## EAPS Weekly News

**UPCOMING EAPS MEETINGS**

### SPRING FACULTY MEETING SCHEDULE

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 14, 2015</td>
<td>3:00 - 4:30 PM</td>
<td>HAMP 3201</td>
</tr>
</tbody>
</table>

### EAPS DISTINGUISHED SCIENCE ALUMNI AWARD RECEPTION

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 17, 2015</td>
<td>HAMP 2201</td>
</tr>
</tbody>
</table>

### EAPS ANNUAL AWARDS BANQUET

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 20, 2015</td>
<td>5:30-9:00 PM</td>
<td>Ross-Ade Pavilion</td>
</tr>
</tbody>
</table>

### EAPS ALUMNI ADVISORY BOARD MEETING

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 21, 2015</td>
<td>3:30 PM</td>
<td>HAMP 2201</td>
</tr>
</tbody>
</table>

### SPRING 2015 FINAL EXAMS

May 4th - 9th, 2015

### COLLEGE OF SCIENCE COMMENCEMENT DATE

May 17, 2015

2:30 PM

*Elliott Hall of Music*

---

### EAPS PUBLICATIONS


### ENERGY COLLOQUIA

- **Terry Engelder**
  Dept. of Geosciences, Penn State Univ.
  "The Confluence of the Shale Gas Revolution and Plaste Tectonics in the Appalachian Basin"
  **Thursday, April 9, 2015**
  3:30 PM
  HAMP 1252

- **Andrew Bunger**
  Dept. of Civil and Env. Engineering
  Univ. of Pittsburgh
  "Geosciences Inspiring Engineering: What Dyke Swarms Teach us about Hydraulic Fracturing"
  **Thursday, April 16, 2015**
  3:30 PM
  HAMP 1252

- **Shawn Maxwell**
  President and CTO Itasca IMaGE
  "What Have We Learned About Fracturing Shales After 15 Years Of Microseismic Mapping?"
  **Thursday, April 30, 2015**
  3:30 PM
  HAMP 1252
EAPS NEWS

IU CROSSROADS GEOLOGY CONFERENCE

EAPS Graduate student Chen Chen participated in the IU Crossroads Geology Conference in Bloomington on 3/27 and 3/28 and presented a talk titled: "Shear velocity structure beneath the central United States: implications for Illinois Basin origin and the mechanism of intraplate seismicity".

~ ~ ~ ~ ~

DISCOVERY PARK POSTER SESSION, RECEPTION TO CELEBRATE STUDENTS’ ACHIEVEMENTS

An undergraduate student research poster session and reception on April 9th will highlight the achievements of students in a host of interdisciplinary internship programs affiliated with Discovery Park.

The annual event, organized and led by the Discovery Learning Research Center, is from 4:30 to 6:00 p.m. in the first-floor atrium of the Hall for Discovery and Learning Research. Stephen Beaudoin, interim associate vice provost for academic affairs and professor of chemical engineering, is scheduled to speak at 5:30 p.m.

More than 100 Purdue undergraduate students are participating in the event through the Cancer Prevention Internship Program, Discovery Park Undergraduate Research Internship (DURI), Louis Stokes Alliance for Minority Participation and the Margo Katherine Wilke Undergraduate Research Internship.

The event is free and open to the public, but registration is required by April 2 at: http://goo.gl/YDBRq1

~ ~ ~ ~ ~

OUTREACH EVENTS

There are many opportunities for you to give back and help with outreach events in the next month. Please look through these events and sign up to help with at least one activity.

April 9, 2015 (Thursday)
The Latino Cultural Center (LCC) water day
The event will be held 1:00-5:00 p.m. However you can sign up to just help with part of it. The LCC will be bringing ~ 20 high school students to campus. We will first take them to the Celery Bog to do some water testing and collect samples. Then we will finish testing back in the department. We need a couple of volunteers to help out and be extra hands. If your research is in Hydrology, this could be a good event for you to share your work.

April 18, 2015 (Saturday)
Springfest! (Please sign up for a 2 hour shift or two)
This is a huge community event that we participate in every year. Please help represent your research area. Steven will have activities ready to go. We will need volunteers to run the activities in shifts through the day.

April 20-24, 2015 (Monday through Friday)
Earth Week (Please sign up for a morning or afternoon)
This year we are making a push to do activities in local K-12 classrooms. We are hosting a geosciences week to help celebrate GLOBE at 20 and to help students understand how science works. We are doing a large data collection push. Purdue students studying in fields ranging from planetary geology to atmospheric science will be visiting classrooms throughout the week to help students collect data and enter it on the GLOBE international database. Funding for our events for this geoscience week was provided by the Halliburton Foundation. Please sign up for one of these days and if your child's classroom would like to participate, have them contact our K-12 Outreach Coordinator (Steven Smith) at mrsmith@purdue.edu. In the comment section of the online form, please indicate if you would like to do a weather related activity or a soil activity.

SIGN UP ON THIS ONLINE GOOGLE FORM:
http://goo.gl/cR8LPB

UNDERGRADUATE AND GRADUATE STUDENT INFORMATION

Hire Big 10 Plus Virtual Career Fair - April 7-8, 2015
Are you looking for a full-time job, internship, or co-op? Hire Big 10 Plus will be hosting a Virtual Career Fair on April 7 & 8, 2015. Students and alumni from all Big 10 schools are invited to interact via chat sessions and meet employers recruiting talent across all majors and degrees.

Click here to learn more and register

FALL AND SUMMER 2015 REGISTRATION
Undergraduate students will start to register for Purdue fall and summer 2015 classes beginning March 24, 2015.
Registration “weeks” are based on current semester classifications and will continue through April 25th. Open registration (open to all) will begin April 27th.
PURDUE UNIVERSITY GEOLOGICAL SOCIETY (PUGS)

PUGS is participating in this year’s Relay for Life to raise money and awareness for the American Cancer Society; their goal is $1,000. Almost all of us have been touched by cancer in some way, so they’ve decided to make a difference by raising money and walking in our campus American Cancer Society Relay For Life event.

At the event, their team will take turns walking around the track to raise money and awareness to help the American Cancer Society in the world's largest movement to end cancer. Their team is taking action to help finish the fight and prove that our generation is making a difference. Please join their team or make a donation. Saving lives from cancer starts with one team, one participant, and one dollar at a time.

You can find more information here:
http://goo.gl/LbO813

~ ~ ~ ~ ~ ~

CAREERWISE TRAINING PROGRAM

The CareerWISE laboratory would like to introduce you to the newly expanded CareerWISE resilience training program. CareerWISE is an evidence-based and freely available online resource that assists women in science and engineering fields to progress through their PhD programs and prepare for future career environments. Developed at Arizona State University with the generous support of the National Science Foundation, the program is the first of its kind - an online, anytime coach customized for women pursuing PhDs in STEM fields.

Since its first release with a 2010 press conference at NSF, CareerWISE has been used by tens of thousands of individuals in over 130 countries. Its effectiveness in strengthening resilience, self-efficacy, problem solving, and interpersonal communication skills, all linked to persistence in education and careers, has been demonstrated in key studies, including nationwide randomized controlled trials.

Some details and benefits to students using the CareerWISE resource:

• Develops specific skills related to self-understanding, personal and interpersonal problem solving, and communication.

• Highlights skills in the context of four common concerns: strengthening working relationships with advisors, juggling academic and personal commitments, navigating a climate that can be unfriendly to women and managing delays and setbacks that are common in the course of pursuing research.

• Offers interactive, live actor-based simulations to practice interpersonal communication skills for Active Listening, Self-Expression, and Receiving and Responding to Feedback.

• Features over 180 Her Story video clips from interviews with women who have successfully navigated the hurdles of graduate school in a variety of STEM fields.

They invite you to familiarize yourself with the CareerWISE resource and recommend it to your students in your program. Attached is a recent news column that features CareerWISE and a brief guide that highlights popular sections of the resource. Please help them share the CareerWISE resource by forwarding this email to your students.

The CareerWISE team welcomes your questions and comments. You can reach us at careerwise@asu.edu or find them on Facebook.

~ ~ ~ ~ ~ ~

SUMMER DATA SCIENCE FELLOWSHIP OPPORTUNITY

Program: The Data Incubator is an intensive 7 week fellowship that prepares masters, PhDs, and postdocs in STEM + social science fields seeking industry careers as data scientists. The program is free for fellows and supported by sponsorships from dozens of employers across multiple industries. In response to the overwhelming interest in our earlier sessions, we will be holding another fellowship.

Locations: There will be both an in-person (in NYC, DC, SF) and online section of the fellowship. There is a common application for both the online and in-person sections.

Dates: All sections will be from June 1, 2015 to July 17, 2015.

Application Link: http://goo.gl/PEFosC

Who should apply: Anyone within one year of graduating from a masters or PhD program or who has already obtained a masters or PhD is welcome to apply. Applications from international students are welcome. Everyone else is encouraged to sign-up for a future session.

For additional information, checkout our blog, Venture Beat article, or Harvard Business Review piece.
IMPORTANT NOTICE ABOUT THIS NEWSLETTER
This newsletter is used as the primary information source for current and upcoming events, announcements, awards, grant opportunities, and other happenings in our department and around campus. Active links to additional information will be provided as needed. Individual email announcements will no longer be sent unless the content is time-sensitive. We will continue to include our publications, presentations and other recent news items as well. Those using paper copies of the newsletter should go to our newsletter archive on the EAPS website at www.purdue.edu/eas/ and Click on News to access active links as needed. Material for inclusion in the newsletter should be submitted to Fallon McQuern (fmcquern@purdue.edu) by 5:00pm on Thursday of each week for inclusion in the Monday issue.

If it is in the newsletter, we assume you know about it and no other reminders are needed. For answers to common technology questions and the latest updates from the EAPS Technology Support staff, please visit http://www.purdue.edu/eas/info_tech/index.php.

Also, as an additional resource for information about departmental events, seminars, etc., see our departmental calendar at http://calendar.science.purdue.edu/eas/seminars.
The Confluence of the Shale Gas Revolution and Plate Tectonics in the Appalachian Basin

Thursday, April 9
3:30 PM – 4:30 PM
HAMP Bldg Room 1252
Refreshments at 3:00 in HAMP Rm 3201

Open to the public

Terry Engelder
Dept. of Geosciences, Penn State Univ.

Abstract: The entire shale gas revolution is enabled by plate tectonics. Both the Utica system and the Middle Devonian gas shales in the Appalachian Basin were deposited during periods of relatively high sea level when crustal loading created the necessary accommodation space. Subsequent burial to maturation occurred during the closure of Gondwana and Laurentia to drive deformation of the Appalachian Basin during the Alleghanian Orogeny. The tectonic overprint on gas shale includes many of the classic brittle and ductile structures of foreland deformation. Despite the extent of structural ‘damage’, a long-term pico-Darcy seal around these gas shales was maintained for more than 200 My, thus preserving maturation-related overpressures to this very day.

Dr. Terry Engelder is a Professor of Geosciences at Penn State University, and is a leading authority on the recent Marcellus shale gas play. His research focus for the past 35 years has been the interaction between earth stress and rock fracture. He has written 160 research papers, many focused on Appalachia, and a book, the research monograph "Stress Regimes in the Lithosphere". Academic distinctions include a Fulbright Senior Fellowship in Australia, Penn State’s Wilson Distinguished Teaching Award, membership in a US earth science delegation to visit the Soviet Union immediately following Nixon-Brezhnev detente, and the singular honor of helping Walter Alvarez collect the samples that led to the famous theory for dinosaur extinction by large meteorite impact. In 2011 he was named to the Foreign Policy Magazine’s list of Top 100 Global Thinkers for drawing international attention to the value of gas shale as an energy source.
Abstract: Hydraulic fracturing has an extensive history of successful applications including quarrying/mining (since the 1890s), gas and oil extraction (since 1949), and Enhanced Geothermal Systems ("EGS", since the early 1970s). With perhaps only one notable exception, the Barnett Shale in Texas, this experience points to a mechanical system that tends to favor localization of fracture growth to one or two dominant hydraulic fractures rather than propagation of many simultaneous branches. This is in spite of 4 decades of attempts to generate complex networks of hydraulic fractures for EGS applications and more than a decade of efforts to generate Barnett-like networks of hydraulic fractures in other shale gas reservoirs. Man-made hydraulic fractures seem highly prone to localization. On the other hand, there are more than 400 known examples of giant dyke swarms on Earth, Venus, and Mars. These stunning features are comprised of hundreds to thousands of subparallel to radiating dykes that originate from a common source region and that appear to have grown concurrently. So, in contrast to man-made systems, these natural systems of fluid (magma)-driven cracks appear to favor swarming dynamics rather than localization.

In this presentation I will tell the story of a recent research effort aimed at finding the ingredients required for swarming behavior to occur in systems of fluid-driven cracks such as dykes and hydraulic fractures. I will show that the missing ingredient has been a basic understanding of the attractive force in these systems, that is, why fluid-driven cracks would have any mechanical impetus to grow near one another in the first place. By showing how this key element of the system depends on geometry and the relative importance of viscous energy dissipation in the context of the energy balance of the system, engineers are now able to draw inspiration from the naturally-occurring dyke swarms in order to design more effective hydraulic fracturing treatments.

Dr. Andrew Bunger is an Assistant Professor in the University of Pittsburgh's Department of Civil and Environmental Engineering. He joined the University of Pittsburgh in 2013 after spending 10 years in Melbourne, Australia working in the Geomechanics Group within the Commonwealth Scientific and Industrial Research Organization (CSIRO). His research interests include the mechanics of hydraulic fractures, coupled fluid-shale interaction, and the emplacement dynamics of magma-driven dykes and sills. He holds a PhD in Geological Engineering from the University of Minnesota.
What Have We Learned About Fracturing Shales After 15 Years Of Microseismic Mapping?

Thursday, April 30
3:30 PM – 4:30 PM
HAMP Bldg Room 1252
Refreshments at 3:00 in HAMP Rm 2201
Open to the Public

Abstract: Hydraulic fracturing is a key enabling technology for the development of unconventional reservoirs, and microseismic monitoring has grown into a common imaging technology over the last 15 years as the key method to image the hydraulic fracture network. The presentation will describe some of the common observations made from microseismic imaging in different settings, in particular the role of the reservoir geology on the fracture network geometry. The presentation will be a practical examination of the role of microseismicity in improving engineering design of the hydraulic fracture operations and monitoring for environmental concerns associated with shallow fracture growth and induced seismicity.

Dr. Shawn Maxwell is President and Chief Technology Officer for Itasca IMaGE (Integrated Microseismic and Geomechanical Evaluation) based in Calgary. Previously he was Chief Geophysicist and Microseismic Advisor for Schlumberger, led microseismic development at Pinnacle Technologies (Halliburton) and ESG, and served as a Lecturer at Keele University in England. Shawn was awarded a Ph.D. specializing in microseismology from Queen’s University in Kingston, Canada.

Dr. Maxwell has published numerous technical articles and serves on various microseismic focused committees and workshops around the world. In 2013, he was a Distinguished Lecturer for the Society of Petroleum Engineering (SPE). In 2014, he was the Society of Exploration Geophysicists (SEG) Distinguished Instructor for the Short Course “Microseismic Imaging of Hydraulic Fracturing: Improved Engineering of Unconventional Shale Reservoirs” and authored the first textbook on microseismic monitoring as an SEG monograph by the same title.