience with his talk on "The million kid march and other aspirations for paleontology".

We are also thrilled to report the launching of the new student award program. The 2014 NAPC student competition, included both oral and poster award categories. A total of 123 students signed up for the competition and their posters and talks were evaluated by numerous



at the Mazon Creek fossil site". Honorable mentions went to Chelsea Jenkins (University of Georgia) and Sharon McMullen (University of Wisconsin-Madison). The best Undergraduate Presentation Award went to Aaron M. Martinez (College of William & Mary) for his presentation on "Time-averaging in Chesapeake Bay mollusks: estimates based on amino acid racemization of Holocene *mulinia*". The honorable mentions went to Nicole Little (University of Cincinnati) and Elysia Howe (College of William & Mary).

It was a great privilege to host the 10th North American Paleontological and it is our sincere hope that those of you who attended found the meeting rewarding and returned back home inspired and energized.

We are looking forward to future NAPC meetings!

Study examines cadmium uptake in New Zealand pastures

MADLINE FISHER
Soil Science Society of America



New Zealand's pastoral landscapes are some of the loveliest in the world, but they also contain a hidden threat. Many of the country's pasture soils have become enriched in cadmium—a toxic heavy metal that is readily taken up by grasses and then transferred to the cattle and sheep that graze them. The concern is that if cadmium concentrations rise to unsafe levels in meat and dairy products, human health and New Zealand's agricultural economy could be jeopardized.

judges. The Best Graduate Talk Award went to Emma Locatelli (Yale) for her presentation on the "Experimental taphonomy of foraminifera". Honorable mentions went to Nicole Cannarozzi and Fabiany Herrera (both from University of Florida). The Best Graduate Poster Award was awarded to Victoria E. McCoy (Yale University) for her presentation on "Distribution of fossiliferous concretions

That so far hasn't happened. However, because much of the cadmium in the nation's pasture soils originates from mined phosphate fertilizers that farmers continue to use, New Zealand isn't taking any chances. Farmers whose soils test high in the metal are being advised to apply low-cadmium fertilizers, for example, and reduce phosphorus applications overall.

Scientists, meanwhile, are trying to determine which soil factors most strongly affect soil cadmium concentrations, with an eye toward predicting where in the landscape pasture grasses are more likely to accumulate the metal. In a new study led by Brett Robinson of New Zealand's Lincoln University, scientists found that soil pH, iron concentrations, and total cadmium levels were all excellent predictors of the potentially bioavailable fraction of soil cadmium. At the same time, they were relatively poor predictors of the actual cadmium concentrations measured in pasture grasses.

What this suggests is that the grasses themselves need to be investigated next. Different species of pasture grasses take up cadmium to different degrees. Their roots may also change soil chemistry in ways that affect cadmium's availability. By refining models of soil-to-plant transfer of cadmium, people can better judge where livestock are at greatest risk of cadmium exposure in the future. The new knowledge should also enable the development of tools—such as pasture species selection—to reduce that exposure, the study's authors say.

Their findings published online on Mar. 21, 2014 in the *Journal of Environmental Quality*.

How did New Zealand end up with so much cadmium in its soils? For many years, phosphate rock from Nauru Island—a tiny island nation in the South Pacific—was used to produce "single superphosphate" fertilizer for the country's agricultural soils. Only later did people realize the phosphate contained high concentrations of cadmium, or roughly 100 mg per kg. Today, the average cadmium concentration in pasture soil has risen to 0.43 mg/kg, according to previous research—or more than two times background levels.

And in the current study, the average level across 69 sites was even greater: 0.89 mg/kg. (The authors think the higher number may stem from their focus on lands under intensive dairy farming, which tend to receive more fertilizer than grazing lands in general.) It's certainly

a troubling finding for a country where pasture covers nearly 40% of the total land area and animal production is a vital industry. But the problem is also not unique to New Zealand. Cadmium enrichment has been reported in soils worldwide, not only through use of cadmium-rich phosphate fertilizers, but also from atmospheric deposition of cadmium and land application of biosolids.

So the question now becomes, how can cadmium be managed? The metal is difficult to remove from soil once it's there, so one important solution is to keep what's already present locked up and unavailable to plants. Robinson's work indicates one way to achieve this. In the study, concentrations of plant-available cadmium rose as pH declined, suggesting that maintaining neutral or high soil pH levels whenever possible will reduce uptake of the metal by grasses—and ultimately by livestock.

Similarly, high iron levels were statistically correlated with lower concentrations of bioavailable cadmium, because iron oxides bind cadmium tightly and hold it in soil. Robinson is now working with the coal-mining company, Solid Energy New Zealand, and the Swiss Federal Institute of Technology to learn whether additions of the compound, lignite, from some coal mining operations, can increase the soil's ability to bind cadmium, as well.

GI: Resources on YouTube!

Elizabeth Cuscino



The Geo-Institute of ASCE invites you to join the hundreds of subscribers and viewers enjoying the resources on our YouTube Channel!

Our Channel can be found at <https://www.youtube.com/user/GeoInstituteASCE> and features videos of Award Lectures from our most recent Geo-Congresses.

Our newest videos are two lectures from the 2014 Geo-Congress:

- The 2014 Peck Lecture, "Innovations in Modeling and Monitoring Technologies for Response of Deep Urban Excavations" presented by Youssef M.A. Hashash, Ph.D., PE, F.ASCE, of the University of Illinois
- The 2014 Terzaghi Lecture, "Energy Geotechnology: Enabling New Insights Into Soil Behavior", presented by J. Carlos Santamarina, Ph.D., Ing., A.M.ASCE, of the Georgia Institute of Technology

We also have Award Lectures from previous Congresses, resources on professional development, and videos of particular interest to students. We are continuing to add material of interest to the geo-community. Subscribe through YouTube to be notified right away when we update.

Friends Of Mineralogy: Highlights of the Pseudomorphism Symposium

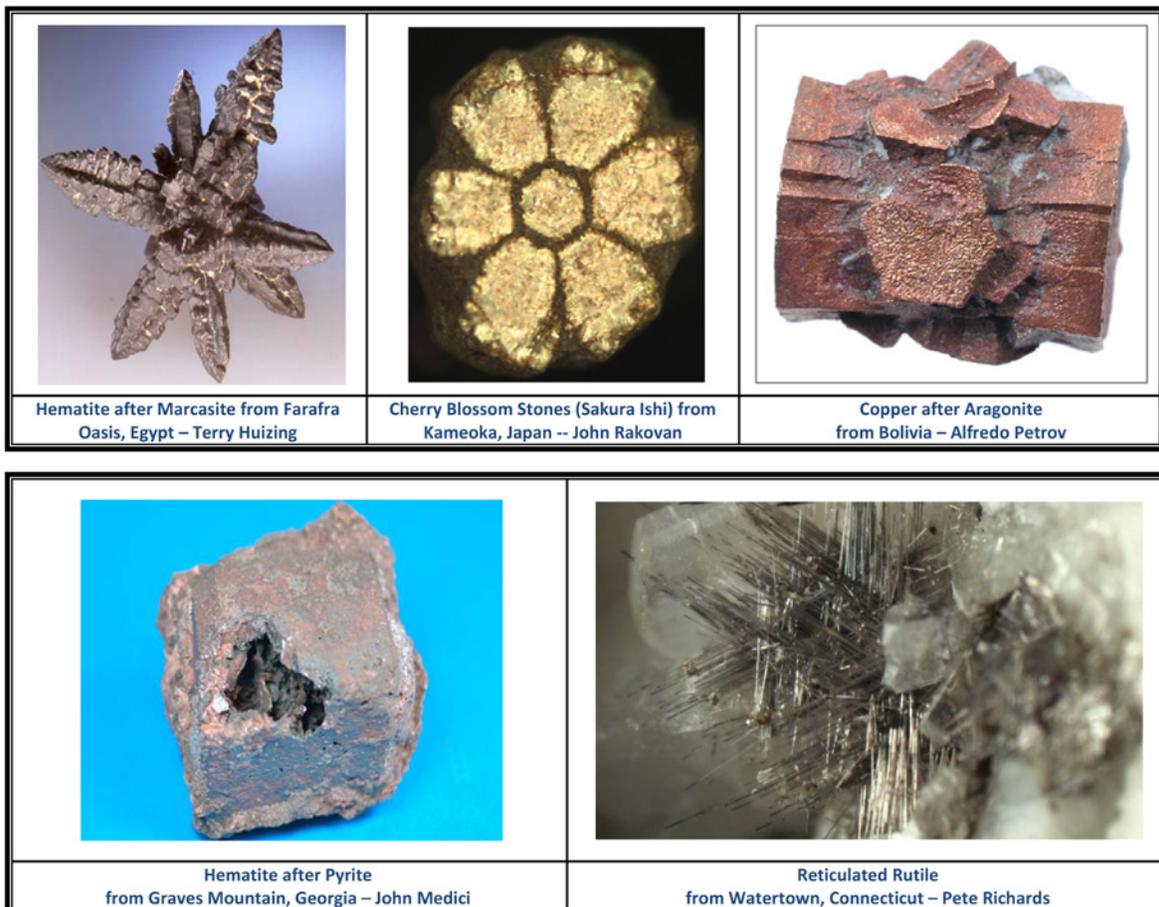
Randy Marsh

Friends of Mineralogy Midwest Chapter held a mini-symposium on pseudomorphism at Miami University on March 15, 2014. The event was made possible by sponsorship from the Karl E. Limper Geology Museum and John Rakovan.

Overall there were between 25-30 participants throughout the day.

Dan Hall kicked things off with his talk Pseudomorphs – The Ghosts of Minerals Past, providing a helpful background on what pseudomorphs are and the different kinds that exist. Wladek Betkowski providing an entertaining and insightful presentation on mechanisms whereby pseudomorphs can be formed, with a focus on mineral replacement by coupled dissolution-precipitation. Terry Huizing then beguiled us with beautiful

HIGHLIGHTS OF THE PSEUDOMORPHISM SYMPOSIUM



pictures of various kinds of highly aesthetic pseudomorphs. After a break, John Rakovan shared his learnings around how Sakuri Ishi (Cherry Blossom) pseudomorphs form in Japan, laying out how a complex set of cordierite-indialite ingrowths give rise to the central core with six surrounding “petals.” Pete Richards shared some fascinating images of how reticulated rutile forms and what is driving the complex branching patterns. Alfredo Petrov wove an engaging story of his years spent collecting minerals in Bolivia and provided free samples of copper after aragonite pseudomorphs from Corocoro. John Medici finished the day by showing us dazzling examples of rainbow hematite pseudomorphs from Graves Mountain.

The event was enjoyable and well-received, with considerable discussion on many of the talks. John Rakovan graciously offered up Miami University for us to host an ongoing annual symposium. I very much hope to see all of you at our next event!

SEG: Research Partnership to Secure Energy for America (RPSEA) selects SEAM for \$1.9 million in project funding

Whitney Emerick

The SEG Advanced Modeling (SEAM) Corporation has been selected by Research Partnership to Secure Energy for America (RPSEA) to receive \$1.9 million in project funding for its “Pressure Prediction and Hazard Avoidance” project.

“The intent of this project is to show our industry what current practice will produce when compared to a perfectly known geologic setting, and fluid setting when the data used to determine pore pressure is as perfect as it will ever be,” states Bill Head, Ultra Deepwater Sr. Manager, RPSEA. “Then opportunity exists to improve how we predict pore pressure from seismic now, and hopefully create suggestions to advance the science to a better, safer outcome.”

The “Pressure Prediction and Hazard Avoidance” project, the third joint industry project managed by SEAM, will evaluate and advance current methodologies for pre-drill pressure and hazard prediction. The research

consortium will provide a collaborative forum where industry experts prioritize current challenges in the use of seismic velocity (and other seismic attributes) to construct pre-drill pore pressure and shallow hazards forecasts for well planning. These challenges will be used to design a comprehensive earth model and to “acquire”, through advanced computer simulation, benchmark data sets to be used by industry for quantifying risk and uncertainty associated with velocity models derived from current and future state of the art in seismic acquisition, processing, and imaging. A methodology will be developed for assessing risk and uncertainty in pressure prediction from seismic. Though the focus will be Gulf of Mexico Deepwater, the resultant advances in pressure prediction and shallow hazards technology and methodology will be more broadly relevant.

Kevin Bishop, Chairman, SEAM Board of Directors states “In the joint interest for safety and more accurate pre-drill pressure prediction, the Research Partnership to Secure Energy for America (RPSEA) and the Department of Energy (DOE) has awarded SEAM a substantial co-funding. This exciting news stimulates the ability of companies joining the SEAM Pressure Prediction Consortium to design a more complex program aimed at testing and advancing pressure prediction technology over the next decade.”

Beginning in the fall of 2014, the three year project is currently inviting participation from industry. To learn more about the project and how to participate, visit www.seg.org/seam.

About SEAM

The SEG Advanced Modeling Corporation mission is to advance the science and technology of applied geophysics through cooperative industry efforts focused on subsurface model construction and generation of geophysical data sets for geophysical problems of importance to the resource-extraction industry. SEAM provides opportunities for companies to share the high cost of model design and data simulation, provides a forum for industry leaders to discuss geophysical problems of common interest, advances the art of modeling and computation by stimulating research and development and provides data sets for industry benchmarks and educational purposes. The SEAM Corporation was formed in

2007 as a wholly-owned subsidiary of the SEG. For more information about the SEAM Corporation and the SEAM Phase I project see the SEG website.

Successor Announced - AIPG Executive Director Robert A. Stewart, CPG-08332

**Raymond W. Talkington, CPG
AIPG 2014 President**

For the past 15 years we have had the same Executive Director – Bill Siok. Bill has provided leadership to AIPG that has reenergized members, developed new programs, fostered improved or new communications and professional relationships with geological organizations around the world, embraced young professionals and student members, and spearheaded programs that have made and will continue to keep AIPG financially strong. These are efforts that we all appreciate. Bill is a team player and has worked closely with AIPG Presidents and Executive Committees, members, and staff to be where we are today.

Bill let AIPG know last year that he would retire in 2014. Although Bill will officially leave AIPG at the end of June of this year, he will continue to be a member of AIPG and a trustee of the Foundation of AIPG.

What next? An Executive Director Search Committee was formed in 2013 to look for a new Executive Director. The search has taken many months and I am pleased to let you know that Bob Stewart has been selected as the new Executive Director of AIPG. Bob is the Editor of TPG. Bob has been a CPG since 1991 and has served many roles for AIPG including an active member of the Northeast Section, National Editor of TPG, and member of the National Screening Committee. In 2011 Bob was awarded a Presidential Certificate of Merit for work as the Editor of TPG and in 2013 he was awarded the Martin van Couvering Memorial Award for service to AIPG. Bob will officially take over the reins at Headquarters on June 30, 2014. Let's all welcome Bob. Even though this transition marks a significant change for AIPG, I envisage this change to be seamless.

NAGT: InTeGrate Announces 2014 Incorporating Geoscience throughout the Curriculum Implementation Programs

Interdisciplinary Teaching about Earth for a Sustainable Future (InTeGrate), a 5-year STEP Center grant from the National Science Foundation, seeks to increase Earth literacy of all undergraduate students, as well as the number of graduates who are prepared to bring an understanding of the Earth to bear on the resource and environmental issues faced by our society today and in the future.

To this end, InTeGrate is pleased to announce the 2014 Incorporating Geoscience throughout the Curriculum Implementation Program recipients:

Next Generation STEM Teacher Preparation in Washington State

A consortium of Washington State Colleges and Universities in partnership with Washington's Office of the Superintendent of Public Instruction (OSPI), the Teachers of Teachers of Science, and Teachers of Teachers of Mathematics, and other key stakeholders, will improve science learning and Earth literacy for all Washington State students by creating an improved model for STEM teacher preparation in Washington State aligned with the Next Generation Science Standards (NGSS) and utilizing InTeGrate course materials. This project intends to strengthen the role of geoscience in the preparation and professional development of K-12 teachers.

Engaged Sustainability: From Curriculum to Community at Wittenberg University, Springfield, OH

Wittenberg University will transform its educational model, moving from isolated general education requirements without linkages, toward a model that fosters interdisciplinary thinking and a proactive student presence in the community. The team at Wittenberg University will thread sustainability modules within existing courses, broadening participation in sustainability curricula through recruitment and training, and creating linkages in sustainability problem-solving within our community.

The Defining Challenge of Our Age – Climate Science across the Liberal Arts Curriculum, Gustavus Adolphus College, St. Peter, MN

Faculty at Gustavus Adolphus College will work together to integrate a set of climate science modules across the liberal arts curriculum, increasing the level of climate science literacy among faculty and students and setting the stage for meaningful interdisciplinary discussions of the role of climate change across the liberal arts curriculum.

Integration of Earth Science Content across Science Teacher Preparation Courses at Grand Valley State University, Allendale Charter Township, MI

The Grand Valley State University project plans to redesign three existing science methods courses for pre-service teaching students majoring or minoring in biology, chemistry, geology, and physics. The courses will incorporate Earth science content, especially climate change and energy, as overarching themes. The courses will develop shared pedagogical content skills, as well as those skills unique to each discipline, with the goal of integrated science methods courses across the curriculum.

Through the development of these implementation programs, InTeGrate strives to infuse Earth literacy across disciplines, engage younger students in the geosciences, and develop a new vision for how geoscience is positioned in higher education. For more information on InTeGrate, please see our website at <http://serc.carleton.edu/integrate/index.html>

AAPG Changes Amends Bylaws for Membership Requirements

BRIAN ERVIN

EXPLORER Assistant Managing Editor

Full membership in AAPG will now require only one sponsor, following a lengthy and impassioned debate among the members of the AAPG House of Delegates at the group's annual meeting before the Annual Convention and Exhibition in Houston.

The body approved an amendment to the AAPG Bylaws that will lower the current requirement of three sponsors.

The amendment was a compromise and substitute for another proposed amendment that would have removed the sponsorship requirement entirely.

Proponents of the initially proposed amendment, like AAPG Secretary Richard Ball, argued that the sponsorship requirement has been an unnecessary barrier to membership that has discouraged in particular young professionals, internationals and geologists outside major energy hubs from upgrading from associate to full membership with voting rights.

"Richard Ball's slide on our membership trends is a huge red flag for our organization," said Jeff Lund of the Houston Geological Association, who argued to drop the sponsorship requirement.

Ball and others contended that the sponsorship requirement is unnecessary to maintaining AAPG's ethical standards because "nefarious people can find three sponsors"; potential members should be considered innocent of being unethical until proven guilty; and if members are admitted and then make ethical breaches, expulsion is still an option – something that has only happened seven times in the last 30 years, Ball pointed out.

AAPG treasurer and past DPA president Deborah Sacrey, however, rebutted that there have been so few ethical breaches within AAPG's ranks precisely because the sponsorship requirement screens potential members.

She and other opponents to the proposed change argued that eliminating the peer-review aspect would devalue AAPG membership, thereby relegating the Association to resemble a mere trade organization.

Also, while proponents cited the consensus among AAPG's leadership councils and committees, delegates who opposed the change argued that the consensus among members appears to favor keeping the sponsorship requirement.

Of the 207 HoD members in attendance, 116 voted to approve the substitute amendment to lower the sponsorship requirement to one, with 76 who voted against it.

After the approval of the new amendment, 158 voted to enact it, with 34 against.

AASP: Pollen in Honey

Vaughn M. Bryant, PhD

I have been examining honey samples from all over the world for nearly 40 years and two things are apparent; most beekeepers don't know what honey their hives produce and most labels on jars of honey sold in the U.S. are wrong or can't be proven correct. There are many reasons why beekeepers often get it wrong and why most jars of honey in the United States don't contain what is claimed on the label. How do we know this? As a melissopalynologist my task is to find the pollen in honey and use it to determine the true nectar sources in the honey and to determine the true geographical location where the honey originated. Neither of these aspects is easy to unravel without a better understanding of the complexity of how pollen gets into honey in the first place.

Trying to achieve both goals (true nectar sources and geographical location where honey was produced) is possible, but it will require the work of a number of melissopalynologists and will require a better understanding of a number of major variables that affect the accurate determination of where a honey is produced and how to identify the correct nectar sources used to produce it. Let me review some of the potential problems that I have encountered in the past. First, I have learned that field identification reported by beekeepers as to the "nectar sources" of their honey are often incorrect. During the past four decades I have examined more than 2,500 honey samples mostly from hives in the United States but also honey produced in a number of foreign countries as well. I have discovered that more than 60% of those "field identifications" of major nectar sources in a honey sample are wrong. Just because honeybees are swarming around some blooming plants, or because some plants near a hive are in bloom does not ensure that those are the major sources for the honey being produced. Second, experimental data reveal that honeybees are efficient at removing a vast amount of pollen during their return flight to the hive from the nectar sources they have collected in their honey stomach. In addition, those same tests document that all honeybees are not "created equal" and that some bees are much more efficient than others in removing pollen from the nectar they have collected. Studies also note that the

size and the shape of pollen grains will influence how efficiently honeybees are able to remove certain pollen types from the nectar they collect. For some of the larger pollen types, such as *Chamerion angustifolium* (fireweed), *Oenothera* (evening primrose), *Oxydendrum arboreum* (sourwood), *Vaccinium corymbosum* (blueberry), *Lamiaceae* (mints), and *Liriodendron* (tulip tree), much of the pollen can be removed fairly quickly before the bee reaches the hive. Other smaller pollen types such as *Mimosa*, *Brassica napus* (canola, rapeseed), *Melilotus* (sweet clover), *Echium vulgare* (blueweed), and *Myosotis* (forget-me-nots), will rarely be removed by the returning bees. Third, a growing number of beekeepers and honey producers are partially or completely filtering their honey and/or are blending their honey with honey from different sources before selling it. Blending and partially removing some of the pollen prevents the accurate assignment of both origin and primary nectar sources in a honey sample. Fourth, my colleagues and I have examined a number of the standard processing techniques currently used in many countries to extract and analyze pollen from honey and we have found flaws in many of those methods. That is why we developed a new extraction method (Jones and Bryant, The use of ETOH for the dilution of honey, 2004, GRANA 43:174-182) that will ensure that no pollen is lost from honey samples. Finally, even when honey samples are correctly processed and their pollen types and percentages are carefully noted, the resulting pollen data do not reflect a one-to-one correlation between the pollen and the primary nectar sources used to produce the honey. Pollen can be incorporated into honey in a number of ways. When a honeybee lands on a flower in search of nectar, some of the flower's pollen is dislodged and falls into the nectar that is sucked up by the bee and stored in her stomach. At the same time, pollen grains that have become attached to the "hairs", legs, antenna, and even the eyes of bees while visiting a flower can fall into the nectar of a different flower. Later, some of those pollen grains can get sucked into a visiting bee's stomach and both pollen types will be regurgitated with the collected nectar into open comb cells of the hive. While still in the hive a honeybee may groom herself in an effort to remove the entangled pollen on her body. During that process pollen can fall directly into open comb cells of

nectar or onto areas of the hive where other bees may track it into the hive area where unripe honey is still exposed. Pollen collected by other bees specifically for storage in the hive or airborne pollen accidentally blown into a hive are other potential sources of pollen that can become incorporated into exposed comb cells of nectar being turned into honey.

Pollen is an essential tool in the analyses of honey. The types of pollen indicate the floral sources utilized by bees to produce honey. As a result, pollen frequency is used to identify and label a honey sample as to the major and minor nectar sources. That information has important commercial value because consumers often prefer honey made from specific nectar sources and those consumers are willing to pay a premium price for types such as *Leptospermum scoparium* (manuka), *Robinia pseudoacacia* (white acacia), *Oxydendrum arborescens* (sourwood), *Salvia* (sage), *Nyssa ogeche* (tupelo), *Fagopyrum* (buckwheat), or Citrus (orange, lemon, etc.) honey. Only by identifying and quantifying the pollen in honey will the full range of nectar sources be identified and the honey's actual foraging resources be correctly labeled. Another reason why pollen analyses of honey are important is to determine the honey's geographical origin. The combination of pollen types found in a honey sample will often produce a pollen spectrum that is unique for a specific geographical region. Because of trade agreements, import tariffs, and legal trade restrictions, most honey-producing nations in the world require accurate labeling of honey before it can be sold. However, the United States Department of Agriculture (USDA) and the Food and Drug Administration (FDA) does not require truth in labeling as a requirement for honey sales in the United States.

During the mid-1900s Todd and Vansell, (F. Todd & G. Vansell, 1943, JOURNAL OF ECONOMIC ENTOMOLOGY 35[5]: 728-731) examined pollen grains in nectar and honey. While conducting those studies of honeybees in California, they made a shocking discovery. They found that caged honeybees fed a diluted syrup-water solution containing 750,000 pollen grains per cc produced honey that had only 25,000 pollen grains per cc. In other words, most of the pollen in the syrup-water had been re-moved by the bees before the solution was emptied from their honey stomach into new comb cells and made

into honey. Todd and Vansell realized that the newly produced honey had a pollen concentration value that was only 1/30th of the original amount of pollen in the syrup-water fluid. The only logical conclusion was that there must be a significant reduction in pollen concentration as a result of the internal filtration system in a bee's honey stomach, which was apparently far more effective than anyone previously realized. They went on to discover that the amount of pollen in the nectar of different plant species varied greatly. That information combined with their study of how bees remove pollen from the nectar provided pioneering efforts in the development of pollen coefficient tables. Their initial efforts then led others to use those ideas and experimental data to compile lists of plants that are over or under-represented by their relative pollen frequencies in honey samples (Bryant and Jones, 2001, The R-values of honey: pollen coefficients, Palynology 25:11-28).

In the half-century since the initial study by Todd and Vansell we have learned a lot about the ratios of pollen in honey and their relationship to the actual amount of nectar those plants contribute. For example we know that only a few percent of sourwood or fireweed pollen in honey means you have a "unifloral honey" from those sources because both sourwood and fireweed pollen are highly under-represented in honey. On the other hand, if you have 75% pollen from rapeseed (canola) sources in a honey sample that does not mean it is a "unifloral honey" because the actual nectar contribution from rapeseed plants, as compared to the large percentage of pollen, is actually minimal. Unfortunately countries and individuals still insist that in most cases to be classified as a unifloral honey one must have "at least 45% pollen" from one floral source. For some plant and nectar sources that requirement is valid but for others, such as fireweed and sourwood, one might never find those levels even in nearly pure honey produced primarily from the nectar of those plants. This is why using pollen coefficient (PC) data are so important and why pollen testing and the application of those data are essential tools needed to provide an accurate identification of the honey sitting on the shelf in some supermarket! However, not everyone accepts the use of PC values because of questions related to the techniques that were used to generate those tables and values. Some of the PC research was conducted more than

50 years ago using techniques and standards that were adequate at the time, but new studies using improved techniques should be done today. The current problem, especially in the United States, is that few academic centers teach techniques related to beekeeping, none of those academic centers teach melissopalynology as part of their programs, and the United States Department of Agriculture, although interested in honeybee research, currently spends most of their funds and efforts on searching for causes of bee colony decline.

Developing new and valid PC standards would not be difficult or expensive, but the research would require time and effort on the part of those working on the problem. So far, there appears to be little interest in trying to develop new sets of PC standards that could be adopted universally as guides to identifying unifloral honey types from any region of the world. Unfortunately, at present no one in North America is tasked with the routine examination of pollen contents in honey samples and thus what is on the label of many honey products sold in urban stores or at farmer's markets in both Canada and the United States often has no relationship to what is actually in the jar. Until beekeepers and consumers, especially in Canada and the United States, insist on changes, we will continue to pay high prices for "so-called" premium honey types, which in reality might be nothing more than inexpensive clover, canola, or even blends of honey from different regions. The first step in correcting this would be to demand truth in labeling for honey sold both in Canada and in the United States. My repeated testing of honey sold commercially in almost every U.S. state, and some provinces in Canada, reveals that this is desperately needed in order to correct the misinformation now found on the jars of most honey. Requirements for truth in labeling of honey would then create a need for developing new sets of accurate PC (pollen coefficient values). After that, the potential for research funding to expand the needed PC research of honey types, and the potential for future palynologists to work in the honey industry and in academic centers would exist. Likewise, students and researchers would soon be willing to pursue the study of melissopalynology with the result being a bonus for consumers throughout Canada and the U.S. who could then believe with certainty that what was written on the labels of honey products is indeed true!

AAPG: Harnessing the Power of Emerging Publishing Technologies



AAPG has launched its new Wiki site, which can be found at wiki.aapg.org.

It is intended to be a resource of geologic knowledge for students of all ages, teachers, practicing geoscientists and the public at large.

Created to engage a broad cross-section of geoscience experts and augment its traditional publishing, AAPG's new wiki currently has more than 700 articles, pulled from two AAPG books: "Methods in Exploration #10: Development Geology Reference Manual," and "Treatise in Petroleum Geology #3: Exploring for Oil & Gas Traps."

The wiki is free and anyone can sign up to help edit or create articles.

Wiki specialist Cecilia Whitehurst monitors the site, reviewing new pages and coordinating edits. AAPG also has set up an Advisory Board to review the accuracy of new articles.

"AAPG's new wiki harnesses the power of emerging publishing technology to deliver AAPG science in to the hands of members, customers and the public," said Executive Director David Curtiss. "The wiki is intended

to augment our peer-reviewed publications program – and we hope that it engages an entire new generation of geoscientists to share their knowledge and expertise with a broad audience.”

The site’s development required close interaction with IT and publication professionals, senior management and “buy-in” from its volunteer committee structure.

The project was initiated with financial support provided by Apache Corporation.

AAPG members are encouraged to visit the wiki and add or edit articles – email wiki@aapg.org for feedback or more information.

Hurricane Sandy and the mapping of coastal soils: What can we learn?

Caroline Schneider, SSSA

In Rhode Island, it was a day of 60 mile-per-hour northeasterly winds. The south shore of the state was battered, beaches were eroded, and coastal ponds were breached. It was Oct. 29, 2012, and Hurricane Sandy had arrived on the East Coast.

“What we got was nothing compared to what New Jersey and New York experienced, but Sandy did cause a lot of damage to towns in southern Rhode Island,” says Jim Turenne, Rhode Island assistant state soil scientist.



Eroded cut in an Enfield soil following Hurricane Sandy. About 20 ft of soil was eroded. An area of beaches, sandy surface is in the foreground. One house in the background is collapsed and the other on the far left (estimated at \$1 million) was condemned and torn down.

While the hurricane brought destruction to the East Coast, it also created something else. For Turenne and other soil scientists in the area, Sandy gave them the opportunity to study coastal soils that were exposed after the storm. With information and experiences taken from the storm, researchers built on their efforts to map and classify soils along the coasts. Scientists hope all of that data will help coastal residents better plan development and more easily recover from—or even avoid—damage from storms.

Mapping Coastal Soils

According to the National Oceanic and Atmospheric Administration (NOAA), more than half of the U.S. population lives within 50 miles of the coast. With people using the coastal areas for businesses, homebuilding, and recreation, understanding the soil on which that development is happening is crucial. How vulnerable are those areas to erosion and storm damage? What soils are best for building a home and where are those soils located?

A major step forward in helping to answer some of these questions took place in 2004 when Turenne and his colleagues started a coastal zone soil survey of Rhode Island. In addition to mapping soils on coastal land, the scientists also mapped “subaqueous soils”—soils that are underwater at depths up to 2.5 m (just over 8 ft). These soils had not been mapped with any detail; in fact, it was not until the early 1990s that these submersed areas were even considered soil.



An outcrop following Sandy in Point Judith, RI revealing a thick deposit of human transported material (fill) over a buried Rainbow soil series. A beaches, bouldery surface map unit is in the foreground.

The idea to define and map subaqueous soils was a bit of an accident, according to Debbie Surabian, a Natural Resources Conservation Service (NRCS) state soil scientist in Connecticut. To map soils efficiently, scientists typically take a circular route that covers a large work area and leads back to the starting point. George Demas, the pioneer of subaqueous soils, was following this practice in the 1980s when he happened upon the idea of mapping soils that were under water.

“He was mapping and decided to walk through a body of water to complete a circle and get back to the other side,” Surabian explains. “He happened to drop his auger in and said, ‘Hey, this looks like soil I can map.’ Lots of research was done, and we expanded the definition of soils in the 11th edition of Keys to Soil Taxonomy to include subaqueous soils.”

A big push in the mapping of subaqueous soils in the Northeast came from a project to restore coastal habitats. Scientists were working to bring back natural areas, such as eelgrass beds, that had been degraded. Biologists began to look for the best locations for re-establishing these habitats. But with all of the data they had, they realized they were missing one piece of information –the kind of soil in which eelgrass likes to grow.

These developments and the questions they posed led the way for the coastal zone soil survey. In addition to the basic knowledge that comes from more fully mapping and interpreting coastal soils, these efforts help with restoration and recovery projects that often carry a large price tag. Millions of dollars are spent helping to restore coastal zones after storms such as Sandy, and any additional knowledge of the coastal areas aids in the recovery.

Rare Opportunities after Hurricane Sandy

While much work had been done to map coastal soils in Rhode Island by the time Hurricane Sandy arrived in 2012, the storm provided some additional information and opportunities. After the hurricane had passed, Turenne and some colleagues went out to look at the damaged areas. In several places along the coast, the storm had eroded and cut into the soil leaving behind outcrops—areas where multiple layers of the soil were exposed. Seeing these layers, which are usually buried,



A storm-cut outcrop showing human-transported material (fill) with an extremely artificial horizon (bricks are visible). Areas of fill soil eroded more than the natural soil.

allowed scientists to better understand, map, and classify the types of soils beneath their feet.

In addition to being able to see soil layers that are normally hidden, Hurricane Sandy also gave the scientists an idea of what areas of the coast were most vulnerable to damage.

“The storm actually helped us see which areas eroded more and which areas were protected,” Turenne explains. “Previously, all of the beach had been mapped out as one beach unit. We developed different map units for the beaches separating them based on whether they were mostly sand, stones, or boulders. And we saw differences in erosion.”

The beaches made up mostly of boulders were resistant to erosion and made it through Hurricane Sandy largely intact. The sandy beaches, however, were easily and quickly eroded. In some areas, the dunes lost 50 to 60 ft of material. By determining which types of beaches were more or less prone to erosion, soil scientists offer helpful information for future uses of beach areas.

The storm also provided unexpected opportunities to better see and map other locations, such as ponds. In many coastal ponds in Rhode Island, inlets have been dredged, allowing salt water in and subjecting the ponds to tidal flooding. Trustom Pond is a freshwater pond that does not have such an inlet. But during the hurricane, it did breach. The storm overwashed the barrier and created an opening through which the pond water could escape. Water levels dropped about 5 ft.



An area of Anguilla soils exposed following the breach of Trustom Pond. Water levels in the pond lowered 5 ft. Water level before the breach was up to the vegetation.

With the pond water levels very low, Turenne and a colleague from NOAA were able to walk around the pond and photograph soils that were usually under water. They were also able to dig holes and collect soil samples much more easily than when the soils are under water.

"I came across the pond, and it was almost like someone had pulled the plug out and just drained the whole thing," Turenne says. "I had mapped the pond in 2007, and this gave me a chance to check my mapping by looking at these areas that were now exposed."

In Connecticut, restoration efforts were also underway after Hurricane Sandy. Much of Surabian's effort was focused on sediment removal. The storm had pushed sediment up into salt marsh channels, restricting flow in the channels and causing flooding.

"We went out and helped determine what fresh sediment was there," Surabian says. "These areas have been mapped but very coarsely. That's one of the things we want to map more fully—our marsh areas. But what we



A basin consisting of Fort Neck soils exposed after the breach of Trustom Pond. The Fort Neck soil surface is highly fluid and almost impossible to walk on.

could do [immediately] was walk the streams and find the depth of looser, fresher sediment deposited by the storm."

Among the sediment, one thing that Surabian was looking out for was sulfidic material—soil materials that contain sulfur compounds that are oxidized to sulfuric acid when the soil is exposed to air. The materials accumulate in coastal marshes near the mouths of rivers and streams. If kept underwater, the sulfuric acid isn't released. But these materials are easily mobilized during flooding and storm events.

"If it comes up, most of the time it smells like rotten eggs, and you'll know it's there," Surabian explains. "When the sulfides do oxidize, oxygen in the water is consumed, and metals and ions are released into the water. It causes habitat degradation and kills plants and animals."

With the many problems that sulfidic materials can cause, it's important that soil scientists know where they are, especially in areas prone to storms. These materials are now tested for and identified as part of subaqueous soil mapping. Identification of materials such as these is another reason that the coastal zone soil survey can help with planning projects along the coast and recovery efforts after storms.

Ongoing Mapping and Outreach

Hurricane Sandy and other storms have provided soil scientists with rare glimpses into coastal soils as well as reasons to better understand them. And soil



An area of Napatree (extremely bouldery) soils exposed following the breach of Trustom Pond. Dark lines on the rocks indicate the water level before the breach.



Joe Kavan (right), a Connecticut NRCS civil engineer, takes a survey reading and Greg Andersen, an NRCS Earth Team volunteer, measures the depth of fresh sediment from Hurricane Sandy in Milford, CT.

scientists have made great strides in coastal zone soil survey mapping in the last decade. As of this year, all of the dunes, marshes, and beaches in Rhode Island have been re-mapped and interpreted. Turenne hopes to finish mapping the small coastal ponds this year also.

In addition to the mapping, outreach has been an important part of the coastal zone soil survey project. With the large amount of data now available, Turenne and his colleagues want to make sure that people are aware of and are using the information. The data are available via the SoilWeb app, making them extremely easy to access and use. (The app, developed in partnership between University of California–Davis California and NRCS, is available for [iPhone](#) and [Android](#) devices.)

“We’re trying to spread the word that the coastal community can now use a tool that they weren’t familiar with using before,” Turenne says. “With smartphones, you can just be sitting on your boat or the beach, hit the SoilWeb app, and you’ll get the information you want.” Adds Surabian, “Anyone from a town planner to a shellfish management planner can use the data.”

Turenne is often asked about the dynamic nature of coastal areas and what that means for mapping. But he says that the coasts are actually more stable than some might think. Mike Bradley, at the University of Rhode Island, did a study in which he looked at bathymetry—a type of underwater topographical map. Using data from a coastal lagoon, he compared bathymetry from the 1960s to new bathymetry that was collected as part of a subaqueous soil survey. He found few differences. Maggie Payne, with the Rhode Island NRCS, also found few changes in a similar study of Little Narragansett Bay.

“The studies basically show that there’s really not that much change that occurs. If you think of the life of a soil survey being 20 to 30 years or so, there’s little change that occurs in that time,” Turenne explains.

To address the few changes that they might find, Turenne and his colleagues are making yearly updates to the data in Rhode Island. If they see that something has changed, if a storm comes along that shifts things around, or if another pond is mapped, they add that information into the yearly updates of survey data. These additions will keep the coastal maps and information reliable.

While much progress has been made in Rhode Island and other select places in the northeast, the efforts need to continue. Turenne recently gave a presentation about mapping coastal soils at the National Cooperative Soil Survey Conference in Maryland. He pulled up the SoilWeb app and looked at coastal areas that were hit by Nemo, a storm that came through after Hurricane Sandy. He found very little information.

“For the Plum Island area in Massachusetts hit hard by Nemo and other storms, there was basically no data and no interpretations,” he explains. “There was nothing to say you may not want to put a house in this area because it’s going to be washed into the sea during the next storm. This troubles me. There is no data telling people to stay away from these areas.”

But through the many efforts of soil scientists like Turenne and Surabian, the knowledge to map and understand coastal soils across the country – and even around the world – is now available. “There needs to be a push to map these areas,” says Turenne. “We have the capabilities and the right protocols and procedures to map coastal areas quite effectively and efficiently.”

This story originally appeared in the [May-June](#) issue of [Soil Horizons](#).

SVP: Lions, and tiger, and bears (and fossas, and badgers, and hyaenas and lots of other carnivorans) OH MY!

Tony Friscia
SVP Member

Let’s talk about something near and dear to my heart – carnivores - specifically, mammalian carnivores. These guys are my main field of study, and a new paper in the *Journal of Vertebrate Paleontology* has given me an opportunity to talk about them.

First, a point of clarification. “Carnivore” is an ecological classification, that is, those animals (and a few plants) that eat meat. “Carnivoran” is a taxonomic classification, meaning members of the mammalian order Carnivora. The latter includes most of the things you probably think of mammalian ‘carnivores’ - lions, wolves, bears, badgers, weasels, etc. It also includes many things that are not carnivorous, i.e., non-carnivorous carnivorans, like raccoons, pandas, and that most recent addition to the carnivoran order, the olinguito. There are also many carnivorous mammals that are not are not carnivorans - grasshopper mice eat a lot of insects and meat, so do some primates, like tarsiers and even chimps.

Within the order Carnivora there are two main groups - the cat-like forms, or ‘feliforms’, and the dog-like ones, or ‘caniforms’. All modern carnivorans fit into one of these two groups. The feliform families include cats (big and small), hyaenas (which surprises many people, who tend to think they’re closer to dogs), and a few groups of lesser-known small carnivorans, which include civets, mongooses, meerkats (who might or might not live in manors), and the endemic carnivorans of Madagascar



Some of my favorite carnivorans - (top) *Cryptoprocta ferox* the fossa (bottom) the olinguito (*Bassaricyon neblina*)

(including my favorite carnivore of all time, the fossa). Caniform families include dogs, wolves, and foxes (canids), bears, the aquatic carnivores (seals, sea lions, and walruses), the red panda (in its own family), skunks, and the mustelids - a particularly diverse family that includes weasels, badgers, wolverines, martens, and otters.

Carnivorans as a whole are a particularly diverse group today, which makes them a model for studying evolutionary diversification. Their dietary range includes animals that only eat meat, like big cats (called ‘hyper-carnivores’), insectivorous forms (including many small carnivores), omnivorous ones who eat a range of food, like coyotes, and a number of very specialized taxa, like otters who eat shellfish and pandas who eat leaves. They get around in a wide range of ways too. There are generalized animals that move around on the ground, like raccoons; tree-living animals, including martens; runners like wolves or cheetahs; semi-aquatic groups like otters, and the fully aquatic pinnipeds (seals and their relatives).



The smallest (the least weasel, *Mustela nivalis*) and largest (elephant seal, *Mirounga sp.*) species in the order Carnivora.

They have the widest range of sizes of any mammalian family, from the tiny least weasel that weighs just 10's of grams (just a few ounces) to the gigantic elephant seals, which can weigh 1000's of kilograms (up to 8500 lbs).

Carnivorans weren't always so diverse in the past. The earliest carnivorans were relatively small, under 10kg (~20lbs.), and probably had omnivorous to carnivorous diets. This is what makes modern small carnivorans interesting to me - they are probably a good model for the earliest forms. Unfortunately, many of these small extant taxa aren't particularly well-known. They are often cryptic, and being small, they don't generate the excitement of the largest carnivorans, like lions, and tigers and bears (oh my!). This is a shame to me, as most modern carnivorans are small, but the big ones get all the press.

The oldest carnivoran taxa date to the beginning of a time period called the Eocene, around 55 million years

ago. A recent paper in the Journal of Vertebrate Paleontology by Floréal Solé and his colleagues described specimens of one of the earliest carnivoran species. The specimens come from Dormaal in Belgium, a site already known for yielding fossils from this interesting time. Many of the fossils there are fragmentary, but the new specimens include over 250 dental specimens, as well as a few ankle bones.

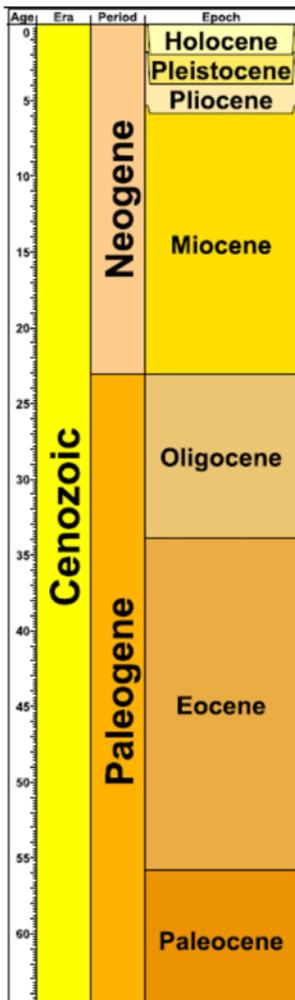


The species, *Dormaalocyon latouri*, described in a new article in JVP.

The new specimens are interesting for a number of reasons. The ankle bones suggest that the animal was small and arboreal, that is, it climbed around in trees. It had been previously suggested that a large forest ran from modern-day Europe to North America. At the time, the two continents were linked via a land-bridge that spanned the North Atlantic. This wouldn't have been the kind of forest we would expect there now, with conifer trees and cold winters. The climate at the time was much hotter, actually the hottest it's been since the disappearance of the dinosaurs 65 million years ago. The new finds are from a time right after an event known as the Paleocene-Eocene Thermal Maximum (PETM). In and around this time, subtropical forests ranged far into northern latitudes. There are fossils of primates far into Canada, even as far north as Ellesmere Island. In addition, this subtropical forest would have extended across the north Atlantic land-bridge, allowing these early carnivorans to find their way between the continents.

Another interesting aspect is that the fossils are very old, right near the beginning of the Eocene. No higher carnivorans are known from before this time, an era known as the Paleocene, but this find implies there must be some out there. The new fossils are primitive, but certainly not the most primitive. The question then becomes, where are these earlier representatives? The answer, as is often the case, is probably Asia. There are early representatives of the group in both Europe and North America, and some of these show intriguing connections to early carnivorans known from China. Much of the fossil wealth of China is only beginning to be uncovered, and there's a lot of land there to uncover, so perhaps the search for the earliest carnivorans will turn there next.

Originally printed on the SVP "Old Bones" blog: [http://vertpaleo.org/The-Society/blog-oldbones/Old-Bones-Blog/January-2014/Lions,-and-tiger,-and-bears-\(and-fossas,-and-badger\).aspx](http://vertpaleo.org/The-Society/blog-oldbones/Old-Bones-Blog/January-2014/Lions,-and-tiger,-and-bears-(and-fossas,-and-badger).aspx). All images courtesy of Wikimedia Commons.



GSA Expands The Geological Society of America Bulletin Archive

The Geological Society of America has completed digitizing another 23 years of The Geological Society of America Bulletin. Published between 1922 and 1944, this content includes many well-known authors and subjects, including Joseph Pardee and J. Harlen Bretz's work on the Channeled Scablands and papers by Beno Gutenberg, Charles Francis Richter, Ian Campbell, Arthur L. Day, and Kirk Bryan.

The cover-to-cover scanning included hundreds of large foldouts, all of which have been made available to GSA Bulletin and GeoScienceWorld subscribers. Non-subscribers can access the content via pay per view or GSA's Bloc of Docs service, where access costs as little as \$4 per paper. The maps from the content will also be indexed in Geofacets.

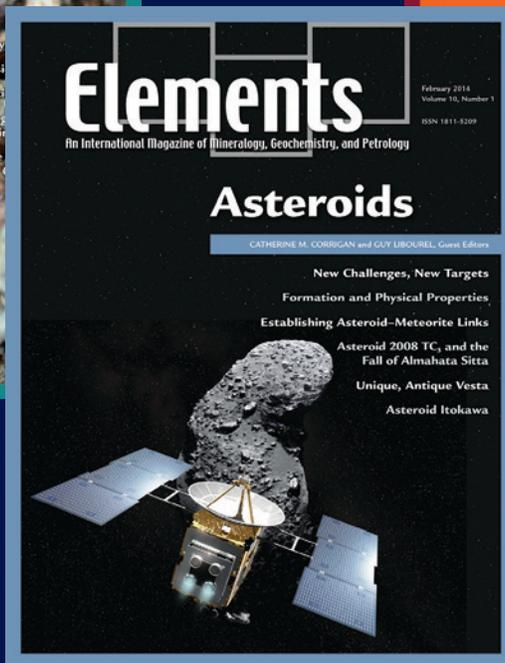
The Society plans to digitize the remaining archive, 1890–1922, this fall. The Society's complete e-book archives, dating back to 1934, were digitized and made available last year.

www.geosociety.org

Journal of Geoscience Education: NAGT announces the May 2014 issue

The Journal of Geoscience Education (JGE) is the premier peer-reviewed publication for geoscience education research and curriculum and instruction at the undergraduate and pre-college levels. JGE is the publication of record for NAGT, and serves as the only international forum for the publication of research concerning the pedagogy, assessment, and philosophy of teaching and learning about the geosciences. JGE is published four times per year in February, May, August and November. Each issue contains editorials, commentaries, papers on curriculum & instruction, and papers on research.

The Journal accepts submissions through an online submission system: <http://jge.allentrack.net>



PRINCIPAL EDITORS

John W. Valley
Patricia M. Dove
Gordon E. Brown Jr.

AN INTERNATIONAL MAGAZINE

To keep abreast of the latest developments in mineralogy, geochemistry, and petrology

Published by 17 mineralogical and geochemical societies

CELEBRATING 10 YEARS OF PUBLISHING!

To receive *Elements*

INDIVIDUALS

Become a member of any of the participating societies:
www.elementsmagazine.org/societies.htm



INSTITUTIONS

Contact your book agent or the managing editor at
pierrette_tremblay@ete.inrs.ca

GeoSpectrum Summer 2014

THEMATIC TOPICS IN 2014

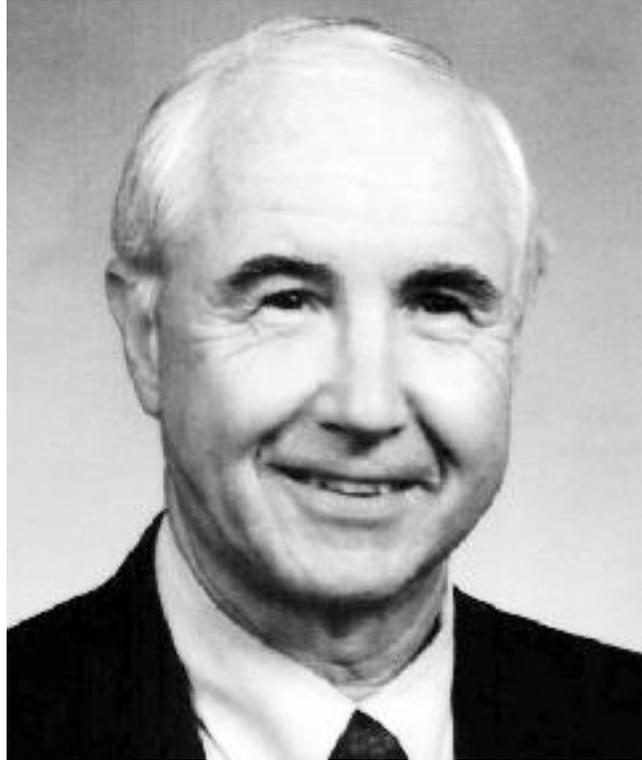
- FEBRUARY – ASTEROIDS
Guest Editors: Catherine Corrigan and Guy Libourel
- APRIL – OPHIOLITES
Yildirim Dilek and Harald Furnes
- JUNE – KAOLIN: FROM ANCIENT PORCELAINS TO NANOCOMPOSITES
Paul A. Schroeder and David L. Bish
- AUGUST – UNCONVENTIONAL HYDROCARBONS
David R. Cole and Michael Arthur
- OCTOBER – COSMOGENIC NUCLIDES
Friedhelm von Blanckenburg and Jane Willenbrig
- DECEMBER – GRAPHITIC CARBONS
Olivier Beyssac and Douglas Rumble III

2012
impact
factor
3.156

To order individual articles or assemble articles for a course pack: www.minpubs.org

To order back issues: www.elementsmagazine.net

Elements is available online at
www.elementsmagazine.org
and www.elementsgeoscienceworld.org
Follow us on Facebook at www.facebook.com/elementsmagazine



Remembering Don Haney

It is with great sadness that the American Geosciences Institute announces the passing of Donald Clay Haney; AGI Past President (1993) and the recipient of the Medal in Memory of Ian Campbell for Superlative Service to the Geosciences (1992).

Among Haney's many accomplishments within the geosciences was serving as a Kentucky State Geologist, and overseeing the Kentucky Geological Survey for 21 years (from 1978-1999). In Haney's remembrance in the Richmond Register, his career with the Kentucky Geological Survey was summarized as, "marked by great progress in coal assessments, groundwater research, mine subsidence programs, earthquake monitoring and the construction of computer databases to serve the public."

Notably, he was one of the principal authors of the National Geologic Mapping Act passed by the 102nd Congress in 1992. The purpose of the National Geologic Mapping Act, as stated on www.usgs.gov was to, "expedite the production of a geologic-map data base for the Nation, to be located within the United States Geological Survey, which can be applied to land-use management, assessment, and utilization, conservation of natural resources, groundwater management, and environmental protection."

He was recognized for his ability to undertake many careers in geosciences, but also completing them exceptionally. In addition to serving as AGI's President, he also held the presidency of AGI member organization the Association of American State Geologists in 1989.

In the official citation for the Ian Campbell Award, Robert D. Hatcher Jr. said, "Don is well known as a man of integrity and as someone who speaks his mind," remarking that he was an outstanding geologist, educator, administrator and public servant.

His memorial service was held on Friday, June 13th, 2014 in Richmond, Kentucky and was officiated by Gene Strange and Bruce Nettleton and included speakers Tom Badgett, Jim Barnes and Jim Cobb. He is survived by his wife of 59 years, Shirley and daughter Holly. Haney is predeceased by his son Greg.

Condolences may be expressed at www.orpfh.com.

WE WANT TO SEE GEOSCIENTISTS IN ACTION!

Do you have any photos showing off your meaningful geoscience work?

Submit to: The 2014 'LIFE IN THE FIELD' Contest

- Field camp or field trips
- Life as an intern
- Indoor or outdoor Geoscience research
- Why do you love the field?



Deadline: July 25, 2014 - Submit digital materials to workforce1@agiweb.org

Entry submission form, contest rules, and awarded prizes can be found at <http://www.americangeosciences.org/workforce/life-field-photo-contest>

By submitting a photo, the entrant gives AGI, AGU, AIPG, and GSA permission to use this material in future printed and digital publications.



New Report Details More Geoscience Job Opportunities than Students

In the American Geosciences Institute's newest Status of the Geoscience Workforce Report, released May 2014, jobs requiring training in the geosciences continue to be lucrative and in-demand. Even with increased enrollment and graduation from geoscience programs, the data still project a shortage of around 135,000 geoscientists needed in the workforce by the end of the decade.

"Industry has recognized, and is mitigating the upcoming shortage of skilled geoscientists in their employ, but the federal geoscience workforce is still demonstrably shrinking" report author Carolyn Wilson said, noting that the federal geoscience workforce decreased in all sectors except meteorology; this includes geoscientists skilled in the energy, mining/minerals and hydrology fields. Combined with continued unevenness in the workforce readiness of many geoscience graduates and a regionally hot job market, the geosciences are a dynamic component of the U.S. economy.

Employers have appreciably skilled geoscientists to choose from too. Numbers of graduating geoscience majors who started their degrees at a two-year colleges have increased, as have the number of students participating in a field camp experiences—an important facet of a geoscience degree, where students get experience interpreting the landforms critical to

determining where energy or water resources exist, as well as interpreting locations susceptible to hazards like flooding or landslides. Most students graduating from a geoscience degree program have taken math courses up to a calculus-II level, but there is still concern from employers over whether these students are graduating with enough quantitative experience to be completely apt for a career in the geosciences.

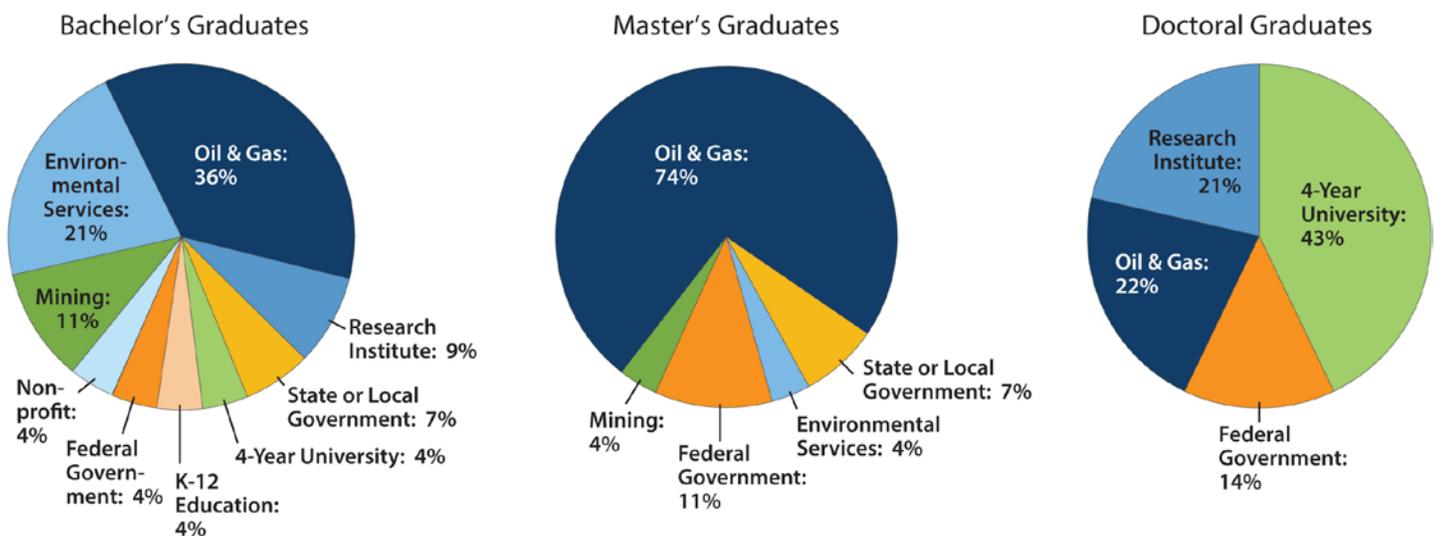
Employers underscore the necessity of having enough skilled grads to meet vacancies that will exist in the geoscience sector in the upcoming decades.

"It's important that working knowledge is passed down because losing the institutional knowledge could have negative impacts for the overall productivity of these companies," Wilson said.

"Most importantly there is incredible potential for institutions to recruit from the diverse talent pools arising at two year institutions, and many career opportunities available to students enrolled in geoscience programs, and early-career geoscientists entering the workforce," Wilson said. "Plus, this is the first time we have seen a major shift in employment patterns in over a generation, with increasing number of bachelor recipients securing geoscience positions, and newly minted Master's finding themselves in high demand."

The report is available for download from the following link: <http://bit.ly/GeoWorkforce>

Industries Hiring Geoscience Graduates



SEG survey on dual-career couples and women: Implications for the future of our Society

**EVE SPRUNT, consultant
NANCY HOUSE, Exco Resources**

MARIA ANGELA CAPELLO, Kuwait Oil Company

The SEG membership has approximately doubled since 2000 to more than 33,000. As many older people have left the workforce and have been replaced by younger employees in the petroleum industry's "big crew change," SEG's Women's Network Committee (WNC) wanted to understand how the membership of SEG has changed and the implications for the future of our Society. To better understand some of the important differences between the older and the emerging workforces, the WNC conducted a survey.

Statistics are not available to quantify the gender makeup of SEG because until recently, membership applications did not ask about gender. Of those who provided age and gender, 39% of the responses from members under 40 came from women, but only 18% of the responses from members over 40 were from women. If the survey results are representative, over the next couple of decades, the SEG membership is on trend to become about 40% female. SEG was wise to establish the WNC to help prepare the Society to thrive as the Society transitions closer to gender parity.

Survey demographics

The SEG staff edited, coded, and distributed the survey to the membership in May 2013 via e-mail. The survey received almost 1600 responses. Figure 1 shows the demographics of those responding to the survey who provided age and gender. The peak in male members is consistent with the large number of people hired by the petroleum industry during the oil boom of the mid-1970s through early 1980s. Between ages 45 and 65, only 19% of those responding are female. In contrast, between ages 20 and 45, 39% of the people responding are female. If this survey is representative and the trend continues, SEG membership will transition from being predominantly male to having a more even gender balance.

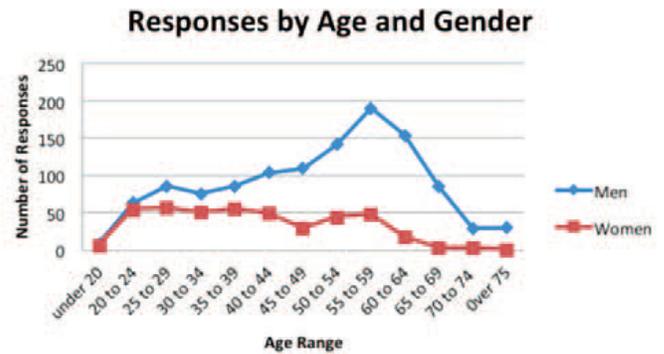


Figure 1. Age and gender distribution of those responding to the survey.

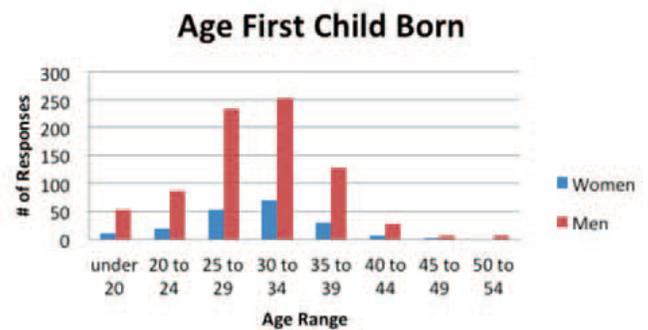


Figure 2. Age when men and women have their first child.

Children and other relatives

Of those members who responded to the survey, 72% of men and 47% of women have children. Twenty percent of the men and 39% of the women have dependent children living with them. More than half of those with children had their first child after 30 (Figure 2). This survey's findings on maternal age at birth of the first child are consistent with larger demographic trends. The average age at first birth has risen to 26.9 in developed nations. In the United States, the biggest factor in the increased average age of first-time mothers is the large increase in women giving birth for the first time at 35 or older (Mathews and Hamilton, 2009).

A higher percentage of people under 40 compared to older people report delaying having children for the sake of their career. Younger women are somewhat more likely than older women to report postponing having a child for the sake of their career. Forty-three percent of women under 40 report postponing having a child and 37% of those over 40 gave the same response. Many more men under 40 than older men are postponing

parenthood. Only 15% of the men over 40 report having postponed parenthood, while 35% of those under 40 indicate having postponed parenthood. This may indicate that younger men anticipate being more engaged in child rearing than older men.

Overall, 55% of men took no paternity leave for their last child, and another 26% took less than two weeks (Figure 3). Of the men over 40 who responded on whether or not they took any paternity leave, 63% of those over 40 said they took none, whereas only 48% of those under 40 took none. This is consistent with the trend for younger men to be more engaged with child rearing.



Figure 3. Duration of parental leave for last child by gender.

Although 91% of women took less than a year of maternity leave, there is a nearly equal distribution of 75% of women taking leaves between five weeks and a year (Figure 3). Only 9% of women took a leave of absence longer than a year for their last child.

Care for other family members besides children is often assumed to be more likely to fall on women than on men, but the survey results indicated otherwise. Overall, 6% of women and men reported having limited ability to relocate because they are caring for relatives other than their partner or children. Another 12% of women and 16% of men are caring for someone other than a parent or child but responded that it does not limit their ability to relocate.

Work-life balance

The survey also asked if people had changed employers for better work-life balance. Because we did not

ask how many times a person changed employers for this reason, one might assume that a greater percentage of older people, having worked for a longer time, would for any reason, including work-life balance, have changed employers more often than younger employers. However, when the responses were sorted by age and gender, 21% of all men under 40 and 21% of men over 40 reported changing employers for this reason. Women over 40 were much more likely to have changed employers for better work-life balance, with 37% having done so, but only 24% of younger women.

Members of dual-career couples were most likely to have changed employers for better work-life balance. Forty-two percent of all dual-career couple women and 37% of dual career couple men have changed jobs for work-life balance.

This article addresses just some of the key findings of the WNC survey. Another article in an upcoming issue of TLE [SEG Publication, The Leading Edge] will cover the differences identified in the survey between the growing dual-career workforce, which is a consequence of the increasing number of female technical professionals, and the older workforce, which largely consisted of men who were their family's primary breadwinner. In particular, the subsequent article will look at how priorities differ as a function of how much the person contributes to the overall household income.

Conclusions

This survey provided valuable insights into the changing workforce and shifts in workforce attitudes and priorities. Understanding these changes is critical to attracting and retaining members and employees. SEG should evaluate ways to better serve female members because women are on track to constitute about 40% of the total membership under 65 within about 15 years.

In considering employers, women are coached to evaluate the corporate culture and to check for the presence of successful female role models. What will women conclude about participation in SEG if they look at the number of women who have served as SEG presidents and won major SEG awards? How does SEG's track record compare to those of sister societies? Care for children and other relatives in need is no longer primarily the responsibility of women. The survey showed that men

are increasingly taking on a growing share of the commitment. Now is the time for SEG to consider ways to better serve its membership by offering not only “spouse” programs in conjunction with the annual meeting and other conferences but also activities and day care for children to facilitate women’s participation. This could include evening care for children so that parents can participate in important dinners and networking events.

The significant percentage of people who are changing employers to achieve better work-life balance should be a warning to employers. Attrition of midcareer women is a problem for many employers (e.g., the article at <http://www.mining.com/new-hr-study-on-mineral-exploration-revealsmid-career-attrition-by-women-is-a-key-challenge/>). Our survey did not attempt to quantify the fraction of young people who are dissuaded from careers in geophysics because of concerns about unacceptable work-life balance. To attract high-quality new talent, a career in geophysics must be attractive relative to the alternatives. What role should SEG play in identifying critical reasons for attrition? Is our Society prepared to serve our changing membership? Is SEG ready or on the right track to transform itself to better serve our female geophysicists and dual-career couples?

Reference

Mathews, T. J., and B. E. Hamilton, 2009, *Delayed childbearing: More women are having their first child later in life: NCHS data brief, no. 21*, National Center for Health Statistics.

Acknowledgments: The authors have served as chairpersons of the Women’s Network Committee. This article was prepared in collaboration with members of the WNC and represents a committee report, not a position statement of the companies where the authors work. The committee welcomes men and women who are interested in enhancing the participation and empowerment of women.

Corresponding author: evesprunt@aol.com

Permalink: <http://dx.doi.org/10.1190/tle33040460.1>

How Will You Separate Yourself from a Large Applicant Pool (“The Pack”) for a Particular Job?

Gail G. Gibson, Ph.D., CPG-09993

As you proceed through your college academic career, looking forward toward a long, prosperous, and hopefully fulfilling work career, are you doing all that you can to separate yourself, in the eyes of recruiters, from other applicants in large applicant pools? Are you going to be among the many looking through the glass door, like these catfish (Fig. 1), waiting to be fed (recognized)? Or will you have prepared yourself to be out in front of the pack like this walking catfish (Fig. 2)?

I raise this question to all of my students on the first day of class.

Getting Out in Front Academically?

As a college student, one can earn a degree by successfully completing the minimum semester hours of credit required, and taking the “easy courses.” This path means taking and passing 15 or

16 credit hours per semester. However, to begin to separate yourself academically from the pack, your transcripts should regularly show 18 to 20 semester hours for most semesters, hours of “meaty,” discipline-specific coursework, obviously earning good grades. That extra coursework [the walking catfish] preparation on your transcript quickly catches the eye of potential interviewers. Fluency in a second language is also a plus; a language minor is often helpful.

Secondly, as a student, avail yourself of student membership opportunities in professional organizations. Attend organization meetings, regional and national. Yes, there are reduced student membership fees, and there is often funding available to help defray one’s expenses to these meetings. Participate in committees, should the opportunity present itself. This is an excellent way to meet professionals in your field, and “become known” prior to job-hunting.

Thirdly, consistently read the journals in your discipline. Obviously, one does not read every word of every article, but read the abstracts and conclusions. Pay close attention to diagrams and pictures, as well as writing styles and vocabulary. Yes, corporations expect

new hires to be able to communicate via well-written and technically correct reports, memoranda, etc. Yes, there are many journals, so select something different each month, spreading your reading through the various publications. This effort will help you build a more extensive knowledge base, beyond that gained in the classroom. Experience has shown that this effort helps one “zero in” on some particular aspect of a discipline as an area of academic concentration.

Lastly: As a college student, your classes are your #1 job. This is your opportunity to practice those skills and utilize discipline-specific knowledge required in the workplace. Many students think that college is “different” from the workplace. It is not. One of the many hats that a college instructor wears is that of a supervisor [perhaps a good one, perhaps not]. Again, on the first day of class, I require my students to actively work together to create a list of employer expectations of employees in the workplace. That list normally includes: punctuality and being prepared to begin work; appearance, demeanor, and behavior appropriate to the workplace; all assignments submitted by or prior to deadlines; demonstrated ability to work cooperatively, constructively, and congenially with others in the company on a day-to-day basis, as well as on “crash” projects; flexibility relative to workplace locations and schedules; the demonstrated ability to work with and without supervision; honesty, usually equated to unauthorized use or misuse of company equipment or materials, falsifying time records, per diem records, plagiarism, and failure to “give credit where credit is due.” Do not tell the instructor that you don’t want to work with peers on a group project. A collaborative project is an integral part of nearly every online course, and a negative student response is something I hear from every online class, often for the reason that “..I cannot work on the schedule provided...” or some variation. Can you imagine saying that to a supervisor in the workplace? Also, what do you think the probable response would be from that supervisor? At best a private admonishment from the supervisor, or dismissal at the end of a probationary period.

I tell my students that when they have completed a class assignment, critically review the work before submitting it, answering the following two questions. (1) Would I submit this material to my supervisor as part of

an annual performance review or potential promotion package? (2) As a supervisor, would I accept this material for distribution representing my company? If the answer to either of these two questions is no, or maybe, redo the assignments. A corporation cannot afford to be known for shoddy work. A number of important workplace expectations that usually do not make the student generated lists include: initiative; imagination; willingness to initiate a continuing professional development program (CPD); and service to the company and community. Why? Because as students we are “given” assignments, so we wait for them. Class assignments often do not require imagination or initiative. Initiating a journal reading program as noted above is the beginning of CPD. Service? As a college student some examples for potential service include: serving as a tutor in learning centers; judging local science fairs; or providing merit badge advice to scout groups. Yes, these activities become part of your resume, and your practice for that future job.

Just What is an “Alternative Career”?

Adrienne Sponberg
ASLO Public Affairs Director



I had the pleasure of serving as a mentor at the Eco-DAS (Ecological Dissertations in the Aquatic Sciences) symposium for new aquatic science Ph.D.’s in October. The presentations and diversity of interests of the group were inspiring, not just for the science content but for the people themselves. Something that struck me was that many of them were openly admitting they were interested in a career path outside of the traditional tenured-professor-at-a-research-institution path.

A little over a decade ago, when I was a graduate student, that was not something you talked about openly lest your advisor find out and write you off (disclaimer:

I should note here that this was not the case with my own advisor, David Lodge, who was always supportive of (if not a bit puzzled by) my insistence that I was going to work in science policy). While things are a bit better in terms of the community accepting that there are multiple career paths for a Ph.D. in aquatic science, conversations with early career scientists suggest there's still a bit of a stigma that someone who does something else "couldn't hack it" or wasn't competitive enough to land the coveted tenure-track research position.

I tried to address these concerns both in private conversations and during the "alternative" career panel. The use of the term "alternative career" in the panel title sparked some discussion itself. The term was used in the context of the speakers addressing the full range of career alternatives and options available to Ph.D.'s. I have always taken the term "alternative" to imply an "alternative" to what your advisor is doing. Since most Ph.D. advisors are typically in the tenured-professor-at-a-research-institution role, though, the term has come to carry a bit of connotation along the lines of "alternative to what you are supposed to do with a Ph.D in aquatic science." This may not be the case in fields such as biotechnology where there are more career alternatives. Looking at the statistics for ASLO members, however, academic institutions are the predominant employing institution (~75%). It's easy to see how this term has acquired this connotation, but as I elaborate on below, I think our community needs to rethink how we talk and feel about career paths outside of the tenured-professor-at-a-research-institution path that the vast majority of Ph.D. advisors have taken.

Science Needs to be More Like Football

There's a headline you thought you'd never read! As an Alabama native, the daughter of a Notre Dame alum, and a Notre Dame alum myself (Go Irish!), I'm well acquainted with the football enterprise. Some of you may be less familiar with the sport and some may be puzzled by Americans' fascination with it. Love it or hate it, I think the science community could learn a lot from it.

For the purposes of this column, I want to focus on the fact that football is a team sport. Yes, the flashy stars tend to get the most recognition from the public, but most football fans know that the players in less familiar roles

(e.g., the offensive line) make it possible for the "stars" to put up big numbers on the field. It's not just the players on the field, though, that contribute to the team. There are the coaches who call the plays and the scouts who assemble a team that will work together and play off each other's strengths. There are also people not on the team such as referees and replay officials who, for better or for worse, can decide the entire outcome of a game regardless of how well a player and team performed.

Research is also a team sport. There are numerous people involved in the research enterprise: program managers, policymakers who decide how much money to put into funding agencies, university research offices, editors of science journals, lab technicians, the crew of the UNOLS fleet, field station and marine lab directors ...it's a long list and you can start to identify the coaches, scouts, referees, and other 'players' once you start thinking about research as a team sport.

It Takes a Village

All of this relates back to the original topic of "alternative careers." Our science will not flourish without well-trained, motivated, and supported people in these "alternative careers." Professors at primarily undergraduate institutions train the next generation of graduate students. Science policy wonks advocate for funding to keep research going. Science editors ensure that our field is publishing high quality and credible papers. Science writers and outreach directors inform the public about the latest research in our field. Facility directors make sure the infrastructure (labs, equipment, support staff) exists for research to take place at institutions across the globe.

Given the number of graduate students most advisors advise over their lifetime, the numbers are pretty clear that not every graduate student will follow the same path as their advisor. As we joked on the "alternative career" panel: "We are the 99%!" It behooves all of us to have motivated, well-trained, and talented people who understand our field in each of those positions. Early career scientists who have aspirations to do something other than a tenure-track research position shouldn't be treated as second-class citizens. We know in nature that diversity is a good thing; we need to embrace diversity in our professional lives as well. Our divergent career

paths influence the path of science in different ways, collectively moving the field forward.

Once a Scientist, Always a Scientist

And finally, for those of you who are contemplating or starting an “alternative career,” I will repeat what I told the Eco-DAS participants: You will always be a scientist. No one is going to sneak into your office in the middle of the night, take your Ph.D. off the wall, and declare you no longer a scientist. You may no longer be “active in research” but you will always be a scientist.

Got feedback? I would love to hear from ASLO members on this topic— either what your experiences have been or your suggestions for how ASLO can better help prepare early career scientists for how ASLO can better help prepare early career scientists for a diversity of careers.

Geo Career MaPS - new opportunity from the AGI Workforce Program!

Jamie Ricci

American Geosciences Institute

I graduated from college in 2009 and upon entering the workforce I realized I had a problem. I was working as an Environmental Consultant and I became aware that much of the content knowledge I learned was not pertinent to my job. While I could identify minerals through an optical microscope or create geologic maps, my employer didn't need this. However, I was expected to know: how to determine if a site qualified as environmentally sensitive; which contaminants to sample for; and how to collect water and soil according to government regulations. The problem was: I didn't know these things. While not all of my collegiate experience was irrelevant, I do wonder how I could have been better prepared.

AGI Workforce Development researchers are looking into just that by working with the Association of American Geographers (AAG) on an NSF-funded project (grant #1202707) called Geoscience Career Master's Preparation Survey (Geo Career MaPS). There are three groups of people who are being surveyed. The first group consists of current Master's students, the second are alumni from Master's programs, and the third are faculty from

geology and geography departments where the highest degree offered is a Master's.

Based on the online surveys from master's students and alumni, the AGI Workforce Program will compare what students say they have learned in their graduate studies to what alumni say are most important in their field of employment. We hope to identify any knowledge gaps that exist between the two cohorts. We will also compare what faculty say has been taught to what students say they've learned to determine if faculty are already trying to communicate a certain skill, but students just simply aren't getting it.

The workforce program will then develop online materials that address any identified needs. These resources will be free and open. By utilizing these, students will be able to identify what skills and competencies are relevant to their desired fields of employment and advisors can point students to resources that will bolster important expertise. Faculty members can look into alternative ways to teach a crucial skill and departments can evaluate how they can better serve their students to improve their employability.

To create exemplary resources, we need participation in our surveys. If you're interested, or know someone who might be, please contact the Principal Investigator, Heather Houlton, at hrh@agiweb.org or researcher, Jamie Ricci at workforce2@agiweb.org. We will be happy to send you the appropriate survey link. We look forward to hearing from you!

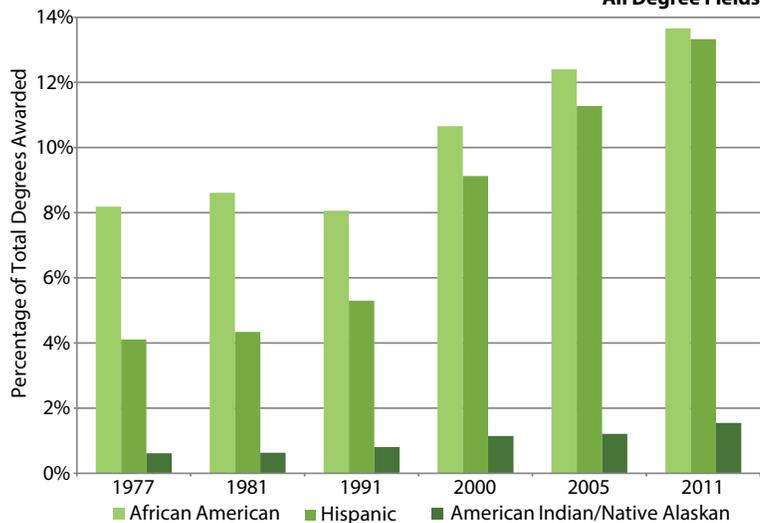
Underrepresented Minority Participation in the Geosciences at the Two-Year College Level

According to the U.S. Department of Education, in 2011, enrollments at two-year colleges were 16% African American, 19% Hispanic, and 2% Native American/Native Alaskan, whereas enrollments at four-year institutions were 14% African American, 10% Hispanic, and 1% Native American/Native Alaskan. While total enrollments are higher at four-year institutions compared to two-year colleges, many underrepresented minorities start their post-secondary education at two-year colleges.

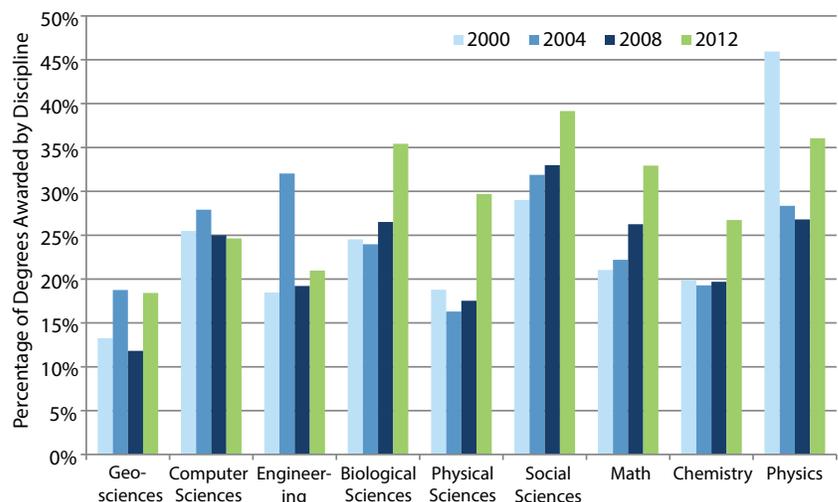
The percentage of associate's degrees awarded to underrepresented minorities has continued to increase to nearly 30% in 2011. According to the National Science Foundation, in 2012 between 18% to 36% of associate's degrees in science fields were awarded to underrepresented minorities. However, associate's degrees in the geosciences have consistently been the lowest percentage of underrepresented minorities of all science disciplines, except for the physical sciences in 2004.

Two-year colleges provide a steadily increasing pool of minority students that are showing interest in the sciences. Over 400 of these schools have a geoscience program or course available for students. Prior research has shown the importance of intro classes in the geosciences for recruitment. To increase minority participation in the geosciences, more focus should be placed on these two-year college programs, whether that means graduating more of these students with geoscience associate's degrees or encouraging them to transfer to a four-year institution for a geoscience degree.

Percentage of Awarded Associate's Degrees to Underrepresented Minorities, All Degree Fields



Percentage of Associate's Degrees Awarded to Underrepresented Minorities by Discipline



- Carolyn E. Wilson

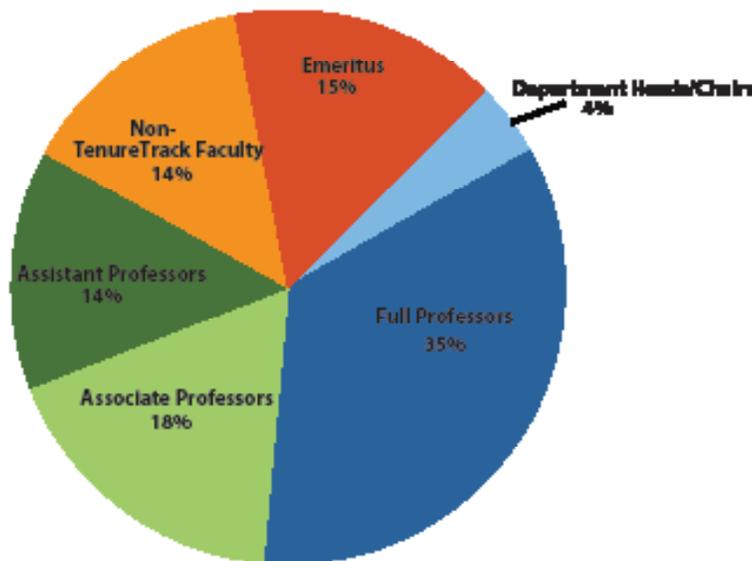
For more information and data about geoscience education and workforce trends, please check out AGI's newly released **Status of the Geoscience Workforce 2014**
<http://www.americangeosciences.org/workforce/reports>

Rankings and Top 10 Degree Granting Institutions for Four-Year University Faculty

In 2013, there were 10,265 geoscience faculty and researchers employed at U.S. four-year universities, compared to 10,213 in 2011 and 10,051 in 2008. Approximately 72% of the geoscience faculty are tenured and 14% are untenured but in tenure-track positions. The other 14% are the researcher scientists, adjunct professors, and lecturers working at four-year universities.

The Massachusetts Institute of Technology has graduated the highest number of current geoscience faculty with their highest degree. The 288 MIT graduates make up approximately 3% of the tenured or tenure-track faculty in geoscience departments.

Percentage of Geoscience Faculty by Rank
in Four-Year Institutions



Top Ten Degree Granting Institutions of U.S. Geoscience
Tenure-Track or Tenured Faculty

School where Faculty Earned Highest Degree	Total Number of Tenure or Tenure-Track Faculty Graduates
Massachusetts Institute of Technology	288
University of California–Berkeley	228
University of Wisconsin–Madison	215
University of Washington	206
Stanford University	204
Harvard University	173
Columbia University	169
California Institute of Technology	161
Pennsylvania State University	151
University of Arizona	140

For more information and data about geoscience education and workforce trends, please check out AGI's newly released **Status of the Geoscience Workforce 2014**
<http://www.americangeosciences.org/workforce/reports>

– Carolyn E. Wilson

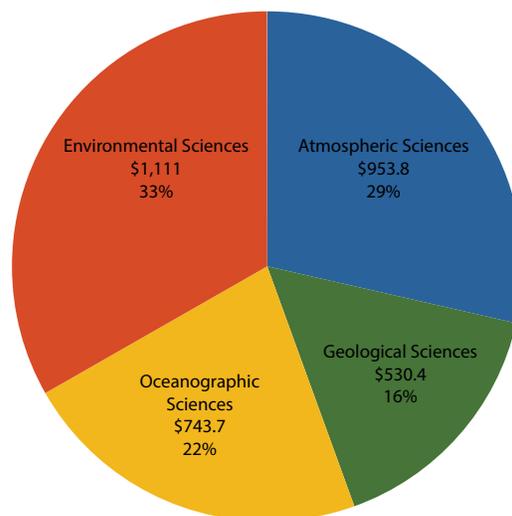
Federal Grant Funding for the Geosciences for the Different Disciplines and from Various Agencies in 2010

According to NSF's Survey of Federal Funds for Research and Development, in 2010, the federal government spent \$3.3 billion on grants for basic and applied research in geoscience. The single largest area of investment was environmental sciences.

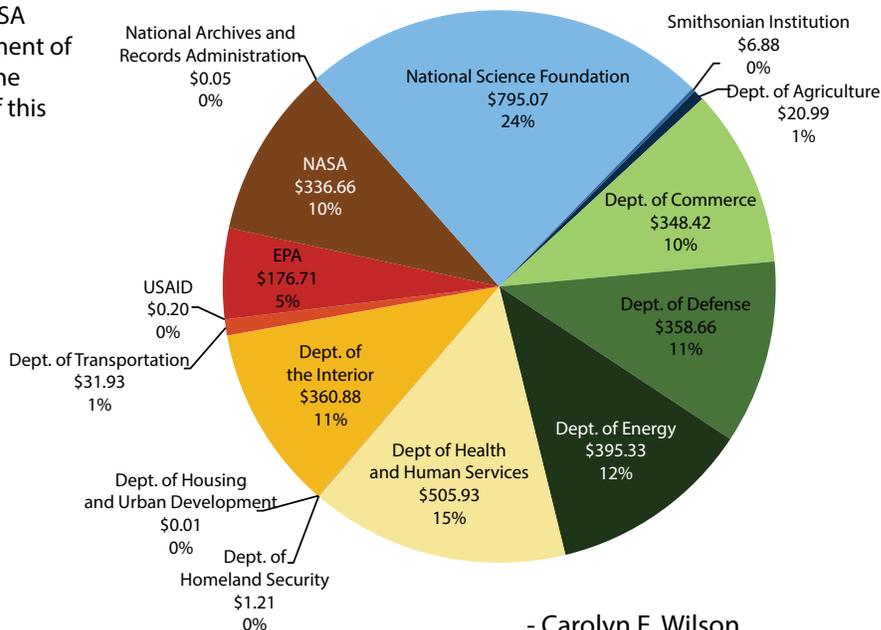
Nearly a quarter of federal grant support has been awarded to researchers through the National Science Foundation (NSF). It is somewhat surprising that 15% of grant funding spent on geoscience research came from the Department of Health and Human Services. All of the funding from Health and Human Services was for environmental sciences research, with the majority of this funding distributed from the National Institutes of Health.

The major agencies granting funding for geoscience research to universities include the Department of Agriculture, Department of Defense, Department of Energy, NASA, and NSF totalling \$1.1 billion. NSF distributed 63% of this funding; the Department of Defense distributed 15% of this funding; NASA distributed 11% of this funding; the Department of Energy distributed 9% of this funding, and the Department of Agriculture distributed 2% of this funding to universities.

Federal Grant Funding Distributed within the Geoscience Fields, 2010 (Millions \$USD)



Federal Grant Funding for the Geosciences by Agency, 2010 (Millions \$USD)



- Carolyn E. Wilson

For more information and data about geoscience education and workforce trends, please check out AGI's newly released **Status of the Geoscience Workforce 2014**
<http://www.americangeosciences.org/workforce/reports>

Earth and Planetary Books from World-Leading Experts

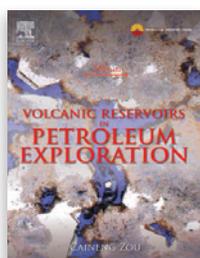
Elsevier's books are available online via ScienceDirect
and in ebook or print format on the Elsevier Store!

SAVE 25% on books and ebooks when ordering from **store.elsevier.com!**

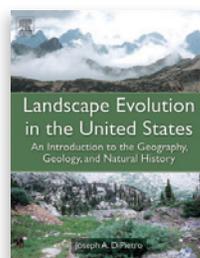
Use code: **EARTH25** Offer ends 30th September 2014



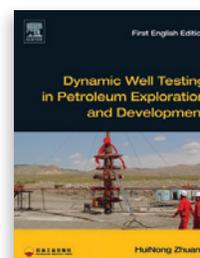
Earthquake Hazard, Risk and Disasters
ISBN 9780123948489
Edited by Max Wyss
Jun 2014 \$150.00



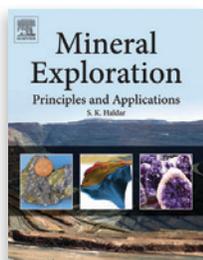
Volcanic Reservoirs in Petroleum Exploration
ISBN 9780123971630
By Caineng Zou
Mar 2013 \$149.95



Landscape Evolution in the United States
ISBN 9780123977991
By Joseph A. DiPietro
Feb 2013 \$119.95



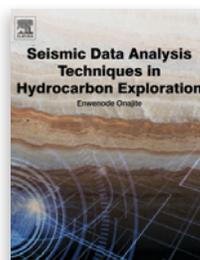
Dynamic Well Testing in Petroleum Exploration and Development
ISBN 9780123971616
By HuiNong Zhuang
Jan 2013 \$149.95



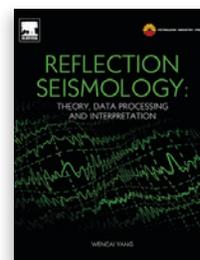
Mineral Exploration
ISBN 9780124160057
By S. K. Haldar
Jan 2013 \$129.95



Introduction to Mineralogy and Petrology
ISBN 9780124081338
By S. K. Haldar and Josip Tisljar
Nov 2013 \$109.95



Seismic Data Analysis Techniques in Hydrocarbon Exploration
ISBN 9780124200234
By Enwenode Onajite
Oct 2013 \$129.95

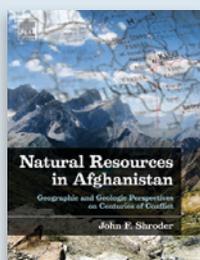


Reflection Seismology
ISBN 9780124095380
By Wencai Yang
Nov 2013 \$129.95

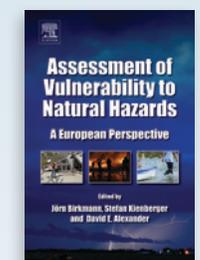
FORTHCOMING



Principles of Electromagnetic Methods in Surface Physics
ISBN 9780444538291
By A. A. Kaufman, Dmitry Alekseev, and Michael Orestaglio
Aug 2014 \$205.00



Natural Resources in Afghanistan
ISBN 9780128001356
By John F. Shroder
Aug 2014 \$200.00



Assessment of Vulnerability to Natural Hazards
ISBN 9780124105287
Edited by Jörn Birkmann, Stefan Kienberger, and David E. Alexander
Aug 2014 \$139.95



Sea & Ocean Hazards, Risks and Disasters
ISBN 9780123964830
Edited by Jean T. Ellis and Douglas J. Sherman
Sep 2014 \$150.00

ELSEVIER ScienceDirect

Visit store.elsevier.com for more information, or info.sciverse.com/books to find out how to access titles via ScienceDirect!

Edward Robeck, Ph.D., joins AGI as Director of Education and Outreach

The American Geosciences Institute (AGI) gladly welcomes Edward Robeck as its new Director of Education and Outreach. Dr. Robeck joins AGI from Salisbury University, on the Eastern Shore of Maryland. He has extensive background in science instruction, teacher professional development, and curriculum design that will contribute to AGI in important ways.

"AGI plays a vital role in geoscience education, and I look forward to being part of this dynamic organization," Robeck said, noting that AGI provides a unique and important voice that supports geoscience education at all levels, and helps the public understand some of the most significant issues of our time. Robeck has worked with AGI programming as an external consultant for over fifteen years and held a Faculty-in-Residence position at AGI in 2006 and 2007. Most recently he has helped to initiate the Center for Geoscience Education and Public Understanding, which is an initiative focused on promoting collaboration in geoscience education, policy, research, and related areas.

Robeck intends to use his role to strengthen relationships between the many stakeholder groups that AGI serves and AGI's member organizations to make sure that their important educational messages and programs are being used to their fullest benefit. As well, he hopes to further underscore the value of the geosciences to the general public.

"I find the narrative aspect of the geosciences to be fascinating," Robeck said. "Knowledge of the geosciences allows one to look at a place and understand the location's story on many levels. This has great value as an educational tool because it makes the geosciences accessible to everyone, and teaches us that things have not always been the way that they are now—the Earth will continue to change over time, and in many ways people can influence the directions of those changes. Geoscience education is a key to making sure that those human influences are positive."

Earth Science Week 2014 Contests Announced

In celebration of Earth Science Week 2014, the American Geosciences Institute (AGI) is sponsoring three national contests honoring this year's theme, "Earth's Connected Systems." This year's competitions will feature a photography contest, a visual arts contest, and an essay contest.

Students, geoscientists, and the general public are invited to participate in this year's photography contest, "Connections in My Community." Entries must be composed of original, unpublished material, and show where you observe the dynamic interactions of earth systems in your community.

This year's visual arts contest, "Earth's Connected Systems and Me" is open to students in grades K-5. Scientists study, for example, how water shapes the land, how living things use air, and how air and water act on each other. How do such connected systems affect you? Use artwork to show how land, water, air, and living things are connected in the world around you.

Finally, students in grades 6 through 9 may participate in the essay contest. This year's essays must address the idea of "Earth System Science in Today's World."

Submissions will be judged by a panel of geoscientists on creativity, relevance, and incorporation of the topic at hand. Selected winners will be awarded for their submissions.

For details, please visit <http://www.earthsciweek.org/contests/index.html>.

GSL: Our Geoheritage

Sarah Day
GSL Writer

The dates for UK Earth Science Week 2014 will be October 13-19, with a theme of 'Our Geo-Heritage.'

The week will raise awareness of the geological Heritage sites which exist throughout the UK, from famous landmarks like the Giant's Causeway, to less well known areas of geological significance. As ever, we hope to encourage organised and self guided walking tours of geology across the UK.

Call for ideas

The Geological Society of London is currently planning events and activities, so please get in touch if you want to discuss ideas or find out more about how to get involved. We can promote activities online via our website, blog and social media sites, and through our network of affiliated schools, Universities, Friends of the Society, Regional and Specialist Groups – so we're looking for ideas that cater for a wide range of audiences!

Download our information pack for ideas about how to get involved.

Please email ESWUK@geolsoc.org.uk if you want to propose an activity, or find out more about taking part.

NESTA announces FREE Student Membership

Roberta Johnson Kileen
Executive Director

The National Earth Science Teachers Association is delighted to announce that we have instituted a new category of membership to help the next generation of Earth and space science educators and scientists Free Student Membership!

NESTA now offers up to two sequential free years of student membership at the Basic level for students at the university level who are studying to become teachers or scientists in the Earth and space sciences, environmental sciences, or related disciplines. For more details, and how to apply, go to <https://www.nestanet.org/cms/user/register/student>. If you are already a member of NESTA, please help us spread the word about this opportunity to your friends and colleagues at the student level that might benefit. You can also share this with faculty at universities that prepare students in Earth and space science education or in the Earth and space sciences.

Please note that student status must be verified by a faculty adviser, and satisfactory progress toward degree objectives must be maintained to continue to the second year of free student membership. See the link above for full details on this great opportunity.

Annual Best Student Geologic Map Competition

T2014 USGS/GSA Best Student Geologic Map Competition Special Session

The US Geological Survey (USGS) National Cooperative Geologic Mapping Program (NCGMP) in partnership with The Geological Society of America (GSA), GSA Foundation, Association of American State Geologists (AASG), American Geosciences Institute (AGI), American Institute of Professional Geologists (AIPG), and the Journal of Maps invites students to participate in the Best Student Geologic Map Competition.

This year marks the second annual Best Student Geologic Map Competition at the GSA Annual Meeting in Vancouver, British Columbia. The competition will highlight student research from around the world that utilizes field mapping and the creation of geologic maps as a major component.

The top three student geologic maps will be selected for recognition and awards at a special judging reception at the GSA Annual Meeting. Students will post their maps (Session Posters) on Tuesday, 21 October by 5 PM until 6:30 PM in the Poster Hall for review and evaluation by the judges. Maps may be placed in this area as early as 9 AM Tuesday, 21 October, but must be removed at 6:30 PM following the reception. At the end of the reception, the top three maps will be selected and awarded.

Awards

The First place student will receive the honor of constructing the Best Student Geologic Map for that year, a Certificate of Recognition signed by the sponsoring representatives, and a Brunton Compass sponsored by the AASG. The student's name will also be added to a Best Student Geologic Map plaque that will be posted at USGS Headquarters in Reston, Virginia. The first place map will also receive a limited run in the Journal of Maps.

The Second place student will receive the honor and a Certificate of Recognition signed by the sponsoring representatives along with a rock-hammer or hand lens sponsored by the AIPG.

The Third place student will receive the honor and a Certificate of Recognition signed by the sponsoring

representatives along with a GSA publication (book, fieldtrip guide, or memoir) sponsored by the GSA Foundation.

In addition, all winners will receive an offer to publish their map in the Student Edition of the *Journal of Maps* and the opportunity to be published in the full journal. The top three student maps will also be recognized and announced on the GSA Website, *GSA Today* and *GSA Connection*, *AGI GeoSpectrum*, and the USGS Website.

Eligibility

The competition is open to all students at any level of their academic career (B.S., M.S., or Ph.D.) who has created a geologic map through their recent and substantial field work. Students must also submit their map as a significant component of their research as the principal author to any poster or oral presentation session at the GSA Annual Meeting. Students who have recently graduated within the past year are also eligible. An eligible geologic map should include all the required components as described in the Judging Criteria below.

How to Submit Your Geologic Map to the Competition

Students must submit their abstract by 29 July 2014 to any GSA Session or Discipline and select the appropriate box on the form to be considered for the geologic map competition. Your abstract must be accepted to be eligible for the competition.

Judging Criteria

A geologic map is defined as a map that depicts the geographic distribution at the earth's surface of bedrock and/or surficial geologic materials and structures, on a published base-map showing topography, hydrography, culture, cadastral, and other base information. Geologic units are identified by color and correlated to the description of map units (DMU). Geologic structures are shown with symbols that allow the user to visualize the features in three-dimensional orientations.

- A geologic map should include the applicable components that sufficiently illustrate the geology of the area mapped, including:
- A clear and legible base (include base map credit and map projection)
- Scale and contour interval
- North arrow and magnetic declination

- Title, authorship, publisher (if published), and date. The student(s) must be the principal author(s).
- Location index map
- Field data or field data stations (strike and dip, coring stations, GPS control stations, etc.)
- Description of map units (DMU)
- Correlation of map units (CMU)
- Explanation of map symbols
- Map unit symbols on map
- A geologic map may also include stratigraphic columns, cross sections, and text.

Submitted geologic maps should be at a scale of 1:24,000 or larger. However, 1:25,000 to 1:62,500 scales are acceptable. Reconnaissance geologic maps are not acceptable.

Examples of maps that are not considered appropriate substitutes for geologic maps include: structure contour maps, isopach maps, stratigraphic and/or facies diagrams, aquifer maps, gravity or magnetic anomaly maps, and element-distribution geochemical maps. These maps are not eligible and will not be judged if submitted. Additionally, submissions of geologic maps that are digital map compilations or digitization maps are not acceptable and will not be judged.

For your information: Visit this useful website for digital geologic mapping standards and mapping symbolization.

Selection Process

Submitted geologic maps will be evaluated by a panel of at least 4 judges based on the criteria outlined above. Each map should stand on its own without explanation by the student author. Students must post their maps in the designated area on Tuesday 21 October no later than 5 PM in the Poster Hall for judging although judges will also be evaluating student maps during poster sessions. Maps may be posted as early as 9 AM on Tuesday, 21 October in the designated area, but must be removed at 6:30 PM following the session. We encourage student participants to be present at this session to network and share information about their maps when judges are evaluating and selecting the top three maps. The award ceremony will take place at the end of this reception.

The University of Louisiana at Lafayette has won the 2014 Imperial Barrel Award.

Barry Friedman
AAPG EXPLORER Correspondent



If it sounds like you already have read this story once before, perhaps you have.

Back in 2012, the school also won.

That's not supposed to happen. Check that. It doesn't happen. No school has ever won twice, which brings us to a school in southwest Louisiana with a little under 18,000 students, a school that would appreciate it if you got its name right: The University of Louisiana at Lafayette.

The team adviser then, the team adviser now, is AAPG Brian Lock, an award-winning professor of geology and the department's graduate school coordinator, and he was confident of this year's victory all the way – except for the moments he wasn't.

"I had seen several other presentations, possible because our team went early, and I had been particularly impressed by the Colorado School of Mines presentation – really professional! – and had hoped for a second or third place for UL," Lock said of the global competition.

"So when CSM was announced as third place winner, I would have taken bets that we were out of the money," he continued. "Then Oklahoma was announced second, and I was even more convinced we were going home empty handed."

And then ...

"The announcement of first place seemed to be in slow motion and it really took a moment to sink in," he said. "University of Louisiana at Lafayette! What a euphoric feeling!"

It Takes a Team

As mentioned, UL is the only two-time recipient of the IBA, an award started and sponsored by AAPG since 2007. UL has competed in the global tournament every year since the program was expanded in 2008. This year the school was one of 122 schools from across the United States and six international regions that entered the contest.

"Being the first team to win the competition twice is really special, but I am sure there were many people not familiar with the program who have been continually surprised by our performance at the Section level," said Lock, who has won an A.I. Levorsen Award for his work, plus AAPG's Distinguished Service Award and the Grover E. Murray Memorial Distinguished Educator Award.

One of the reasons for the surprise is the school's size. UL has approximately 150 geology students. By contrast, the University of Texas has about 600, a fact not lost on Lock's students.

"Our continued success in the IBA competition not only does a great job of getting global exposure for our university, but it proves that we can compete with the larger, better funded programs and win," said AAPG member Jordy Babineaux, a member of the team.

"Our students," Lock added, "had really worked hard – eight or nine-hour days, seven days a week throughout the eight weeks – and I was really pleased with the quality of their work and the strong sense of a team."

You can almost hear Babineaux mutter, "Tell me about it!"

"The Dutch North Sea data set that our team was given included 13 previously drilled wells, 12 of which were dry holes," he said. "That was when we first realized this project was not going to be a cakewalk."

"Through the eight-week competition, we had to collectively piece together the basin history, interpret the 2-D and 3-D seismic data, determine why the previously drilled wells were failures and develop prospects that

would be successful," he said. "We also had to figure out how to effectively communicate our ideas to a panel of industry experts within a 25-minute time frame."

Efforts – and Intangible Dynamics

Another student on the team, AAPG member Jolie Helm, said those 25 minutes were all-consuming. The judges, in fact, select the winning team based on technical quality, clarity and organizational skills.

"In preparation, we set timelines and goals for ourselves and literally lived this dataset every day for two months, and I think it showed in our presentations," she said. "It was grueling at times when we were working 50-plus hours a week, but the outcome was extremely rewarding."

As to the award itself, she said, "It felt very surreal that we won the competition; it definitely took some time to sink in."

Adding to how impressive this all is, Lock pointed out that his Region, the Gulf Coast, is a perennially strong arena (the University of Texas won the IBA in 2011), so it's not just enough for a team to do well – every school will do that – it has to do something special.

"In each round, though," Lock said of his students, "they pulled out everything they had and it turned out to be enough, although I doubt there was much room for the judges to choose between the top teams."

Often that distance between teams comes down to the intangibles, even the inexplicable, like the swimmer who eats the same meal before games, like the towel on which former UNLV basketball coach Jerry Tarkanian used to gnaw.

"One of the students had made a comment indicating he was somewhat superstitious – didn't want to change anything about our approach from the success," Locke said, referring to that first victory back in 2012, so he tried to replicate the lead-up.

"In Long Beach (2012) we spent the Saturday visiting the La Brea tar pits and museum, so this Saturday of the competition we went to the Houston Museum – what a fine museum! – and at the awards ceremony we again sat in the front row as a statement that we expected to win, just as we did in Long Beach."

Practical Petroleum Geology

For UL at Lafayette, like all the schools in the competition, participation in the IBA competition is not just about the contest or the \$20,000 first prize – which will be used to upgrade facilities and programs, provide scholarships, buy computers and software ("We are not well funded compared with many other programs, and the award money definitely helps," Lock said) – but about its overall program, its day-to-day operations, its students preparedness.

"Our reputation has grown. Recruiters have become aware that we have a program strongly oriented toward practical, petroleum industry geology."

But he wants to underscore that none of it happens without a team of students, administrators and others.

"I cannot leave out a comment about the industry mentors for IBA," he said. "Without the time and trouble that these men and women provide, for little recognition, the IBA program would not be the success it is."

And here he mentions, specifically, the great work and passion of AAPG members Mary Broussard and Mike Quinn of Freeport-McMoRan Oil and Gas in Lafayette, who also are adjunct faculty members at the school.

Ultimately, Lock says the IBA winners, which, along with Helm and Babineaux, consisted of Sam Ely, Nicholas Geyer and Daniel Sutton, are now ready for the next contest: careers.

"The IBA competition is a fantastic opportunity for a lot of students to gain incredible experience," he said, "and I know that anyone who has 'IBA team' on his or her résumé is sending a strong message – here is a bright, hard-working team player who is ready to take a place in our industry."

The team will tell you it's more than that.

"I have a great sense of pride," Helm said, "in this school and the geology program."

A thought echoed by Babineaux.

"As geology students at the University of Louisiana at Lafayette, we are all well aware of how strong the geology program is here," he said, "but it is still not as well known as some of the geology programs at the larger universities."

It's known now.

AAPG Student Video Contests: Unleashing Student Creativity

Barry Friedman

AAPG EXPLORER Correspondent



As most of you know, there are AAPG Student Chapters at universities and colleges all over the world – and they’re filled with creative, energetic, iconic students who grew up on music videos and games, and know as much about social media as they do oil and gas plays.

And since they also know rocks, AAPG had an idea some years back to hold an AAPG Student Chapter YouTube video contest as a way of promoting the profession while also highlighting the activities of the specific schools and clubs.

The contest did something else, too – it was the catalyst that unleashed the creativity of geoscience students that many do not see.

In short, why not combine all that they want to become with all who they presently are? That was the thinking behind the AAPG YouTube Video Contest.

Global Showcase

The rules?

The videos could be no more than three minutes.

And that pretty much covered it.

With freedom like that, what student chapter wouldn’t want to be part of the fun?

Eventually, -schools participated in this year’s contest, with all the videos shown and the winners announced at the Student Chapter Reception, which is held each year at the AAPG Annual Convention and Exhibition.

This year’s winner: San Diego State University. Finishing second was the team from the University of Padjadjaran, Bandung, Indonesia and the Colorado School of Mines took third place.

Taylor Carrasco, SDSU’s team leader, said this contest is a great idea.

“The most anticipated part of the contest for us at San Diego State University is getting to see the videos produced by other Student chapters, learning new ways to get students excited to participate in the AAPG and implementing successful practices into our own chapter,” he said. “It’s a great way to share ideas with distant chapters that we would otherwise rarely be in contact with.”

Kind of a pageant answer, so he continued.

“Another thing we always hope for when making our video entries for the YouTube contest is the possibility that students outside the organization might see it and be interested enough to look up who we are and what we do and learn how joining the AAPG could lead them to incredible opportunities,” he said.

“Thanks to the social media-based popular vote, student chapters have that venue to share their passions for geology and energy exploration with others around the world.”

AAPG’s Mike Mlynek said Carrasco’s response was right in line with what organizers intended when they started the contest a few years back: sharing the energy of these students and ginning up the excitement of the profession.

“We’ve been doing it a couple of years,” he said, adding that AAPG’s Student Chapter Committee wanted to honor what these students are doing below the AAPG radar.

“The videos allow them to show their chapters on YouTube,” Mlynek added – and the videos, frankly, feature a professionalism that took him by surprise.

“The quality of the videos is better than anything we used to have on our old website,” he said about what would be found at www.aapg.org a few years ago.

“I sit and watch all these videos and I think, hey, these kids are geology students. Are they amateur filmmakers in their spare time?” he said. I mean, what’s going on here? And the videos are getting better each year.”

Other Dynamics

As for this year’s winning video, Mlynek was impressed by what he saw from SDSU and amused by what he heard, knowing that imitation is the sincerest form of flattery.

“I did notice they had pirated some Scott Tinker audio in there from SWITCH,” he said about the past AAPG

president's award-winning documentary that has been shown both commercially and to private groups around the world.

"When I saw Scott in Houston at the annual convention, I asked him about it," he said.

And?

"He was fine," Mlynek said, laughing.

"San Diego State had a good run this year," he continued. "They made the finals of the IBA and won the YouTube Videos."

(And not that it's a make or break deal, but the winners for the YouTube contest receive \$1,000 for the top video; \$300 for second prize; and \$100 for third.)

Also on the SDSU team was Kaitlin Wessel, who is featured in the three-minute video.

Wessel said there's another dynamic at work.

"The video is also a great way to get students noticed in the community," she said. "Adding student interviews or highlighting student success in the video will subsequently get students' faces and names out there for prospective employers to see."

SDSU's winning video was coincidentally shown as the lead-in video to the convention's opening session – before it had been announced as this year's winning effort – earning an enthusiastic round of applause from the audience.

The video itself is both understated and powerful, de-mystifying energy – "It's not a right," said a student in it, "it's a commodity" – while talking about how student groups, both at SDSU and elsewhere, are the lifeblood of the organization and the profession.

Couple that with gorgeous shots of San Diego beaches (and how tough was that?) and it's an impressive three-minute piece of filmmaking.

Winners are chosen by a combination of "Likes" received on YouTube and Facebook and from ratings by student chapter committees.

Wessel didn't want to get away without a special shout-out to someone on her team – Taylor Carrasco.

"He single-handedly put this video together with late nights collecting video clips, organizing interviews and editing," she said. "He has created the videos for SDSU the past two years and has done an incredible job ... I don't know what we will do once he graduates!"

Ah, yes, graduation. The future.

The video addresses that. One of the students says at the end, "We have to think about energy this century differently than we did last century."

Good to know some of the people in this video, some of these students, will be doing just that.

Video Link: <http://youtu.be/pvhnuG25PFg>

Creating Habits as a Student that Lead to Professional Success



Justin Mauck, SA-4234, was awarded an AIPG scholarship in 2013. He is currently pursuing a Bachelor of Science at Texas A&M Kingsville and will graduate in May. In the fall, he plans on pursuing a Master's degree. When Justin graduates he wants to pursue a career in petroleum geology. He considers himself one of the lucky few to have found geology.

Justin Mauck, SA-4234

We can prepare ourselves to be better students and professionals by putting forth a more organized and concerted effort in our studies. Developing habits that lead to success in college can translate into career success. There are common pitfalls that students can avoid by creating good habits early in their academic career.

A few universal mistakes that students make are not showing up for courses, failing to turn in assignments, and not effectively dedicating the

time to one's studies. Failure to make any of one these commitments is grounds for termination in the workplace. By taking our college curriculum seriously and treating it as we would be expected to do in a professional career, we are preparing ourselves for success early in life.

As Geology students, we sometimes spend tedious hours in the lab looking at thin sections or analyzing data and maps. Many times, if the material is new and unfamiliar, frustration starts to materialize and we can easily lose focus. These monotonous hours when we struggle the most and spend the time to solve the small or minute but common problems are the most rewarding. Every time we deal with one of these frequent tribulations,

finding future solutions to larger problems becomes a little easier and more routine.

It is not uncommon in our academic careers that we are called upon to learn something that does not motivate us or possibly we are asked to complete a task that is difficult to grasp. By dedicating ourselves to the aforementioned tasks and working diligently towards a solution, we develop problem-solving skills that will prove beneficial in the workplace. When a company hands us a problem and is able to depend on us to analyze and solve it, you become a valuable asset to that company.

Learning to be dependable is something we must accomplish early in our academic careers. Organization and time management are key abilities when it comes to being dependable. College gives us the ability to practice these habits and to refine methods for completing course work, while successfully mastering the materials. By exhibiting dependability, we set examples for others that prepare us for leadership roles.

Leadership is something with which some of us are comfortable and some of us are not. The best way to gain knowledge of how to become a leader is by taking on added responsibility in student organizations, such as the American Institute of Professional Geologists (AIPG). These responsibilities help build the confidence needed to effectively manage complex situations. For example, interacting with peers in stressful situations, while meeting deadlines, can establish a strength that is highly desirable, when transitioning into a career.

Seek out the local geological society and attend the monthly meetings. These meetings will often provide an avenue for a potential internship or, at the very least, help establish connections within the industry. Experienced geologists go out of their way to help geology students flourish and prosper. The desire to learn geology and to struggle with ambiguous problems is what binds all of us. When we graduate maintain these connections both with your local society and with the AIPG.

AIPG embraces competence, integrity, and ethics. These are the foundations of continued professional success, and without these qualities, one is likely to be doomed to mediocrity. By espousing these benchmarks as students, we can put into practice what it takes to succeed early and often. In doing so, we can begin our professional careers more prepared to excel in the

workplace. If we put forth time and effort in all of our ventures and we will be amazed at what we can achieve.

U.S. student teams excel at first International Soil Judging Contest

Susan Fisk
SSSA



Coaches and students from the U.S. International Soil Judging Competition teams: John Galbraith (coach), Tyler Witkowski, Kyle Weber, Emily Salkind, Caitlin Hodges, Nancy Kammerer, Bianca Peixoto, Julia Gillespie, Brian Maule, Chris Baxter (coach).

In the United States alone, thousands of soil scientists use the skill of “soil judging” in their daily jobs. They look at and feel the soil to determine its health, carbon content, drainage properties, and other factors. Using only their eyes, sense of touch, and a limited set of tools, they make land usage recommendations about agriculture, construction, wastewater treatment, recreation, and more. In addition, many companies who hire crop advisors look for excellent soil judging skills. Indeed, the skills honed by soil judging are used by soil scientists around the world.

For this reason, the Soil Science Society of America (SSSA) sent eight soil science students to the 20th World Congress of Soil Science, Jeju Island, South Korea last week. Aided by two coaches, the students competed in the first International Soil Judging Contest. The students competed on two U.S. teams; the teams took first and second place in the overall competition, against thirteen



Julia Gillespie working in a pit during the contest. Photo courtesy of John Galbraith.

teams. Tyler Witkowski, University of Maryland, placed second out of 45 contestants in the individual competition. Emily Sal-kind, Virginia Tech; Nancy Kammerer, Penn State; Julia Gillespie, Virginia Tech; and Caitlin Hodges, University of Georgia finished 4th through 8th.

“Learning how to describe and evaluate soils in the field is an important part of training for soil scientists,” says Chris Baxter, the coach for the winning team,

and a professor at University of Wisconsin-Platteville. “These are skills that the professional soil scientist uses every day. It was a once-in-a-lifetime experience for them. The students worked very hard and were excellent ambassadors for the United States and for competitive soil judging.” John Galbraith, a professor at Virginia Tech, was the coach for the second place team. “We are very proud of how the U.S. students represented themselves and their country, both in performance, character, and friendliness with other teams,” says Galbraith.

Students were selected based on their performance during the National Collegiate Soils Contest held earlier this year. The contest encourages team effort and individual knowledge in identifying, evaluating, classifying, and describing soil profiles. The contest is a joint program of SSSA and the American Society of Agronomy. SSSA and its cooperating organization, the Agronomic Science Foundation (ASF), funded the students’ trips to Korea.

“Our experiences in Jeju were once in a life time opportunities,” says Witkowski. “We saw types of soils called Andisols and Melanic epipedons—which are not in abundance in the United States. Seeing them was something new to all of us competing from the United States. Seeing the soils was an experience, but meeting students from other countries interested in soils (and soil judging) was surreal. We had a great time meeting other people and looking at the soils.”

“I had the most amazing experience being part of the first International Soil Judging Contest,” says Nancy Kammerer. “Meeting other students from around the world, getting to see new soils and ways of classifying soils, and touring the beautiful island of Jeju are all things I will remember for a lifetime. The World Congress of Soil Scientists and the Koreans were the most gracious hosts and helped to make this trip extraordinary.”

“The World Congress of Soil Science organization of Korea did a marvelous job in supporting the first international soil judging contest,” says Jan Hopmans, president of SSSA and a professor at University of California-Davis. “SSSA thought it was important to send students to the competition. Having the students meet others also studying soil science from different countries, compete, and interact with them is important for global camaraderie, understanding of various cultures, and a great way to jumpstart international collaborations. Also, with the International Year of Soils starting in 2015, activities such as the International Soil Judging Contest increase awareness of the relevance of soils, as the students network and share their experiences using their own social media.”

In the contest, participants described soil profiles using standard field techniques, classified the soil using either Soil Taxonomy or the World Reference Base, and provided interpretations for land use based on soil and site characteristics. Contestants were graded on the level of agreement between their descriptions and those made by a team of official judges from South Korea, the United States, Australia, and Hungary. The contest included an individual competition and a team competition where teams of up to four contestants worked together to create a single description. The overall team winner was determined by combining the individual and team scores.

Student competitors sponsored by SSSA and ASF were: Tyler Witkowski, University of Maryland; Emily Sal-kind, Virginia Tech; Caitlin Hodges, University of Georgia; Kyle Weber, University of Wisconsin-Platteville; Bianca Peixoto, University of Rhode Island; Julia Gillespie, Virginia Tech; Nancy Kammerer, Penn State; and Brian Maule, Northern Illinois University.

AAG: East Lakes Division Team Takes 2014 World Geography Bowl Title



The East Lakes Team won first place in the 2014 World Geography Bowl, an annual quiz competition for teams of college-level geography students representing the AAG's regional divisions. The event was a milestone for AAG as its 25th year for hosting during its Annual Meeting.

On April 11, seven teams, each representing an AAG regional division, competed at the convention center in Tampa. Of the nine regional divisions, the following seven was represented by a team: East Lakes, Great-Plains Rocky Mountains, Middle Atlantic, Middle States, New England-St. Lawrence Valley, Pacific Coast, and Southeast Divisions, A spoiler team was added, comprised of students present at the competition.

The championship round pitted the top two teams in a match-up from a round-robin tournament. The Middle Atlantic Division (MAD) team, ultimately the runner-up in the competition, had been undefeated during round-robin play. In the end, the East Lakes Division defeated MAD by a score of 120-90 in a challenging final round.

At the conclusion of the exciting competition, AAG President Julie Winkler, wrapped up the event with an uplifting message and presented the winners with prizes. Bob Dulli (representing National Geographic Society) partnered with Julie Winkler to give out the Atlas prize to second runner-up winners.

The winning East Lakes Division team's roster was:

- Steven Schultze (Team captain), Michigan State University
- Alex Colucci, Kent University
- Lisa Dershowitz, Miami (Ohio) University
- David Eichenauer, University of Toledo
- Michael Chohany, University of Toledo
- Evgeny Panchenko, University of Toledo
- Lisa DeChano-Cook (team sponsor/coach), Western Michigan University

The East Lakes team consisted of the top six scoring individuals from an on-line quiz that the region uses to determine the team each year. The team was coordinated by Dr. Lisa M. DeChano-Cook from Western Michigan University.

The first runner-up Middle Atlantic Division team's roster was:

- Raynell Cooper (Team captain), George Washington University
- Owen Dowell, Salisbury University
- Sam Hudis, George Washington University
- Sara Hughes, Frostburg State University
- Walker Skeeter, Salisbury University
- Will Steckman, Frostburg State University
- Tracy Edwards (team sponsor/coach), Frostburg State University

The second runner-up Pacific Coast Division team's roster was:

- Brendan Gordon (Team captain), University of Idaho
- Crystal English, San Diego State University / University of California, Santa Barbara
- Biniam Mengisteab, San Francisco State University
- Daniel Phillips, University of California, Santa Barbara
- Tina White (team sponsor/coach), Pasadena City College

The top five individuals with best personal scores were awarded an MVP prizes. Listed in order of most points earned:

- Raynell Cooper, George Washington University
- Brendan Gordon, University of Idaho
- Pete Akers, University of Georgia
- Kevin Bean, Bridgewater State University
- Evgeny Panchenko, University of Toledo

Thanks to 2014 WGB prize donors and volunteers

Organizers of the World Geography Bowl would like to express thanks to the countless volunteer question writers, team sponsors/coaches, moderators, judges, and scorekeepers who make the competition possible, and to the many students who competed throughout the country. We would like to recognize the volunteers this year as: Andrew Allen (University of Kansas), Casey Allen (University of Colorado Denver), Don Colley (San Diego State University), Jamison Conley (West Virginia University), Richard Deal (Edinboro University), Suzanne Dickens (Front Range Community College), Dawn Drake (Missouri Western University), Robert Edsall (Idaho State University), Emily Fekete (University of Kansas), Peggy Gripshover (Western Kentucky University), Melvin Arthur Johnson (University of Wisconsin – Manitowoc), Patrick May (Plymouth State University), Lee Nolan (Pennsylvania State University), Wesley Reisser (George Washington University and U.S. Department of State), Zia Salim (San Diego State University/University of California, Santa Barbara), Michael Webb (University of North Carolina).

World Geography Bowl organizers thank its supporters who generously donated atlases, books, gift certificates, softwares, and MVP awards – Avenza Systems, Cambridge University Press, East View Press, Esri, Guilford Publications, Lonely Planet, McGraw-Hill Higher Education, National Geographic Society, The University of Chicago Press, and The University of Georgia Press – who recognize the important role the competition plays in building a sense of community and generating excitement around geographic learning. Your continued support is truly appreciated.

And, a heart-felt thank you was expressed to Andrew Shears, assistant professor of geography at Mansfield University, for his three-year term leading the tournament. This was his final year as World Geography Bowl executive director. Jamison Conley (West Virginia University) succeeds Andy Shears as the new executive director.

2015 World Geography Bowl – Chicago

The 2015 World Geography Bowl competition will be held in Chicago in April, 2015. Regional competitions typically occur during the fall at respective AAG regional meetings, where regional teams for the national competition are usually formed. For more information

on organizing a team, contact the World Geography Bowl executive director, Jamison Conley, at West Virginia University at Jamison [dot] Conley [at] mail [dot] wvu [dot] edu or Niem Huynh at nhuynh [at] aag [dot] org.

Apply to Present at the Geophysical Information For Teachers Workshop

AGU is currently seeking scientist/education & outreach professional teams to present at the Geophysical Information for Teachers (GIFT) workshop, an annual event at Fall Meeting. The successful event allows K-12 science educators to hear about the latest geoscience research from the scientists making the discoveries, explore new classroom resources for their students, and visit exhibits and technical sessions of the AGU meeting for free. Learn more and apply; the deadline is 6 August. Educators, more information about registering for the workshop will be available in the coming months.

Link 1: <http://education.agu.org/education-activities-at-agu-meetings/gift/>

Link 2: http://www.nestanet.org/agu_gift_form.php

Share Your Science at an AGU Exploration Station

Exploration Station is an annual AGU event that takes place at the Fall Meeting. It provides a venue where the local community and AGU members can come together to share the excitement of science. The event is an open house for San Francisco families, teachers and kids (as well as Fall Meeting attendees and their families) to learn about the exciting work currently occurring in the fields of Earth and space science. During the event, participants have a chance to meet scientists, do hands-on science, and take home fun resources collected during their visit.

If you're interested in presenting at Exploration Station, please read our FAQ and email Bethany Adamec to register. The registration deadline is 20 August. All

costs for the event other than shipping and handling of materials are covered by AGU.

Link 1 :<http://education.agu.org/education-activities-at-agu-meetings/exploration-station/>

Link 2: <http://education.agu.org/files/2014/02/Exhibitor-FAQ-.pdf>

Link 3: bhadamec@agu.org

AIPG Aims to Educate Next-Generation Geologists

The American Institute of Professional Geologists (AIPG), an AGI member society, was founded to advocate for geologists and certify their credentials. Today AIPG is reaching out to Earth science students and educators.

Available online for free download, AIPG offers several PowerPoint presentations providing relevant career information for young, newly graduated geoscientists. These presentations also enable K-12 teachers to convey what geoscientists do for a living.

Students who become AIPG members can establish professional contacts, attend meetings and field trips, receive mentoring from professionals and potential employers, access undergraduate scholarships, tap resources on careers in geology, and submit papers to the journal "The Professional Geologist." To learn more, visit <http://www.aipg.org>.

SSSA: Dig It!

Dig It! The Secrets of Soil opened at the California Museum on May 1. It will run through March 29, 2015. SSSA is the founding sponsor of Dig It!, which was developed on conjunction with the Smithsonian Museum. Exploring Dig It! reveals the complex world of soil and how this underfoot ecosystem supports nearly every form of life on earth. The picture shown shows children playing with a soil profile puzzle. The museum estimates that over 75,000 schoolchildren will visit the exhibit during field trips, in addition to regular museum attendance. Since 2008, the exhibit has been in Washington DC, Omaha, Seattle, and Minneapolis. For more information on Dig It!, visit soils.org/discover-soils/dig-it.



Discover more

By studying the isotope ratio of your CO₂, you can discover more about the physical or biological processes that created it. The **field-deployable Thermo Scientific™ Delta Ray™** isotope ratio infrared spectrometer represents a new and exciting solution for the continuous measurement of isotope ratios and concentration of CO₂ in air. Utilize state of the art mid-infrared spectroscopy to simultaneously determine $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ every second, 24 hours a day, 7 days a week.

using CO₂ isotopes

• thermoscientific.com/DeltaRay



Thermo Scientific Delta Ray
Isotope Ratio
Infrared Spectrometer

SME Foundation announces Miners Give Back Humanitarian Program

John Hayden

The Society for Mining, Metallurgy & Exploration Foundation (SMEF) is pleased to announce the launch of the Miners Give Back program. The goal of this program is to tangibly contribute to improving the lives of individuals where mining is, or has been, an integral part of their community. Through this new program, SMEF is committed to support worldwide initiatives focused on humanitarian efforts.

“As the largest professional society in the mining industry, SME will be a conduit for industry specialists around the world to positively impact and enhance the lifestyles of local communities with sustainable benefits that will last for generations,” said SME Executive Director David L. Kanagy.

SMEF is prepared to invest matching funds to find solutions to projects related to health issues, water systems, education, youth mentoring, and other mining-related concerns within an impacted community. It seeks to realize this outcome through:

- Sponsorship of an established mining company,
- The formation of partnerships with local or regional organizations, and
- Local SME Sections or individuals who will initiate and implement well-defined projects where the results will provide a definitive benefit to the local community.

The 2014 Miners Give Back grants are made possible by a generous donation from Drummond Company, Inc.

Any SME member is eligible to submit a nomination for a project to be considered. Proposals may include a request of up to \$10,000, must have an established mining-related company serve as its sponsor, must have local representative involvement in the project’s planning and implementation, and must have committed matching funds. Applications should be submitted to SMEF by September 10, 2014. Details about the program and a downloadable application can be found at <http://community.smenet.org/smefoundation/programs/mgb> or contact Sharon Schonhaut at schonhaut@smenet.org, 303-948-4236 or 800-763-3132.

GWB Project Impact Grows

Dean Clark

**Society of Exploration Geophysicists
The Leading Edge Correspondant**



The interim reports from four active projects dramatically illustrate the worldwide extent of SEG’s Geoscientists Without Borders (GWB) program and the ability of sev-

eral modern developments in applied geophysics to ameliorate major and often long-standing problems in some of the world’s most impoverished areas. Even before this, however, GWB projects have spurred local, state, and national governments to act based on the results of work in India, Indonesia, Jamaica, Romania, South Africa, and Thailand.

Of the four projects in the spotlight today, two are in Haiti, which was struck by a devastating earthquake in 2010 (fatalities are estimated at 300,000); this was just two years after the island nation was hit by major hurricanes. The third project focuses on landslides in the Nordic countries and the fourth on water quality in Benin, West Africa.

Haiti

The first of the two projects in Haiti, the “Haiti subsurface imaging project,” is under the direction of the University of Houston, but the team also includes members from Chesapeake Energy, ExxonMobil Production Research, Western-Geco, Southern Methodist University, and the University of Calgary. The SEG Foundation approved the project in 2011, and in-country fieldwork began in January 2012, coordinated so that several team members could attend the Haiti Earthquake Memorial Conference, sponsored by the United Nations, which was held exactly two years after the earthquake.

The Haiti earthquake is something of a geologic mystery because it did not appear to rupture along the main fault in the area, and in fact, there is no clear surface expression of the hypocentral rupture; as a result, it has been termed a “blind” fault. The major goal of the project is finding and imaging this fault because such knowledge would greatly improve the understanding



Team leader Michael Kalinski from the University of Kentucky collects field data in Haiti.

of Haitian tectonics and, of course, tectonics in similar areas around the world.

The first phase of the project, 10–17 January 2012, was essentially reconnaissance that included total-station, GPS, gravity, and seismic surveys in the vicinity of the epicentral region. These data, after processing, provided sufficient detail to pinpoint more sophisticated surveys in February and May 2013 in the second phase of fieldwork. The seismic effort in that phase benefited from considerably more equipment, including numerous cases of GSR recording nodes loaned by Global Geophysical.

Seismic data were recorded in February with two different systems, the autonomous nodes of Global Geophysical and Geometrics Geode cabled recorders. Two kinds of sources were used, the GISCO slanted-weight drop (to excite P- and S-waves) and the propelled-energy generator. The fieldwork in May 2013 was dedicated to sonar surveys on Lake Enriquillo, which has dramatic fluctuations in water level that are scientifically puzzling and economically and socially hazardous.

This set the stage for the third and final phase of fieldwork, in March 2014, collection of more detailed and deeper seismic lines (involving more receivers, long lines, and sources with deeper penetration), along with additional surveys of the lake (chirp, side-scan sonar, and boomer systems) which would lead to more accurate imaging of the “blind” fault. The data are being processed, and the initial findings will be presented at professional meetings this year.

The second Haiti project, “Shear-wave velocity measurement and estimation of seismic site response in Port-au-Prince, Haiti,” is focused more on civil engineering than geology and is directed by the Department of Civil Engineering at the University of Kentucky (UK). The team leader is Professor Michael Kalinski, and the team includes Melinda Jean-Louis, a Haitian native now pursuing a master’s degree at UK.

Because Haiti is considered at risk of major earthquakes in the future, the goal of the project is to use newly collected seismic information (mainly shear-wave velocity) to quantify the effect of soil stiffness on earthquake quantification so buildings can be designed to resist earthquakes. A vital component of this primary goal is to train Haitian geoscientists to collect and use such data in the future.

Fieldwork at eight sites in Haiti was conducted during 10 days in July 2013. Some comments by Kalinski, which appeared in an article in UK Now (the University of Kentucky’s online daily publication), imply that this was a sobering experience for the team and put into stark relief the vital role that GWB projects can play.

“There is garbage literally everywhere,” Kalinski said. “Open streams run right through the city, carrying all kinds of waste, including untreated sewage, while pigs, goats, and chickens graze in the filth.”

Police presence is minimal, and vigilante justice is common. This is what a world without government or infrastructure is like. “It was a constant challenge to find electricity to power our laptops and instruments. Everywhere we went, we were always looking for ways



Propelled S-wave source used to gather data in Haiti. Courtesy of University of Houston. Used by permission.

to store electricity here and there. We would charge our laptops using inverters in cars, even if it was just a five minute drive. We would use small USB-powered fans to cool ourselves at night because there was no electricity in the house.”

The team eventually used surface-wave data to derive shearwave velocity profiles which were used to analyze the seismic response at various sites. The final results were delivered to Haiti Engineering, a partner organization in the project, which passed them along to relevant organizations in Haiti.

The project team also developed a user’s manual on how to perform seismic surface-wave experiments and analyze the data. Local geoscientists are interested in learning how this technology could complement or even largely replace the traditional soil borings because only a few drill rigs are available in the entire country.

The results of this project are expected to be presented at SEG’s 2014 Annual Meeting and ultimately published in the SEG journal Interpretation.

Sweden

The third project supported by Schlumberger, “Integration of geophysical, hydrological, and geotechnical methods to aid in monitoring landslides in Nordic countries: A 4D approach for landslide risk assessment,” focuses on one of the most commonly occurring natural disasters which annually claims hundreds of human lives and causes billions of dollars of damage to property. The lead organization is the Department of Earth Sciences at Uppsala University in Sweden.

Initial geophysical fieldwork began in September 2011 over a known landslide scar near the Gota River in southwestern Sweden. The area was known to contain quick clays, which are thought to be a major factor in landslides in Nordic countries. The investigations combined 2D and 3D seismic (both P- and S-waves), geoelectrics, controlled-source and radio magnetotellurics, GPR, gravity, and magnetic surveys. These data, after processing, were combined with existing geotechnical information and hydrologic surveys to provide high-resolution images down to bedrock.

Additional geophysical fieldwork, carried out in February and May 2013, involved drilling and extensively



Project leader Alireza Malehmir assists during data gathering in Sweden.

logging three wells and conducting 3C seismic using wireless sensors. These data are being processed.

More than 40 students and senior scientists from five universities and three governmental institutions participated in the field surveys, which lasted a total of about seven weeks. Initial results indicate that the level of detail revealed by the geophysical data demonstrates that the integration of these methods imaged fine structures associated with quick clays. Such data are likely to be important in site assessment and characterization. Researchers say they have results that will provide them with work for many months.

The project has been successful in attracting participation by graduate students and other organizations. Six doctoral and four master’s degree students have worked on this project, and all have used or will use data from the site in their theses. Organizations which have joined are the Polish Academy of Sciences; NORSAR, the University of Oslo, and the International Center for Geohazards from Norway; and Vibrometric. Also participating is Lund University’s Bryan Loughheed, who carried out several measurements on core samples.

Project members have presented many papers at professional meetings around the world, including several sponsored by SEG and/or EAGE, and 12 papers have been published or submitted to geophysical journals. “A multidisciplinary geophysical and geotechnical investigation of quick clay landslides,” by Alireza Malehmir and 12 coauthors, was selected as one of the 30 best presentations at SEG’s 2013 Annual Meeting. In addition, Charlotte Krawczyk’s 2013 paper “Quick clay landslides in Sweden — Insights from shear-wave reflection seismics

and geotechnical integration" was chosen as one of the four best papers presented at the EAGE Near Surface

Conference in Bochum, Germany, by EEGS and was invited to be presented at the 2014 SAGEEP Conference.

Benin

The fourth project summarized in this article, "Seismic imaging to help understand and manage water quality in coastal Benin, West Africa," involves collaboration among Boise State University and Gonzaga University in the United States and Université d'Abomey-Calavi in Benin. CGG funds were directed toward this project. The city of Cotonou in Benin, with a population likely to approach two million soon, relies on the Godomey aquifer for water supply. Saltwater intrusion, which is expected to worsen, is a serious threat to the sustainability of the city's freshwater supply. Thus, the focus of the project is to improve understanding of the flow paths of the aquifer and saltwater and to image the freshwater-saltwater contact. The information can then be integrated into the area's hydrogeologic model which, if successful, will improve the city's strategy for management of its water supply.

In January and February 2013, the initial fieldwork required considerable improvisation because of complications caused by the dense population in the areas under investigation. Road surfaces varied considerably, and many were not amenable to planting geophones. Heavy traffic further limited seismic coverage. The conditions caused a change in strategy, with the focus on dense coverage in critical areas.

The final product was 11 lines with lengths ranging from less than 200 m to greater than 1.5 km. Despite the change in strategy, project leaders say the resulting data quality is excellent, and they have produced a relatively detailed interpretation of the aquifer architecture which differs from the current hydrogeologic model.

The initial findings from the new seismic data show one or more paleochannels that cut through multiple aquifer/aquitard units in several locations between the lake and the water wells. The current hydrogeologic model assumes continuous, isolated aquifers. The seismic data, however, are consistent with recent hydrogeologic data, which suggest that the various aquifers are

connected because they appear to respond in concert to changing pumping pressures.

The second phase of fieldwork, carried out in the fall of 2013, involved marine reflection surveys over Lake Nokoué, filling in gaps in land seismic coverage, and a completely new strategy for complementary electrical surveying. The heavy urbanization of the area, much greater than anticipated, effectively "zeroed out" the first attempts at recording electrical data. The high level of cultural noise made the data from TEM measurements, which were expected to locate the saltwater-freshwater interface, essentially useless. The electrical system was reconfigured in mid-2013 to record deep 1D DC resistivity soundings, which were expected to be less sensitive to cultural noise.

Supporting GWB

In the last six years, 20 GWB projects have been selected. Nine are active and two are in negotiations. Donor funds are not restricted to a single project, and many companies become involved in projects in other ways such as providing equipment, interpreters, or other intangible support. Schlumberger, GWB's founding supporter, and other major supporters such as PGS are the principal financial backers of the first three projects summarized in this article. CGG is the primary backer of the project in Africa. The GWB humanitarian program cannot function without the support of donors. The SEG program staff and supporters invite you to participate in the success of Geoscientists Without Borders.

For more information, visit www.seg.org/gwb.

Permalink: <http://dx.doi.org/10.1190/tle33060664.1>

Editor's note: Geoscientists Without Borders is a registered trademark of the SEG Foundation.

Shisasari Freshwater Spring Protection Project

Meredith Beswick



AEG has joined with others to sponsor this project, located in the community of Shisasari in western Kenya, which has an approximate population of 10,000 people. Shisasari has three springs that have been flowing since the community's establishment that fulfill Shisasari's water demand. Unfortunately, the water from these springs is unprotected from surface contamination subjecting the community to waterborne diseases and, in some cases, deaths. The community has also recently added a secondary boarding school, making the demand for good-quality water even greater. It is the community's wish that the water be protected to reduce the risk of contamination, and conveyed (in a future phase) to the

school sites so that the students are not disrupted from their studies to collect water from the distant springs.

A team from the Sacramento Valley Professional Chapter of EWB was formed to design and implement this project. The team is led by former AEG President Bruce Hilton and has team members from multiple agencies and companies, including the California Department of Water Resources (DWR), CH2M Hill, General Mills, Merrill Lynch, Michael Baker, RBF, California Department of Transportation, and the California Public Health Department. The team performed a site visit in August 2007 to assess the land and gather data for the design of the protection system. The team is designing a spring box for one of the unprotected springs most viable to the community and will visit the community in mid-2014 to build the spring box and obtain further information for the second phase (conveying water to the school sites).

AEG contributed generously to this project in late 2013 and will continue to keep an eye on the project progress and benefits to the community. This project is just one example of how engineering geology professionals can come together and use their expertise to benefit communities like Shisasari. For more information on EWB or the Shisasari Freshwater Spring Protection Project, please contact Bruce Hilton at BRHHilton@gmail.com.

Valuable Earth and Space Science Research now more accessible to the public. AGU to make journals freely available online

The American Geophysical Union (AGU) and Wiley today announced that, starting 1 May, all AGU journal content from 1997 to content published 24 months ago will be made freely available. This change will apply to all articles and supplementary materials from journals that are not already open access, as well as AGU's weekly newspaper, Eos. It currently represents more than 80,000 journal articles and issues of Eos. Additional content will continue to become open every month, on a 24-month rolling cycle.

“As the largest publisher of Earth and space science research, not only is it AGU’s responsibility to advance our science and support the execution of high-quality research, of equal importance is our responsibility to share that knowledge as widely as possible,” said Carol Finn, President, AGU. “Our journals are leading the way in a number of areas, including the quality of our peer review, and we have a wealth of content that is relevant to the interests of the public and civic leaders, policy-makers, educators, and citizen scientists. Improving their access by unlocking this content serves our mission to promote discovery in Earth and space science for the benefit of humanity . . . and it will lead to a deeper understanding of natural hazards, water and air quality, land use, ocean resources, use and monitoring of natural resources, and many other critical societal issues.”

In addition to increasing free access to journals online, AGU has also joined the innovative Access to Research initiative through its publishing partner, Wiley. This program provides patrons of U.K. public libraries instant online access to journal content from 1997 to the present at the library.

“Wiley supports the Access to Research initiative and the constructive engagement between publishers and public libraries which has led to the launch of this innovative project,” said Sue Joshua, Legal Director, Global Research, Wiley. “Our society partners are also enthusiastic about the project which provides online access in public libraries to the latest peer-reviewed research from around the world. Together, we will develop a much better understanding of how to meet the demand for expert, reliable knowledge, which we believe will grow over the term of the pilot.”

This new policy marks the latest innovation in AGU’s publishing strategy, which already includes providing access to developing nations through its participation in the Research4Life program, enabling more than 5,000 institutions to freely access AGU’s content. In addition to these new programs, AGU offers Green Open Access after six months that allows a copy to be placed in a repository, and it also offers three fully open access journals – JAMES, Earth’s Future, and the recently announced Earth and Space Science, which will publish its first articles later this year.

USGS iCoast – Did the Coast Change?

Ethan Alpern, USGS
ealpern@usgs.gov; 703-648-4406



Hurricane season starts again this June. Do you know what happens to our coasts after these extreme storms? The [U.S. Geological Survey](#) has launched a new crowdsourcing application called “[iCoast – Did the Coast Change?](#)” to show you these [coastal changes](#) from extreme storms.

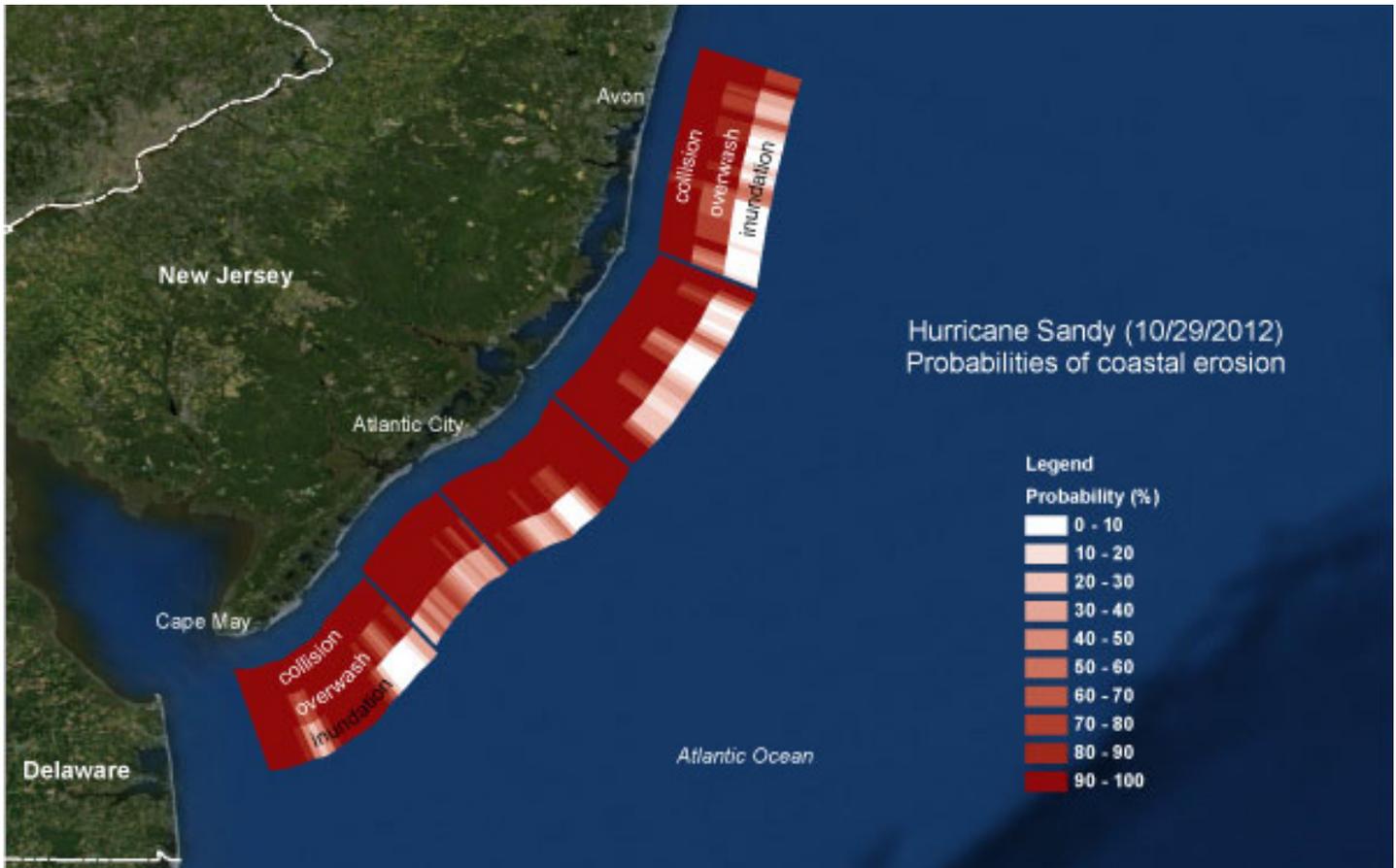
iCoast allows [citizen scientists](#) to identify changes to the coast by comparing aerial photographs taken before and after storms.

Crowdsourced data from iCoast will help USGS improve predictive models of coastal change and educate the public about the vulnerability of coastal communities to extreme storms.

Since 1995, the USGS has collected more than 140,000 aerial photographs of the Atlantic and Gulf coasts after 24 hurricanes and other extreme storms. Just for Hurricane Sandy alone, more than 9,000 aerial photographs were taken a week after the storm.

USGS acquires high-resolution oblique aerial photography after extreme storms and compares them to imagery collected before the storms. These [aerial photographs](#) are taken at a low altitude to capture a small area of the coast. USGS collects aerial imagery to ground truth and improve the USGS coastal change probability models.

“Computers cannot yet automatically identify damages and [geomorphic changes](#) to the coast from the oblique aerial photographs,” said Sophia B. Liu, USGS



USGS determines probabilities of hurricane-induced coastal change for the Atlantic and Gulf coasts of our Nation to better inform evacuation, response, preparedness, and mitigation efforts.

Mendenhall Postdoc Fellow. “Human intelligence is still needed to finish the job.”

Without the personnel or capacity to analyze all the photographs taken after every storm, the USGS decided to launch a citizen science project, asking citizens to help identify changes to the coast while also gaining knowledge about coastal hazards.

The Power of Citizen Science and Crowdsourcing

Analyzing the aerial photographs to identify storm damage will help coastal scientists refine their predictive models of coastal erosion and damage caused by extreme storms. Currently, these mathematical models are derived from dune elevation and predicted wave action during storms. Adding the human observations will allow the scientists to validate the models and to provide better predictions of damage before storms occur.

“After an event like Hurricane Sandy there is always a great interest in our photographs,” said Barbara Poore,

USGS Research Geographer. “The USGS iCoast team hopes that people will learn about coastal change and about their personal vulnerabilities to extreme storms.”

Integrating Citizen Science into the Model

Research on storm-induced coastal change hazards provides the data and modeling capabilities to allow the USGS to identify areas of the U.S. coastline that are likely to experience extreme and potentially hazardous erosion during hurricanes or other extreme storms.

To assess coastal vulnerability to extreme storms, the USGS has developed a [Storm-Impact Scale](#) to produce [Coastal Change Probability](#) estimates.

Hurricane-induced water levels, due to both storm surge and waves, are compared to beach and dune elevations to determine the probabilities of these types of coastal change processes:

- **Beach Erosion** occurs when wave runup is confined to the beach.

- **Dune Erosion** occurs when the base or toe of the dune is eroded by waves and storm surge.
- **Overwash** occurs when sand is transported and deposited landward over the beach and dune by waves and storm surge.
- **Inundation** occurs when the beach and dune are completely and continuously submerged by storm surge and wave **runup**.

Benefits of the USGS iCoast Project

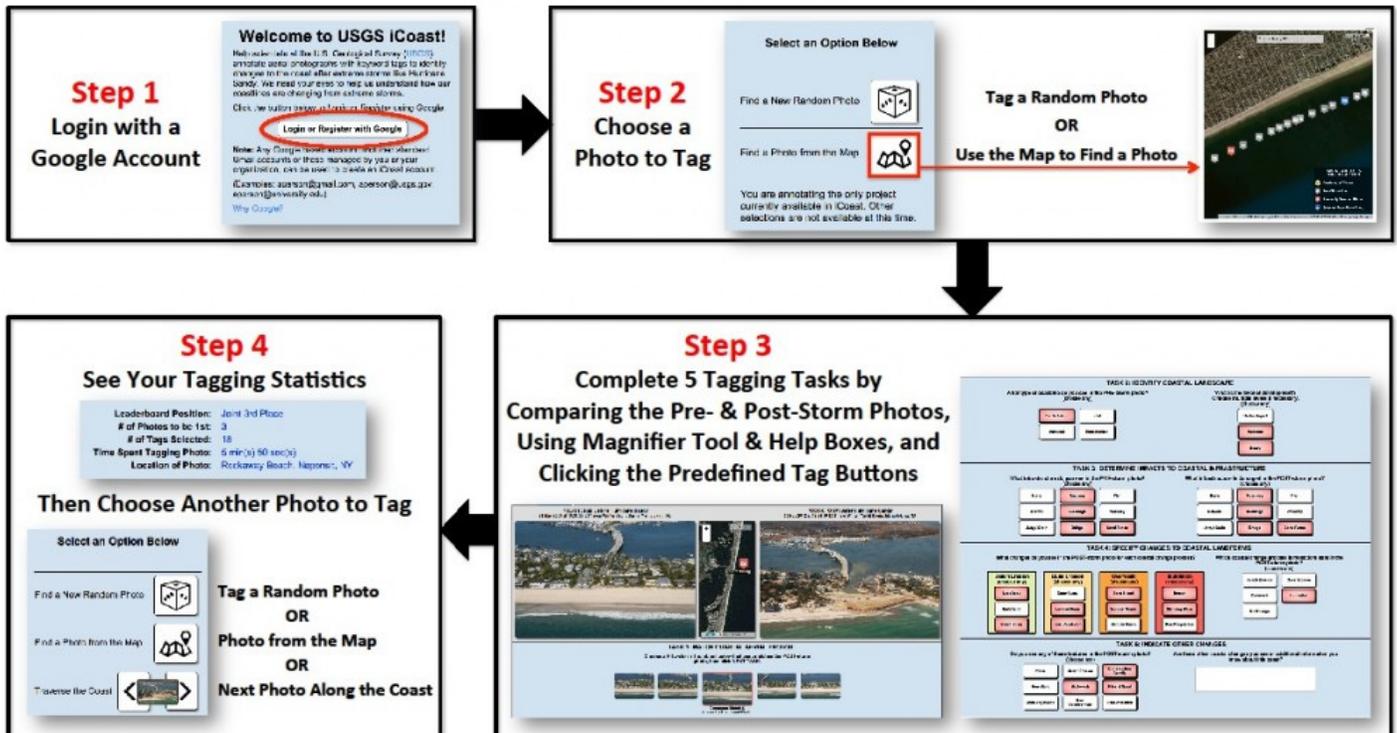
There are scientific, technological, and societal benefits to the iCoast project. The crowdsourced data from iCoast will enhance predictive modeling of coastal erosion to better inform emergency managers, planners, and residents of coastal vulnerabilities in their regions.

Citizen science projects like iCoast serve the cause of **Open Government** and **Open Data**, by sharing USGS aerial imagery with the public. iCoast can also be a great tool for marine science educators to create interactive and fun lessons related to coastal hazards.

How to Use iCoast:

USGS iCoast: How to Get Started

iCoast Website: <http://coastal.er.usgs.gov/icoast>



Visit Our Website
Purchase with Only a P.O. #
No Credit Card Needed!



Did You Know...

Enviro-Tech Rental Program

If Requested
Calibration Kit,
Video & CD,
Tool Kit

Instruction Manual
and Rental Agreement

**It looks Sharp
and Professional**

Instrument is
Charged & includes
Charger

**Our Quality Guarantee—
If we fail to provide any
of this, your rental is
FREE* until we fix it.**

*The only condition is you need to
notify us immediately.

All Accessories
as needed

Clean Foam
Packaging

Working Instrument &
Certificate of Calibration

We Rent Instruments

Visit www.envirotechonline.com ◆ Call Toll Free **1-800-468-8921**

EnviroTech's Quality Guarantee on Rentals

- If we fail to provide any accessory equipment as ordered, your rental is free
- If any rental doesn't work, your rental is free



Solinst 101
Water Level Meter

RENTAL RATES
25/60/200
DAY WEEK MONTH
Also a Certified
Repair Facility



RAE Systems
MiniRAE 2000 PID

RENTAL RATES
75/200/725
DAY WEEK MONTH
Also a Certified
Repair Facility



AMS Basic Soil Sampling Kit

RENTAL RATES
75/200/600
DAY WEEK MONTH
Also a Certified
Repair Facility



Geotech
Low Flow Sample System

RENTAL RATES
w/Controller
165/495/1485
DAY WEEK MONTH
Also a Certified
Repair Facility



Solinst Levellogger

RENTAL RATES
60/180/560
DAY WEEK MONTH
Also a Certified
Repair Facility



RENTAL RATES
75/210/600
DAY WEEK MONTH
Also a Certified
Repair Facility

YSI 556
System

We accept PO's ◆ Call Toll Free **1-800-468-8921**

Finding Stable Ground: Using Science and Partnerships to Manage Landslide Hazards

[Finding Stable Ground: Using Science and Partnerships to Manage Landslide Hazards](#) was a congressional briefing sponsored by the Hazards Caucus Alliance, the Association of Environmental & Engineering Geologists, the Association of American State Geologists, and the American Society of Civil Engineers Geo-Institute. On Monday, June 23, four landslide experts from across the U.S. came to Washington, D.C. to brief congressional Members and their staff about how geoscience can help inform decision making to save lives, property, and critical infrastructure.

An archived webcast of the briefing is available online [here](#).

Landslides occur in every state and territory across the United States. According to the U.S. Geological Survey, landslides in the U.S. cause more than \$1 billion in damages and result in 25 to 50 deaths in a typical year. So far in 2014, landslides in Washington and Colorado have killed more than 40 people, and landslides in the mid-Atlantic region have displaced numerous families. This briefing addressed landslide hazards across the U.S. and how advances in the geosciences, including breakthroughs in lidar technology, improved geologic mapping, and improved landslide susceptibility and risk assessments, can help inform decision making.

- Hosted by Senator Maria Cantwell
- Speakers (with links to presentations)
- [Dave Norman](#), State Geologist of Washington, Manager of the Department of Natural Resources, Manager of the Division of Geology and Earth Resources, Washington Geological Survey
- [Jennifer Bauer](#), Principal Geologist and co-owner of Appalachian Landslide Consultants, PLLC
- [Mike Chard](#), Director, Boulder Office of Emergency Management
- Moderated by Peter Lyttle, U.S. Geological Survey

Hickenlooper Working to Bridge the Gap

By **DAVID BROWN**,
AAPG EXPLORER Correspondent



When Colorado Gov. John Hickenlooper (and former AAPG member) set his sights on new air quality rules for the oil and gas industry, he called together some of the state's biggest producers and one of the country's biggest environmental organizations.

"For the first couple of months they sat down and focused on agreeing to the same set of facts," Hickenlooper told the EXPLORER. "Both sides got cranky from time to time. My job was to make sure both sides stayed in the room."

The result was a set of fugitive-emission rules and a leak-detection-and-repair regimen that could become a model for other states, and is now considered the strongest in the United States.

Discussion in that rulemaking process included Anadarko Petroleum Corp., Encana Corp. and Noble Energy Inc., and representation from the Environmental Defense Fund, a green advocacy group with a special interest in air quality.

"There's been such bad blood for a while, there was a level of mistrust that we had to work through," Hickenlooper said.

The oil and gas industry is keeping an intense watch on the development of state regulations that affect hydraulic fracturing. The regulatory picture still isn't completely clear, but it is becoming clearer.

Operators in some states have worked with regulatory agencies, environmentalists and citizen groups to devise new rules for hydraulic fracturing. In each case, a primary goal of the industry was to lessen public concerns.

Some recent developments:

- New water-testing rules took effect in Wyoming earlier this year. Companies now must test wells and springs

within a half-mile of a drilling site, both before and after drilling. Testing targets the presence of several chemical compounds, dissolved gases, bacteria and other factors

- The Colorado air quality rules, finalized in February, require 95 percent capture of methane and volatile organic compounds from specified industry operations, including new and recompleted wells, centrifugal compressors, dehydrators and storage tanks. Some tanks are subject to even stricter limits
- Baker Hughes Inc. published a Chemical Disclosure Policy for hydraulic fracturing, aimed at full disclosure of chemicals used in the fracturing process. “Baker Hughes believes it is possible to disclose 100 percent of the chemical ingredients we use in hydraulic fracturing fluids without compromising our formulations – a balance that increases public trust while encouraging commercial innovation. “Where accepted by our customers and relevant governmental authorities, Baker Hughes is implementing a new format that achieves this goal, providing complete lists of the products and chemical ingredients used,” the policy states.

Hickenlooper began his career as a petroleum geologist in the 1980s and later opened a restaurant and brewpub in Denver, then was elected mayor of Denver in 2003 and governor of Colorado in 2010.

He emphasized the importance of states bringing all stakeholders together in creating oil and gas rules that the public can rely on.

“If we do a good enough job, people will calm down about the perceived risks of hydraulic fracturing,” he said. “What this is, is a process of winning back the public trust.”

The Costs of Compliance

After Colorado adopted the new air quality regulations, some operating companies complained about the potential cost of compliance.

The Colorado Oil & Gas Association issued a brief statement from Doug Flanders, COGA director of policy and external affairs in Denver: “The new rules accomplish

much, which we support. Unfortunately, we were not successful in ensuring that the rule accommodates the differences in basins and operators,” the statement said in part.

Flanders said the emissions-capture and leak-detection regulations are just the latest items in a long process of rulemaking that affects the oil and gas industry in Colorado, most of it from the Colorado Oil and Gas Conservation Commission.

“Since 2008, we’ve essentially been in perpetual rulemaking,” he said. “We’ve had so many changes it’s kind of hard to tell how well the process is working. We have good relations with the commissioners. We have good relations with the Commission.”

He noted the regulations do not directly address hydraulic fracturing but are broader rules targeting industry activities. They “are not ‘hydraulic fracturing’ per se – they are oil and gas rules,” he said.

Colorado has emerged as a national leader in regulations affecting hydrofracturing, but at the same time has had to significantly increase regulatory staff, according to Flanders.

“Some of the things that other states are still grappling with we dealt with in the 2008 rulemaking, early on,” he said. “I think what you’re seeing (in Colorado) is a process that’s working, but you’re also seeing a process that’s stressed.”

Andrew Casper, COGA’s regulatory counsel, said the need to add additional employees and to increase spending to comply with the state’s new oil and gas rules do put a meaningful burden on the industry.

“Operators are constantly working to implement all the new regulations,” he noted. “It’s an ongoing process.”

A Work in Progress

The Environmental Defense Fund supports a variety of green initiatives but has focused many of its efforts on issues related to air quality, said Dan Grossman, Rocky Mountain regional director for EDF in Boulder, Colo.

He supports the state’s recently developed emissions-capture and leak-repair regulations and hopes they become a model for other states. Overall, he gives mixed grades to Colorado’s regulatory approach to oil and gas.

"I think it's safe to say that it's been a mixed bag. The agencies have gotten some things close to right, and some things not so close to right," Grossman said.

While Colorado has now promulgated strict air quality rules – and Hickenlooper himself prescribed a "zero tolerance" policy on methane emissions – Grossman described regulation as an ongoing process.

"These rules addressed production but not so much compression, distribution and transmission," he said. "It makes sense for us to think about how we might realize efficiencies further downstream."

Technological advances, especially, could affect the development of future regulations, he said. As an example, he cited the possibility of better emissions-monitoring tools than today's typical infrared flare-gun monitoring.

"As that technology develops, we may need to take another look at the regulations," he said.

EDF works with corporations on environmental matters because it wants "to make real progress, and not just rhetorical points," Grossman said. He acknowledged that companies, environmentalists and special-interest citizens groups have had problems cooperating in the past.

"We set out to disprove that theory in Colorado, at least in regard to the air rules," Grossman observed. "But a lot of that burden falls on industry."

Today, cooperation seems more possible, even likely. A desire to ease public concerns about the possible adverse effects of hydraulic fracturing brings industry to the negotiating table.

Both Hickenlooper and Grossman mentioned a "social license to operate" – the concept that corporations can conduct operations only with society's support and approval, which is neither automatic nor unconditional.

Environmental groups come to the table to have a voice in the regulatory process, and because they recognize that hydraulic fracturing isn't going to go away. Some, like Grossman, believe that natural gas can replace or offset more-polluting fuel use.

"This incredible energy boom brings enormous opportunity for the country and the environment, but also enormous risks," he said.

Hickenlooper said increased oil and gas production from hydraulic fracturing is providing huge benefits for the United States, while also taking industry operations

"right to the front doorsteps of people in suburban communities" that had never even expected to see a drilling rig or well.

"I think it's one of the great opportunities for this country," he said. "It's also bringing very rapid change. The industry needs to stay out ahead of the change."

EEGS: Unmanned Aerial Systems for Agricultural Geophysics — Potential and Public Policy

Robert S. Freeland & Patricia K. Freeman
EEGS Contributing Writers

Unmanned aerial systems (UAS - "drones") will revolutionize agriculture. Field scouting will become automated, inexpensive, and on-demand. The low-flying UAS will closely examine crops, pastures, and timberlands. Since they will see crop infestation at its very outset, farmers will be able to focus precisely on pest containment. Cattlemen will be able to monitor livestock health and pinpoint both strays and their predators, while they "ride herd" overhead using UAS thermal imaging. Geo-referenced nutrient and yield maps will become commonplace. Rapid delivery of essential, time-critical information at very low cost is the trademark of the UAS.

U.S. farmers will have access to this technology very soon; the Federal Aviation Administration (FAA) has been mandated by Congress to develop regulations to safely integrate commercial UAS into American airspace by September 2015. Many anxiously await these legal changes, since current FAA regulations severely restrict UAS deployment. Most UAS commercial applications within U.S. airspace are now prohibited. One consequence of these UAS prohibitions is that U.S. production agriculture is now at a distinct disadvantage with its global competitors in its UAS applications.

These restrictions are particularly frustrating because, although the U.S. market for commercial UAS applications is essentially closed, the price of a UAS has significantly declined. UAS hobbyists world-wide have been driving down the cost of this technology, principally through their freely donated innovations and open-source software. Very powerful UAS mapping platforms



Figure 1: Hobbyist mapping UAS constructed of flexible EPO (Expanded Polyolefin)

are now available in the U.S. They can be assembled from inexpensive hobbyist kits imported from overseas. The UAS constructed from components and materials supplied for the hobbyist will cost significantly less than a UAS marketed for commercial purposes (Figure 1). In less than two years, a commercial mapping UAS first offered at \$80,000 can now be assembled from \$800 in hobbyist parts and deployed using free open-source software. Two UAS designs are commonplace: a winged UAS and a multi-rotor UAS. Compared to the multi-rotor UAS, the winged UAS (Figure 1) provides faster flight, longer flight times, and a more stable imaging platform. However, the multi-rotor UAS provides more maneuverability and lifting power.

FAA Restrictions

The limits placed on the UAS by the FAA fully encompass the use of hobbyist airframes. Deploying these hobby “drones” commercially will result in cease and desist letters from the FAA, with possible stiff fines. Aerial photography for hire are the majority of these offenses. The following are the FAA regulations (2012) that address the civil use of a UAS. A model aircraft (i.e., unmanned), or an aircraft being developed as a model aircraft, can only be flown under the following conditions:

- the aircraft is flown strictly for hobby or recreational use;
- the aircraft is operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization;

- the aircraft is limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization;
- the aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft; and
- when flown within 5 miles of an airport, the operator of the aircraft provides the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport) with prior notice of the operation (model aircraft operators flying from a permanent location within 5 miles of an airport should establish a mutually-agreed upon operating procedure with the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport)).

The FAA defines the term “model aircraft” as an unmanned aircraft that is--

- capable of sustained flight in the atmosphere;
- flown within visual line of sight of the person operating the aircraft; and
- flown for hobby or recreational purposes.

The FAA may pursue enforcement action against persons operating model aircraft who endanger the safety of the national airspace system. Government public safety agencies (e.g., local police, fire, rescue, etc.), if permitted by local ordinance, are permitted to operate unmanned aircraft weighing 4.4 pounds or less when the aircraft is operated:

- within the line-of-sight of the operator;
- less than 400 feet above the ground;
- during daylight conditions;
- within Class G airspace (uncontrolled); and
- outside of 5 statute miles from any airport, heliport, seaplane base, spaceport, or other location with aviation activities.

The economic cost of the FAA ban on commercial UAS application is considerable; the Association for Unmanned Vehicle Systems International estimates the U.S. economy loses \$10 billion for every year UAS production sales are delayed (AUVSI, 2013). Nevertheless, many state legislatures and local governments have, or are considering, outright bans or limitations of “drones” due to privacy and property-rights concerns. Concerns

of potential invasive overflights of farming operations by environmental or animal-rights activist have initiated “Ag-Gag” laws within some states.

The Potential

Flying a UAS is only a fraction of the cost of a manned aircraft, and for many operations it is much faster and safer. A UAS flying a large field, for example, can provide mapping at 2-cm resolution in 18 minutes; a job that if flown traditionally would require hours, if not days or weeks, due to aircraft scheduling. Another application is for crop insurance claims; UAS allow almost effortless documentation of land flooding, drought conditions, and crop damage. Strict U.S. government regulations on UAS use have severely limited American agricultural research and development. There are only a limited number of FAA-approved test ranges, and only those public agencies having FAA-issued Certificates of Operation (COA) are allowed to use these ranges for research. As a result of these constraints, most of the UAS research and development is taking place in foreign airspace. Companies outside the U.S. are supplying commercial UAS platforms for agricultural applications in Australia, South America, Europe, and Asia. According to the largest trade group, the Association for Unmanned Vehicle Systems International (AUVSI), Japan has an estimated 10,000 UAS vehicles deployed for agricultural use, where they do 90% of the aerial crop dusting (AUVSI, 2013). A wide breadth of countries, ranging from Uruguay, Argentina, Brazil, to Australia are also using UASs in agriculture to track cattle, survey crop health, detect harvest readiness, and as a tool for surveying the damage from drought, flooding, weeds, and pests. Since commercial use of the UAS is prohibited in the U.S., few of the UAS applications benefitting agriculture internationally can be implemented to benefit American agriculture.

One such UAS making inroads in agriculture is the Yamaha RMax helicopter, the size of this vehicle is similar to a motorcycle (Figure 2). It has a 28-kg load capacity, with a practical visual operating range of up to 400 m. The Yamaha RMax helicopter, first introduced in Japan as an agricultural UAS, was developed from Japanese government R&D funding extending back to the 1980’s. Dealerships for this UAS are now opening in Australia. The liquid sprayer has two 8-L tanks, and the granular

sprayer has two 13-L hopper. It can spray cover 1.3 ha in 10 min. The manufacturer promotes a wide variety of agricultural uses that include spraying, seeding, remote sensing for precision agriculture, frost mitigation, and variable rate dispersal. In Japan, RMax helicopters are used primarily for seeding and spraying rice. Yamaha states that “the use of unmanned helicopters rapidly spread to other crops besides rice, including wheat, oats and soybean in 1992, lotus root in 1993, daikon radish in 1994, and chestnut groves in 1995.” Despite the enormous contribution this vehicle could make to agriculture, its size and capability may hinder its adoption within the U.S. It can be easily weaponized, which may lead to stringent import/export restrictions.



Figure 2: UAS spraying grapes, showing maneuverability and lifting power

Geophysical Applications

Many users of ground-penetrating radar (GPR) are aware of the restrictions placed on their surveys by the Federal Communication Commission (FCC) over the past decade. Although the lower-frequency, unshielded antennas were not banned, they can no longer be sold for domestic use. The higher-frequency GPR antennas, ground-coupled and upwardly shielded, are still sold domestically, but they now have performance restrictions and require user registration with the FCC. Mounting active geophysical transmitters, such as GPR, microwave, and EMI, on UAS platforms in large numbers will most surely initiate FCC attention. Thus for the mass U.S. market, passive remote sensing technologies (e.g.,



Figure 3: Fixed wing UAS with payload viewport.

hyperspectral, multispectral, geomagnetic) have the most potential for UAS applications in the near future.

Any passive geophysical sensor that can be miniaturized in size and weight of a “Point-and-Shoot” digital camera or smart phone can become a UAS payload (Figure 3). For example, the generation of inexpensive geo-referenced digital elevation maps (DEMs) and orthomosaics with flight patterns pre-loaded within the UAS (Figure 4), are now well within the hobbyist realm. Inexpensive digital camera with GPS-capable geo-referencing can be configured to trigger automatically, or from the on-board autopilot generating pulses based upon travel velocity. Overlapped images can be processed into a mosaic, or stitched, forming stereo pairs for near- LiDAR 3-D images or point clouds (Figures 5 and 6). Many software options are available for processing UAS images from sequential geo-referenced photographs, both workstation and web based.

Supplementing Ground-Based Geophysics

The potential benefits that UAS technology can bring to geophysics is evident when considering the following application. An immediate research goal is to determine a survey methodology for the mapping of large acreages of buried agricultural drainage tile networks across the U.S. Midwest. Figure 7 shows a Google Earth image, which by happenstance, has the field moisture and crop growth stage revealing the buried tile network. One can observe that too much growth masks the network in some areas, while in lower moisture areas; the lush growth only immediately above reveals the tile network. Earlier or later in the season, the network would have



Figure 4: Ortho imagery from hobbyist-grade UAS, nearly reaching or matching that of lower-tier commercial grade systems.



Figure 5: Near LiDAR quality imagery from hobbyist-grade UAS.



Figure 6: (a) NDVI image from a converted Point and Shoot digital camera, (b) corresponding photograph (Event38).

Table 1. UAS Agricultural Geophysics

Category	Target	Passive Sensor ¹
<u>Crop</u>		
	Chlorophyll	NDVI
	Stress	NDVI, visual
	Maturity	NDVI, visual
	Disease	NDVI, visual
	Fertility	NDVI, visual
	Population	NDVI, visual
<u>Soil</u>		
	Surface compaction	geomagnetic, visual
	Traffic pans	geomagnetic, visual
	Drainage	geomagnetic, visual, ortho
	Moisture	geomagnetic, visual, near infrared
	Classification	visual
<u>Insurance</u>		
	Flood	visual
	Drought	visual
<u>Pests</u>		
	Weeds	NDVI, visual
	Disease	NDVI, visual
	Insect/nematode/etc.	NDVI, visual
	Animal	Thermal, visual
<u>Livestock</u>		
	Health	Thermal
	Location	Thermal, visual
	Predators	Thermal

remained hidden from view. On-demand aerial surveying can similarly reveal numerous other dynamic features that are influenced by time-varying parameters, such as soil moisture, cover crop, crop maturity, and season. Passive geophysical surveying from an inexpensive UAS can be an effective tool in that it helps focus more expensive, ground-based geophysical surveys. Table 1 is a tabulation of agricultural geophysics applications that are applicable to the UAS. Note that these are passive systems, rather than active, and the list will expand as UAS technology matched with miniaturized geophysics matures. The UAS has the potential to make significant contributions to agriculture. However, research and development within the U.S. is currently limited, as the implementation of UAS technology for commercial use is restricted for general agricultural operations under current FAA regulations. Experts project rapid UAS expansion in agricultural production applications when these restrictions are loosened after September 2015.

Original Article located here: <http://www.eegs.org/Portals/2/FastTimeFiles/March%202014%20FastTIMES%20-%2005%2027%202014%20-%20Low%20Res.pdf>



Figure 7: Google Earth image illustrating the dynamic effect of soil moisture and crop growth in revealing buried drainage tile network

Free UAS Hobbyist Resources

- Personal Unmanned Aerial Vehicles. <http://diydrone.com/>
- Droneyard. <http://droneyard.com/>

References

- Association for Unmanned Vehicle Systems International. 2013. The Economic Impact of Unmanned Aircraft Systems Integration in the US. Robotics Tomorrow. March. Available at: <http://tinyurl.com/I5qrt8s> . Accessed 25 February 2014.
- FAA. 2012. FAA Modernization and Reform Act of 2012. SEC. 336. Special Rule for Model Aircraft. Available at: <http://tinyurl.com/85vhakh> . Accessed 25 February 2014.

USGS nominee clears Senate Committee on Energy and Natural Resources

AGI Geoscience Policy Program

The Senate Energy and Natural Resources Committee cleared the nomination of Dr. Suzette Kimball as Director of the U.S. Geological Survey (USGS) in a business

meeting on June 18. The nomination cleared the committee by unanimous voice vote.

Senator Joe Manchin (D-WV) expressed his approval of the work Dr. Kimball has done in her capacity as Acting Director of USGS since 2013, and signaled his support for the nomination. Dr. Kimball testified before the committee at a hearing held May 13 and affirmed her commitment to the role of USGS in providing science to support public health and safety, and sustainable, resilient communities.

The nomination will move to the full Senate for further consideration.

Source: Senate Energy and Natural Resources Committee

Study finds global REE supplies sufficient for U.S. defense needs

AGI Geoscience Policy Program

A recent Department of Defense (DOD) report finds that for the foreseeable future, the global supply of rare earth elements (REEs) should be sufficient to meet U.S. defense needs. Despite concerns about availability and price of REEs, DOD finds an 11.8 percent decline in global REE demand from 2010 to 2013. During that period, REE demand and prices declined while available supplies increased.

Global REE prices soared in 2010 in the wake of new Chinese export controls, prompting decision makers and companies to examine alternatives, including mining REEs outside China and exploring substitute materials. Rare earth advocates point out the potential negative impacts of relying on foreign nations to provide critical defense supplies. They suggest promoting domestic production of REEs where possible and developing methods of recycling and remediating REEs. DOD responded that recycling has proved infeasible due to financial, regulatory, and technical challenges. However, the Administration will continue pursuing a strategy of diversifying supply, exploring substitutes, and recycling waste.

Sources: Department of Defense, E&E News

House Science, Space, and Technology Committee approves FIRST Act

AGI Geoscience Policy Program

The House Committee on Science, Space, and Technology approved the Frontiers in Innovation, Research, Science, and Technology (FIRST) Act (H.R. 4186) by a party-line vote of 20-16 in a markup held on May 28. The FIRST Act reauthorizes federal funding for the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST), and the Office of Science and Technology Policy (OSTP).

The FIRST Act would bring changes to the NSF funding process by having Congress set funding at the directorate level, whereas current legislation allows NSF to allocate funds among the directorates. The bill would cut the Geosciences Directorate budget by 3 percent and would cut the Social, Behavioral, and Economic Sciences Directorate budget by 30 percent, while boosting funding for other directorates. The FIRST Act authorizes \$127 million less for NSF than the fiscal year 2015 Commerce, Justice, Science, and Related Agencies Appropriations Bill (H.R. 4660) currently under consideration by the Senate. The bill would require scientists to prove each grant's unique scientific merits and direct relevance to the broad national interest before funding is granted.

In the first part of the markup held on May 21, Committee Chairman Lamar Smith (R-TX) stated that NSF should focus on areas that lead to technological innovation and job growth, such as physical science and engineering. Ranking Member Eddie Bernice Johnson (D-TX) opposed passage of the bill, voicing concern that it diminishes the ability of the scientific community and the country to advance science and innovation. An amendment offered by Representatives Jim Sensenbrenner (R-WI) and Zoe Lofgren (D-CA) that shortens the embargo period for open access to federally funded research from 24 months to 12 months was also approved by voice vote.

The bill will now be referred to the full House for further consideration.

Sources: American Association for the Advancement of Science, E&E Daily, House Committee on Science, Space, and Technology

Recognize anyone you know?

Leigh Sutherland

American Geosciences Institute

AGI closed its nominations on February 1 of this year and then the nominating committees went to work. The individuals who the AGI Member Societies approved are the following:

This year the AGI Medal in Memory of Ian Campbell for Superlative Service to the Geosciences, AGI's highest award, will be presented to James F. Davis for his five-decade career in capacities such as State Geologist of New York, State Geologist of California, President of the Association of American State Geologists, and President of AGI. During his California tenure, he established a statewide program of landslide- and liquefaction-hazard mapping and oversaw a program for improving seismic safety in public schools and hospitals.

For our William B. Heroy Jr. Award for Distinguished Service to AGI, the American Association of Petroleum Geologists was chosen for many reasons, including its support of Earth Science Week, AGI's K-5 initiative, sponsoring AGI's Spring and Fall interns, providing committee members, and helping to ensure complete coverage of AAPG publications in GeoRef.

The AGI Award for Outstanding Contribution to Public Understanding of the Geosciences will be given to David R. Wunsch, State Geologist, Delaware Geological Survey, but it will be for his prior duties as State Geologist of the New Hampshire Geological Survey where for ten years he served to educate the public of the importance and fragility of New Hampshire's agricultural, groundwater, and mineral resources and about ways in which to protect them.

The above awards will be presented in October in conjunction with the Geological Society of America annual meeting to be held in Vancouver, British Columbia, Canada.

If you know of someone deserving of recognition for their work, AGI would appreciate receiving their name on a nomination form. Nomination forms are available on the AGI web site to download. Nominations can be made by individual members of any AGI Member Society. Nominations can also be submitted online by visiting the website: <http://www.americangeosciences.org/awards>

and clicking on "Call for Nominations" at the bottom of the page.

The deadline for submitting nomination forms and supporting bio/backup material on candidates to AGI is February 1, 2015.

2014 J.P. Gries Geologist of the Year Award Announced

The South Dakota section of the American Institute of Professional Geologists (AIPG) has named South Dakota School of Mines & Technology professor Dr. Colin J. Paterson as 2014 J.P. Gries Geologist of the Year. The award is named in honor of Dr. John Paul Gries for his exceptional work in the field of geology and is provided each year by the South Dakota Section AIPG in memory of Dr. Gries, a longtime geology professor at the School of Mines.

Dr. Paterson, a native of New Zealand, earned Ph.D. and B.Sc. (Honors) degrees in geology at University of Otago in 1978 and 1972, respectively. He inherited his love of the outdoors, sports, and geology in the majestic terrain of the South Island of New Zealand. While attending university there, Paterson interned with mineral exploration companies, completed his Ph.D., and then took a position as lecturer in economic geology at the University of Cape Town in South Africa (where he fine-tuned his squash skills), and used these educational and research experiences to launch an academic career in North America.

Dr. Paterson currently serves as professor of Economic Geology at the School of Mines, where he has remained a faculty member of the Department of Geology & Geological Engineering for the past

32 years. In this position, he has educated thousands of undergraduate and graduate students in geology, many of whom have gone on to achieve success in the mineral industry in North America and elsewhere around the world. Dr. Paterson has led geology field camps and trips for college students in the Black Hills, Turkey, Spain, Hawaii, New Zealand, and the southwest United States. He has published over 30 professional papers in the field of geology.

Dr. Paterson has made many other exceptional contributions to the field of geology and the environment, a few of which are listed below.

- Following a 1993 NASA Space Grant funded summer faculty internship at USGS EROS Data Center, Paterson helped develop the first undergraduate and graduate classes in Geographic Information Systems (GIS) at the School of Mines
- Chairman, Dept. of Geology and Geological Engineering at School of Mines from 1995-1997
- Director, Black Hills Natural Science Field Station (geology field camp) from 1999-2005
- Co-founder and President of the Norbeck Society, Inc., an advocacy group for stewardship, restoration, and enjoyment of public lands in the Black Hills
- Founder and advisor of "Norbeck Uni" and "Society of Economic Geologists", student organizations at the School of Mines

Previous J.P. Gries award recipients include State Geologist Derric Iles, CPG-

10986, and Dr. Mark Fahrenbach of the South Dakota DENR's Geological Survey Program, Fred Steece of DENR's Minerals and Mining Program, and Drs. James Fox, Alvis Lisenbee, MEM-1747, J. Foster Sawyer, CPG-10000, Perry H. Rahn, CPG-03724, Jack Redden and Edward Duke of the School of Mines, and Mark Anderson of the U.S. Geological Survey.

NAGT 2014 Dorothy "Dottie" Stout Professional Development Grants Awarded

The National Association of Geoscience Teachers is pleased to announce the winners of our 2014 Dorothy (Dottie) Stout Professional Development Grants. Dottie Stout was the first female president of NAGT and was active as a strong supporter of Earth science education at all levels. In honor of Dottie's outstanding work and lifelong dedication to Earth science education, NAGT

awards grants to faculty and students at two-year colleges and K-12 teachers in support of the following:

- Participation in Earth science classes or workshops
- Attendance at professional scientific or science education meetings
- Participation in Earth science field trips
- Purchase of Earth science materials for classroom use

This year's grant recipients are:

Joel Aquino, West Hall High School, Oakwood, GA

The Dorothy Stout Professional Development grant will allow Joel Aquino to attend the 2014 Geological Society of America conference in Vancouver, Canada. Joel is in a unique situation in that he teaches the cross-disciplines of geology and physics/physical science in a K-12 high school (West Hall High School), introductory college (University of North Georgia) and graduate-level education (Piedmont College). Joel's attendance and participation at GSA will assist him in achieving his goals of remaining up-to-date on current Earth science pedagogy and Earth science research. This grant will allow Joel to update his professional knowledge, skills, and connections in order to better serve his broad spectrum of students and future science educators.

Ella Bowling, Mason County Middle School, Maysville, KY

The Dorothy Stout Professional Development grant will allow Ella Bowling to attend the History of Life—In the Fossil and Rock workshop with the Geoscience Adventures of the Bighorn Basin. Currently, Ms. Bowling teaches a wide array of Earth science concepts including the rock cycle, plate tectonics, and weathering and erosion. This grant will allow her to experience this type of geology first hand in a field study basis that would enhance her content knowledge, improve her skill set, and greatly expand what she is currently doing regarding Earth science education in her 7th grade classroom.

Andrew Buddington, Spokane Community College, Spokane, WA

The Dorothy Stout Professional Development grant will allow Andrew Buddington to facilitate an

undergraduate student research project involving a combination of field and laboratory research on newly recognized (and geologically important) Precambrian rocks of the Inland Northwest region. The area of study (Cougar Gulch) was recently age dated by researchers from Washington State University. The geologic ages produced were completely unexpected and represent some of the oldest known rocks in the Pacific Northwest (1.86 to 2.64 billion years old). This grant will provide funding for sample preparations and analysis needed to complete an important phase of the project.

AAG Awards Presented at 2014 Annual Meeting

AAG members and conference delegates gathered for a special awards luncheon to honor recipients of AAG awards, grants, and scholarships at the AAG Annual Meeting in Tampa, Florida, on April 12, 2014. Other commendations announced and presented at the luncheon include, AAG 50-Year Members, AAG Honors, Enhancing Diversity Awards, Book Awards, the Harold Rose Award for Anti-Racism Research and Practice, and the Stan Brunn Award or Creativity in Geography.

AAG International Geographic Information Fund Awards

The AAG International Geographic Information Fund supports full-time students who are currently registered in an undergraduate or graduate degree program within the United States, and who are working in any area of spatial analysis or geographic information science or systems. Three 2014 travel grants supported student attendance at the AAG Annual Meeting in Tampa.

- Amber Boll, from Georgia State University
- Paulita Bennett-Martin, from Georgia State University
- Yaoli Wang, from the University of Georgia

AAG Darrel Hess Community College Geography Scholarships

Outstanding students from community colleges, junior colleges, city colleges, or two-year educational institutions who will be transferring as geography majors to four-year universities receive support and recognition

from this scholarship program, including \$1,000 for educational expenses. The scholarship has been generously provided by Darrel Hess of the City College of San Francisco to 25 students since 2006.

- Megan Yanez, Rio Hondo Community College, California State University Los Angeles
- Joel van de Sande, City College of San Francisco, University of California, Berkeley

AAG Community College Travel Awards

AAG provides Community College Travel Grants to support attendance at the AAG Annual Meeting by students from 2-year institutions. These travel funds are generously provided by Darrel Hess and Robert and Bobbé Christopherson. The award consists of conference registration, one year membership in the AAG, and a travel subsidy of \$500 to attend the meeting.

- Megan Yanez, Rio Hondo Community College
- Joel van der Sande, City College of San Francisco

2014 AAG Mel Marcus Fund for Physical Geography

The AAG Mel Marcus Fund for Physical Geography was created to carry on the tradition of Mel Marcus, who, throughout his career, advocated for the importance of field experiences in research, in teaching, and in life. Grants from the AAG Mel Marcus Fund for Physical Geography foster personally formative participation by students collaborating with faculty in field-based physical geography research in challenging outdoor environments.

Dr. Yarrow Axford with graduate students Gregory Everett Lasher and Jamie Marie McFarlin from Northwestern University, "Field Studies of Past Climate Change in Northwest Greenland"

J. Warren Nystrom Award

This prestigious annual prize distinguishes a paper based upon a recent dissertation in geography. Nystrom was the AAG Executive Director from 1966-1979, and an exceptional educator and professor of geography with a long and productive career in international relations as a senior official in Foreign Policy at the U.S. Chamber of Commerce, an international relations consultant, and Senior Fellow at The Brookings Institution. 2014

Nystrom Committee Members are Thad Wasklewicz (Chair), Kevin Ward, and Julie Silva.

Martha Bell, Pennsylvania State University, "Historical Political Ecology of Water: Municipal Water Governance in Colonial Lima, Peru (1578-1700)"

2014 William L. Garrison Award for Best Dissertation in Computational Geography

The biannual William L. Garrison Award for Best Dissertation in Computational Geography supports innovative research into the computational aspects of geographic science. The award is intended to arouse a more general and deeper understanding of the important role that advanced computation can play in solving the complex problems of space-time analysis that are at the core of geographic science. The award is an activity of the Marble Fund for Geographic Science of the AAG.

- Eric Shook, Kent State University, "A Computational Approach to Understanding Spatial and Temporal Granularities in Agent-Based Modeling," University of Illinois at Urbana-Champaign
- Yiyi Wang, Montana State University, "A New Spatial Model for Predicting Multivariate Counts: Anticipating Pedestrian Crashes across Neighborhoods & Firm Births across Counties," University of Texas at Austin

2014 Glenda Laws Award

The Glenda Laws Award recognizes early to mid-career scholars and their outstanding contributions to geographic research on social issues. It is named in memory of Glenda Laws—a geographer who brought energy and enthusiasm to her work on issues of social justice and social policy. The award is administered by the AAG and endorsed by the Institute of Australian Geographers, the Canadian Association of Geographers, and the Institute of British Geographers.

Juanita Sundberg, University of British Columbia, is recognized for her commitment to social justice, which is deeply embedded in both her teaching and scholarship. Her work at the intersection of political ecology, feminist geopolitics and critical theories of race pushes and challenges other scholars committed to social justice imperatives to be cognizant of their own potential complicity in reproducing various inequities, including North-South differences. Her teaching in upper division

courses has been evaluated as 'life-changing' by students and is reflected in the teaching awards she has received. Dr. Sundberg develops curriculum inviting community-based organizations to partner with her in providing courses that investigate social justice issues in a participatory framework. Nominators said, "she is constantly putting community realities at the forefront of her pedagogical approach," and that her work has powerful ripple effects. Like the late Laws, Dr. Sundberg is dedicated to understanding feminist perspectives. Despite her noteworthy accomplishments, she is deeply humble, doing much of her activist work behind the scenes without seeking credit or attention.

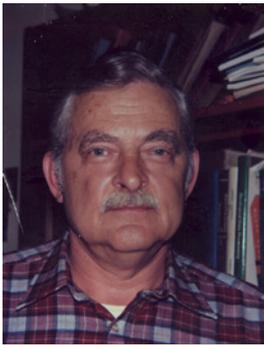
2014 AAG Meredith F. Burrill Award

The AAG Meredith F. Burrill Award honors work of exceptional merit and quality that lies at or near the intersection of basic research in geography on the one hand, and practical applications or policy implications on the other. The purpose of the award is to stimulate and reward talented individuals and groups whose accomplishments parallel the intellectual traditions Meredith F. Burrill pursued as a geographer, especially fundamental geographical concepts and applications as relevant to local, national, and international policy arenas.

Douglas Batson, Research Fellow at the National Intelligence University and Toponymist on the staff of the U.S. Board of Geographic Names, Foreign Names Committee is recognized for his outstanding career that encapsulates the award's intent to recognize work that bridges research and policy. As toponymic analyst and through his scholarship on applied toponymy and political geography, Mr. Batson has made substantive contributions that meet each of the three special considerations of this award, namely to conduct interand multidisciplinary work on the interrelationships of significant cultural phenomena; to advance place name standardization; and to promote local, national, and international collaboration on such problems and topics.

The Reynolds Cup of the CMS

Michael Plötze



Award namesake Bob Reynolds, and the cup

The Reynolds Cup competition, named after Bob Reynolds for his pioneering work in quantitative clay mineralogy and his great contributions to clay science, was created in 2002 by Douglas McCarty (Chevron ETC), Dennis Eberl (USGS), and Jan Srodon (PAN, Poland). The competition was sponsored by Chevron and the trophy was donated by the USGS. The Reynolds Cup competition is now on a regular base funded by the Clay Minerals Society CMS and the German-Austrian-Swiss Clay Group DTTG.

The primary goal of the Reynolds Cup is to stimulate improvements in techniques of quantitative mineral analysis and individual skills in a sportive spirit! An important aspect of the Reynolds Cup is that it fosters continued interest in improving methods (instruments, software, models...) and is not only an academic exercise but a form of proficiency testing for daily use in the lab. Quantitative mineralogical analysis of clay bearing rocks and soils are vital to both academia and industry, yet it still remains a

challenge to implement and develop methodologies that give accurate results. The competition is held on a biennial basis and free for all to enter using any analytical method or combination of choice. Unlike other round-robin events that used well-ordered, high-symmetry phases or splits from natural samples with unknown mineral composition, the Reynolds Cup competition utilizes mixtures of pure standards that represent realistic clay-bearing sedimentary rock or soil compositions. The participants are sent three artificial mixtures, and they



Reynolds Cup Awarding.

must identify and quantify all of the components. The results submitted by the participants are ranked by the sums of the differences between the actual compositions and the measured compositions (bias). The entry with the smallest sum of absolute errors for the three samples provided is presented with the prestigious Reynolds Cup. Only the names of the top three contestants are announced at the Clay Minerals Society annual meeting and are presented with commemorative plaques. The names of all other participants are kept confidential.

The Reynolds Cup competition has developed into a story of success (sometimes even mentioned as "world championship" in quantitative mineralogy). It goes now into its 8th round (16th year) with participation increasing year on year. Whereas in the first competition in 2002 from 40 registrants just 15 submitted results (rate 38%) the numbers increased in 2014 to 81 registrants from 21 countries with 67 submitting results (rate 83%).



Winner RC2014 Labor Freiberg

The results of the most recent 7th CMS Reynolds Cup were announced at the Annual CMS meeting in College Station, TX in May 2014. The competition was won by Reinhard Kleeberg and his coworkers Ulf Kempe and Robert Möckel (TU Bergakademie and Helmholtz Institute Freiberg, Germany). Reinhard Kleeberg is thus also the first who could repeat his victory in the Reynolds Cup. The second place went to Steve Hillier and his teammates Helen Pendrowski, Nia Gray, and Ian Phillips (The James Hutton Institute, Aberdeen, Scotland). Jan Diétel and Jasmara Wojatschke (University Greifswald) and Kristian Ufer, Stephan Kaufhold, and Reiner Dohrmann (BGR, LBEG Hannover, Germany) tied for third place.

The Reynolds Cup will continue its tradition in 2016, and the 8th competition will be organized by Reinhard Kleeberg. Further information about the competition including guidelines and previous winners with a description of their applied methods can be found on <http://clays.org/SOCIETY%20AWARDS/RCintro.html>.



Randi Martinsen

2014-2015 AAPG Executive Committee

Randi Martinsen, principal with Hydrocarbon InSight in Laramie, Wyo., assumed the presidency of AAPG on July 1.

Martinsen, a native of Brooklyn, N.Y., is a former longtime senior lecturer of petroleum geology at the University of Wyoming, Laramie. She previously served on the AAPG Executive Committee as treasurer in 2006-08, and received the AAPG Distinguished Service Award in 2009.

Martinsen holds a bachelor's degree in earth and space science from the State University of New York, Stony Brook, and a master's in geology from Northern Arizona University in Flagstaff, Ariz.

She started her career in 1974 as a geologist for Cities Service Co., in Denver, and five years later moved to Laramie to become a consulting geologist. Starting in 1981 she began her association with the University of

Wyoming – she's been a sponsor for the University of Wyoming Student Chapter since 1993, and has since 2002 served as chair of the Rocky Mountain Rendezvous of Geoscience Students and Employers job fair, held annually in Laramie.

She started Hydrocarbon InSight in 2012.



John Hogg

Joining Martinsen on the Executive Committee is John Hogg, an AAPG Honorary member and newly named president of Skybattle Resources Ltd. in Calgary, Canada, who recently was voted president-elect and will serve as AAPG president in 2015-16.

Hogg, who previously had been vice president of exploration and operations for MGM Energy Corp. in Calgary, earned his B.Sc. in geology from McMaster University in Hamilton, Ontario. He had been exploration manager for ConocoPhillips Canada and a geologist for other Canadian and international companies before joining MGM Energy, often focusing on the Atlantic and Arctic regions.

He previously served on the AAPG Executive Committee as vice president-Regions and as chair of the AAPG House of Delegates.

Hogg will be one of two Canadians on the Executive Committee, joining fellow Canadian David Dolph, team lead for global exploration-new ventures for Calgary-based Nexen Energy ULC, who began his one-year term as the chair of the AAPG House of Delegates.



Steve Brachman

Others recently elected to the AAPG Executive Committee and who began their two-year terms of office on July 1 were:

- Vice President, Sections: Steve Brachman, vice president of exploration and development, Wapiti Energy, Houston.

AWARDS & LEADERSHIP

- Treasurer: Jim Tucker, former longtime geologist for Saudi Aramco and now a consulting geologist in Houston.



Jim Tucker

- Secretary: Richard W. Ball, Chevron, Angola Block O, Houston, also completing the final year of his two-year term.



Richard W. Ball

Others on the 2014-15 committee are:

- Vice President, Regions: John Kaldi, Australian School of Petroleum, University of Adelaide, Adelaide, Australia, completing the final year of his two-year term.



John Kaldi

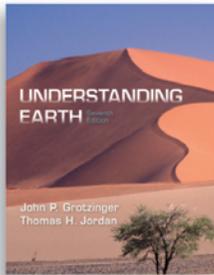
- Editor: Michael Sweet, ExxonMobil Production, Houston, completing the second year of his three-year term.



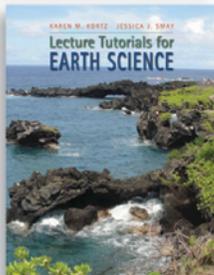
Michael Sweet

W.H. FREEMAN AND COMPANY NEW FOR 2014

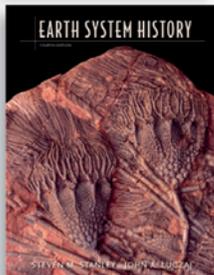
GEOLOGY



Grotzinger | Jordan
UNDERSTANDING EARTH
Seventh Edition



Kortz | Smay
LECTURE TUTORIALS FOR EARTH SCIENCE



Stanley | Luczaj
EARTH SYSTEM HISTORY
Fourth Edition



Merritts | Menking | de Wet
ENVIRONMENTAL GEOLOGY
Second Edition



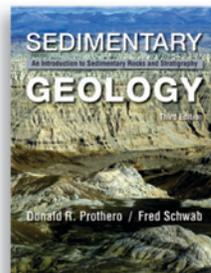
Bierman | Montgomery
KEY CONCEPTS IN GEOMORPHOLOGY



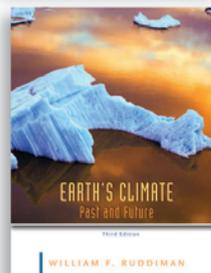
Because technology should never get in the way.

W. H. Freeman's acclaimed media content in a breakthrough interface in which power and simplicity go hand in hand. Featuring:

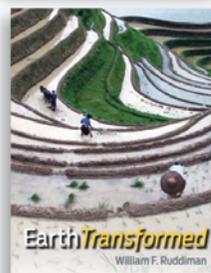
- Prebuilt Units
- LearningCurve adaptive quizzing
- Videos and tutorials
- Helpful analytics
- Interactive e-Book
- GoogleEarth® exercises



Prothero | Schwab
SEDIMENTARY GEOLOGY
An Introduction to Sedimentary Rocks and Stratigraphy
Third Edition



Ruddiman
EARTH'S CLIMATE PAST AND FUTURE
Third Edition



Ruddiman
EARTH TRANSFORMED

For more about our outstanding textbooks and educational media across the geology curriculum, contact your local W.H. Freeman representative, or visit www.whfreeman.com/geology



SEG EVENTS | segweb.org/events

SEG

www.segweb.org

Sedimentary Rock-Hosted Copper Deposits of the Central African Copperbelt

Windhoek, Namibia, Africa
August 17, 2014



A pre-meeting short course offered in conjunction with The Roy Miller Symposium

DESCRIPTION

Sedimentary rock-hosted stratiform copper deposits comprise disseminated to veinlet Cu- and Cu-Fe-sulfides in siliciclastic or dolomitic sedimentary rocks. These deposits are common, although rarely as economically significant occurrences. Yet they currently account for ~23% of the world's Cu production and known reserves and are important sources of Co and Ag.

This one-day, pre-meeting short course will focus on the geology and ore deposits of the Central African Copperbelt, the world's largest and highest-grade sedimentary copper province, with ~200 Mt of contained copper and the world's largest cobalt reserves. Deposit settings, mineralization controls, and alteration styles in the Zambian Copperbelt, Congolese Copperbelt, and in the North West Province of Zambia will be covered. In analyzing why the Central African Copperbelt is so rich relative to other sedimentary Cu districts, participants will learn exploration strategies for this deposit type.

PRESENTER



- Presenter: Dr. Murray W. Hitzman** – Charles F. Fogarty Professor of Economic Geology, Department of Geology & Geological Engineering, Colorado School of Mines, Golden, Colorado, 2005 President of SEG

Murray W. Hitzman worked in the petroleum and minerals industries from 1976 to 1993, receiving a Ph.D. in geology from Stanford in 1983, and was largely responsible for the Lisheen Zn-Pb-Ag deposit discovery in Ireland. Murray served as a policy analyst in both the U.S. Senate (1993–1994) and the White House Office of Science and Technology Policy (1994–1996). In 1996, he accepted a position at the Colorado School of Mines. Murray has been conducting research with students in the Central African Copperbelt for the past 15 years.

REGISTRATION Online at www.geolsocnamibia.org

Registration Fees

Member: N\$1800

Student Member: N\$250

Non-member: N\$2800

Student Non-member: N\$400



AAPG: URTeC

Online registration continues for the second annual Unconventional Resources Technology (URTeC) Conference, which will be held Aug. 25-27 at the Colorado Convention Center in Denver. URTeC, hosted jointly by AAPG, the Society of Petroleum Engineers (SPE) and the Society of Exploration Geophysicists (SEG), is the industry's only integrated event for unconventional resource teams.

"It's the only conference where the three big professional societies come together," said AAPG Honorary member Randy Ray of R3 Exploration Corp., who also co-chairs the URTeC technical program committee as a representative of SEG. His co-chairs on the committee are Honorary member and past AAPG president Steve Sonnenberg of the Colorado School of Mines, representing AAPG, and AAPG member Luis Baez of BG Group, representing SPE. The technical program boasts papers from all three disciplines dealing with innovations, best practices and experiences in integrated approaches for North American unconventional resource plays. The event has been designed to fill the unique need for a peer-reviewed, science-based unconventional resources conference that will take an asset team approach to development of unconventional resource plays – similar to how oil and gas professionals work in today's market.

"URTeC was developed in response to the industry's need to bring together geologists, geophysicists, engineers and business managers to gain a mutual understanding of each other's roles and deploy an asset team approach to E&P operations," Baez said.

And, the strength of that demand was reflected in the massive turnout and positive response to URTeC's inaugural event last year: More than 4,300 individual members of the oil and gas industry and 173 exhibiting companies participated.

Following the event, 100 percent of survey respondents said they found it useful for their job and company and would recommend URTeC to a friend or colleague, and 100 percent said they felt that the underlying concept of the conference was critical to the advancement of the unconventional sector. Ray said this year's technical program will differ from last year's in that the sessions are organized to serve a more integrated audience, whereas they were more discipline-specific in 2013.

"We are intentionally trying to have technical sessions in which we have an engineer and a geologist and a geophysicist give presentations within that same technical theme," he said. "This year, we tried to create some hybrid sessions where we would invite all those professions to share in their learnings. We have sessions where we have team presentations, with speakers from all of these professions."

This year's event will open with a plenary session lasting from 8:30 a.m. to noon on Monday, Aug. 25. The plenary event will "explore the foundational scientific, technical and business technologies and practices" that in a multi-disciplinary environment can "move the needle across the value chain of unconventional resource identification, assessment and monetization."

The session's moderator will be former AAPG executive director Rick Fritz, now with SM Energy. Panelists will include:

- Robert Ryan, vice president-Global Development, Chevron.
- Brad Holly, vice president-Rockies, Anadarko Petroleum.
- Scott Key, chief executive officer, HIS.
- Jay Ottoson, president and chief operating officer, SM Energy.
- Tom Petrie, president, Petrie Partners.

For more information go to the URTeC website, at www.urtec.org.

AAPG: International Conference and Exhibition (ICE)

The technical program has been finalized and registration is open for this year's AAPG International Conference and Exhibition (ICE), set Sept. 14-17 in Istanbul, Turkey.

The theme for the meeting – hosted by the Turkish Association of Petroleum Geologists and the AAPG Europe and Middle East Regions – is “The Spirit Between Continents: Energy Geosciences in a Changing World.”

Organizers said the technical program will provide the latest in science – not only for regional plays, but also geological advances from around the world.

The technical program themes include:

- New and Emerging E&P Provinces.
- E&P in Mature Basins.
- Regional Geology and Tectonics.
- G&G Integration.
- Unconventional Resources.
- Conventional Resources.
- Petroleum Systems and Geochemistry.
- Siliciclastics and Carbonates.
- Structural Geology and Traps.
- Health, Safety, Environment Geology and Hydrogeology.
- History of Petroleum Geology.
- Several special forums are planned, including:
 - Technical Innovation and Collaboration – Keys to Affordable Energy.
 - Tethys Evolution.
 - Sessions honoring the careers and work of AAPG legendary geologists Peter Ziegler and Dave Roberts.
 - The newest presentation of the Discovery Thinking Forum, this time offering specific talks on northern Iraq, India's Barmer Basin, Yemen's Habban Field and Oman's Mabrouk deep gas discovery.

This year's event marks the first time an ICE has been held in Istanbul, but the meeting has other historical significance: For the first time, an ICE will incorporate AAPG's regional Prospect and Property Expo (APPEX), which will offer its own exploration-themed presentations and exhibits alongside those of ICE.

APPEX is the key forum for networking and international deal development, carefully designed for participants to meet, discuss and negotiate deals with global decision makers.

Complete ICE details and registration information can be found online at ice.aapg.org/2014.



AAPG

International Conference & Exhibition

Join Us for the 57th Annual Meeting

September 20-28, 2014 | Scottsdale, Arizona

Hosted by the AEG Arizona Section

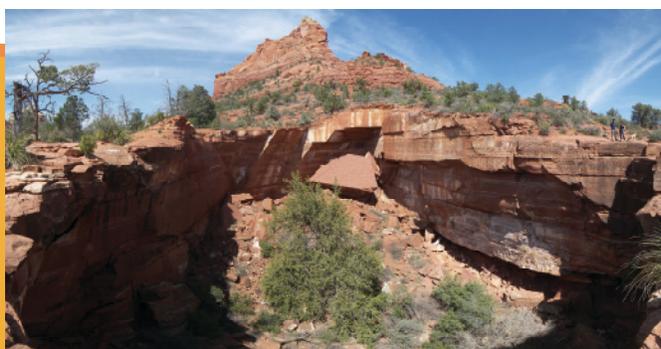
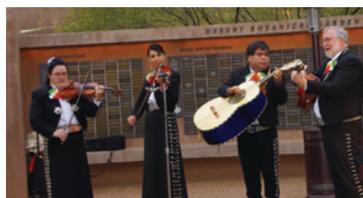
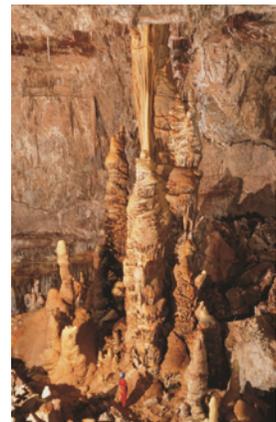


Conference Highlights

- ◆ Learn best practices and emerging trends by attending technical sessions/symposia
- ◆ Four reasonably-priced short courses
- ◆ Field trips to Grand Canyon, Sedona and more
- ◆ Guest tour of unique Frank Lloyd Wright home
- ◆ Stunning Sonoran Desert scenery
- ◆ Enjoy the Valley of the Sun weather poolside
- ◆ Enjoy a mariachi band at the special event
- ◆ Network with old and new colleagues
- ◆ Visit with our Exhibitors
- ◆ Wander the Art District in Old Town Scottsdale
- ◆ Go shopping at the Scottsdale Fashion Square
- ◆ Fantastic Mexican and southwestern food

Affordable Professional Development

- ◆ Spend your organization's money wisely, and join AEG for a memorable conference in beautiful Scottsdale, Arizona.
- ◆ Full conference registration is only \$395 for members registering by August 1, 2014
- ◆ Group rate at the well-appointed DoubleTree Resort by Hilton Paradise Valley – Scottsdale is only \$139/night.
- ◆ Five reasonably-priced field trips planned to amazing Arizona geologic destinations.
- ◆ Special event at The Zelma Basha Salmeri Gallery of Western American and American Indian Art includes transportation, beer and wine for only \$60/person.



www.azaeg.org/aeg2014



Register Before
August 1 to Take
Advantage of
Reduced Registration Rates!



Tourism Vancouver/Clayton Perry.

Annual Meeting & Exposition

GSA 2014



19-22 October | Vancouver, BC, Canada

Take this opportunity to travel to fabulous Vancouver, British Columbia, to meet face-to-face with colleagues, peers, potential employers, and some of the top “rock stars” in this industry! It is time well spent—just ask any of the 8,000+ attendees from our 2013 annual meeting.

Submit your abstract.

<https://gsa.confex.com/gsa/2014AM/efp.epl>

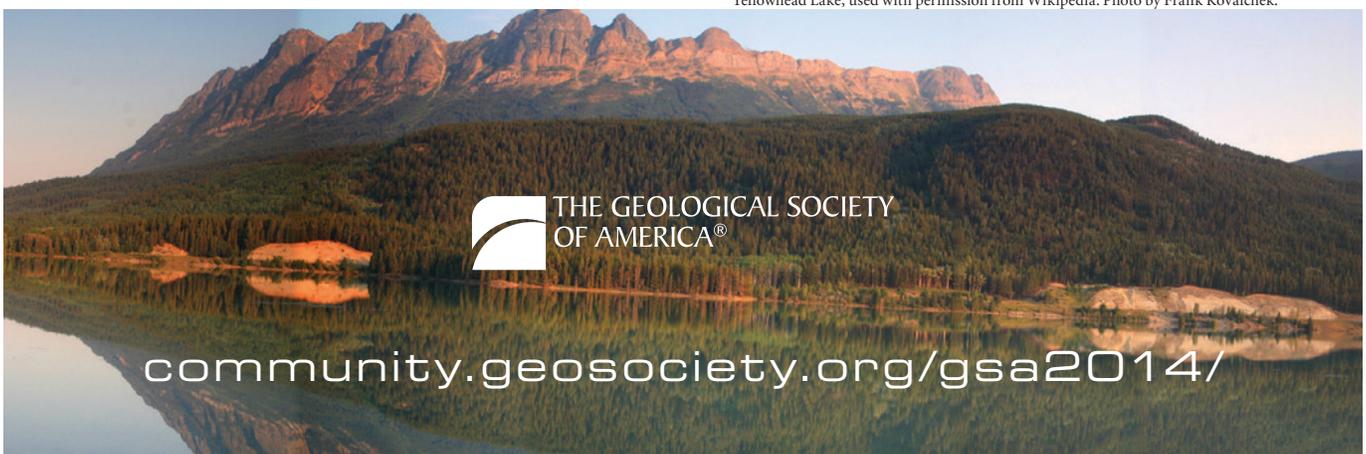
Abstract deadline: 29 July 2014

Register Today!

Plan to arrive early or stay late and attend a
Technical Field Trip or Short Course.

Early registration deadline: 15 September 2014

Yellowhead Lake, used with permission from Wikipedia. Photo by Frank Kovalchek.



 THE GEOLOGICAL SOCIETY
OF AMERICA®

community.geosociety.org/gsa2014/