Allegheny-Ohio Section NEWSLETTER

April 2014

Editor: Nate Saraceno

Meeting Date
Wednesday, April 23rd

Time
6:00 PM - Social Hour /Poster Presentations
7:00 PM - Dinner
8:00 PM - Oral Presentations

Location
Foster's Restaurant
Foster's Plaza 10
Pittsburgh, PA 15220

Cost
$25 Professionals
$5 Students with ID
(Checks preferred)

Reservations
c/o "PGS Dinner Reservation" to Steve McGuire at:
pgsreservations@gmail.com
or (412.809.6723)

RSVP BY Monday, April 21st

Reservations via PayPal at pittsburghgeologicalsociety.org (incl name & # of reservartions)

12th Annual Student Night

Wednesday, April 23, 2014

Co-sponsored by:

The Association of Environmental & Engineering Geologists

The American Society of Civil Engineers – GeoInstitute

Pittsburgh Geological Society

Every year, the local Sections of AEG, ASCE-GeoInstitute and PGS host a joint student night in which the region's geology and geotechnical students can showcase their research.

Each society has chosen three students to present their research during this special meeting – one oral presentation and two poster presentations – for a total of three oral and six poster presentations! The students that present their original research grow from the experience by improving their public speaking skills, networking with professionals and experts in their fields.

All presenters will receive certificates of recognition and appreciation, as well as complimentary dinner. The three oral presenters will each receive awards of $100, while the six top poster presenters will each receive $50!

Student night has been a growing success will every year, and is **a great opportunity to get a look at local, talented students and soon-to-be professionals!**

Join us on Wednesday April 23 at 6:00PM

AEG Oral Presentation Award

Landslide Susceptibility Assessment Using GIS in Allegheny County, Pennsylvania

Clarissa L. Enslin, *Dr. Kyle C. Fredrick, Dr. Thomas R. Mueller, Department of Earth Sciences California University of Pennsylvania 250 University Avenue, Box 55 California, PA 15419*

The landscape of southwestern Pennsylvania exemplifies the interplay of surficial processes and underlying geologic structures. Deeply incised stream valleys are prevalent throughout much of the region and are usually controlled by structurally derived fracture lineaments in the sedimentary bedrock. Due to the deep, steep-walled nature of many of these valleys, the historical land use and development in the region, slope failure is a relatively common occurrence. These mass-wasting events can range from small slumps on the order of a few cubic meters to large landslides up to thousands of cubic meters. One area that is particularly prone to these events is Allegheny County. With the city of Pittsburgh at its center, development in the county is pervasive and continues today. The purpose of this study is to assess landslide susceptibility using a weighted overlay analysis method in GIS for Allegheny County, Pennsylvania. Nine controlling factors of landslide occurrence are considered in the construction of an indexing model. The factors include: slope, aspect, lithology, land use, soil texture, precipitation, distance from streams, distance from roads, and distance from known faults. Parameters are weighted according to an impact score assigned to each parameter based on its perceived significance for landslide occurrence. Due to subjectivity in weighting the parameters, a model calibration strategy is used to match existing landslide data to predicted high-susceptibility areas. An iterative procedure to compare landslide frequency measures with high susceptibility areas produces an error map, whereby a measure of difference indicates poor model performance. Parameter weights are manipulated to optimize the indexing model and reduce these differences. Completion of the landslide susceptibility map within the GIS framework allows for updates to current data and improvement to the model as conditions within the county change. Additionally, the indexing model allows for up-to-date analysis of susceptibility based on land use changes, informing stakeholders and decision-makers of the implications of those changes.

AEG Poster Presentation Award #1

Evaluating the Variability of Discontinuity Orientation Data for Slope Stability Purposes

WINDUS, Chelsea E*., cwindus@kent.edu, Department of Geology, Kent State University*

In any geologic site assessment there are problems associated with variability in measured orientation of discontinuities (joints, bedding, faults, etc.). Variability refers to how spread out or clustered collected data is. Geologic and human factors contribute to variability in any site assessment. The geologic factors include the degree of development of discontinuities (well developed versus randomly developed discontinuities), and lithologic variation within the site. Objectives of this study included evaluating factors that lead to variability, attempting to quantify variability of discontinuity orientation data, evaluating effects of variability on kinematic analysis for slope stability purposes, and determining the optimum number of discontinuity measurements needed to accurately take into account variability. In order to achieve the objectives, 500 discontinuities were measured at each of two selected sites. DIPS software was used to plot orientation data on stereonets and determine the principal discontinuities. Site 1, located along State Route 4 in Clark County, Ohio, is comprised of a Silurian Limestone, and represents well developed discontinuities. Three main discontinuities were identified including bedding and two perpendicular joint sets, with average attitudes of 076, 5SE; 014, 87NW; and 270, 80N, respectively. The data does not show much variability when 100 to 150 discontinuities are plotted, suggesting that the optimum number of measurements needed for a site with well-developed discontinuities is 150. Site 2, located along State Route 2 in Brooke County, West Virginia, is comprised of interbedded Pennsylvanian sandstones and shales, and represents randomly oriented discontinuities. A total of 4 discontinuities were identified at this site with average attitudes of 143, 2SW (bedding); 070, 77NW; 089,88NW; and 335 72NE. These attitudes were highly variable when plotting 50 to 300 discontinuities. Plotting more than 300 discontinuities resulted in fairly consistent attitudes, suggesting 350 as the optimum number of measurements needed for sites with randomly developed discontinuities.

AEG Poster Presentation Award #2

A Paleoseismicity Record for Cariaco Basin, Caribbean Sea: An Analysis of Turbidites in Sediment Cores

Geoffrey Dipre*, Ohio State University*

Turbidites have been identified as paleo-earthquake proxies in many marine and lacustrine settings. When present in the sediment record, turbidites provide the potential to reconstruct paleoseismicity history for tectonically active regions. Earthquakes have been cited as a primary mechanism for producing turbidity flows in Cariaco Basin off the coast of Venezuela (Thunell et al., 1999). Two turbidites in box core PL07-81 BC have been correlated with the historically-recorded 1929 and 1900 earthquakes (Hughen et al., 1996). This study identifies turbidites found in several box cores taken from two sub-basins in the Cariaco Basin. I present evidence that the production of turbidites here is a basin-wide phenomenon. X-ray fluorescence data, along with observable physical characteristics, suggest that tectonic activity along the El Pílar and the Morón fault zones are responsible for producing the turbidites found in the Cariaco box cores. Finally, I tentatively calculate an age model and recurrence interval for the turbidites found in box core PL07-11 BC. Consistency between our calculated recurrence interval and the reported data for significant tectonic activity along the El Pílar fault zone suggests that the turbidites found in Cariaco Basin are earthquake-induced.

ASCE Oral Presentation Award

Factors Influencing the Effects of Underground Bituminous Coal Mining on Water Resources in Western Pennsylvania

Michael B. Keener, E.I.T.*, B.S. Civil and Environmental Engineering, University of Pittsburgh, 2012*

Coal mining in Pennsylvania has been fundamental to the commonwealth's economy for over 150 years. Since that time, over 1.2 million acres of bituminous coal have been mined using underground mining methods. Pennsylvania is also estimated to have over one million domestic water wells over its 29 million acres area. From 2003 to 2008, 2,789 water supplies were undermined with about 24.5% having reported impacts. The effects of underground coal mining on the utility of these wells and other water resources have only been studied systematically within the past 20 years and are still not completely understood.

Pennsylvania amended its Bituminous Mine Subsidence and Land Conservation Act (Act 54) in 1994. The amended act requires that a report be submitted every five years that assesses the impacts on water resources and structures due to underground coal mining. Well and spring effects can be classified into two categories: water loss (diminution or total loss of water) and water contamination (reduced quality, increased metals, gas, etc.). Once these types of problems are identified, they are analyzed to determine the relationship between underground coal mining and water resource quality and quantity.

This study investigates the factors associated with water loss and water contamination due to underground coal mining. The study area includes all underground bituminous coal mining activity in Pennsylvania from August 21, 2008 to August 20, 2013. The area encompasses 10 counties in western Pennsylvania providing a diverse sample of water resource data, mining methods, and local conditions. Mining activity was conducted by 6 companies with a total of 6 longwall mines and 40 room-and-pillar mines. Factors include mining method, mining depth, proximity to mining, hydrogeological setting, topographical setting, climate, and more. A statistical analysis of these factors is used to determine the most important factors driving water resource impacts. Greater study is then conducted on the most significant factors using geographic information systems (GIS) and modeling software to better understand how problems are caused and how they can be mitigated or eliminated.

Come support our students!

ASCE Poster Presentation Award #1

Models of Hypothetical Stream Contamination from Hydraulic Fracturing of the Marcellus Shale in Indiana, County, Pennsylvania

***CARPINELLO, Dennis J.**, Department of Geosciences, Indiana University of Pennsylvania*

Hydraulic fracturing, when combined with horizontal drilling, has made extraction of the natural gas reserves found in the Marcellus Shale much more feasible. A byproduct of this method is flowback in the form of brine, which has extremely high salinity and contains high concentrations of various elements, including radium. Proper disposal of brine has been a focus of public attention, considering that, in 2010, 55% of wells were located within 300 meters of streams. While public concerns may be reasonable, we argue that anything other than catastrophic displacement of flowback fluids into streams would result in minimal impact on their overall drinking water quality.

We set out to determine if the concentrations of specific contaminants, Total Dissolved Solids (TDS), sulfate, barium, and total radium found in brine extracted from a Marcellus gas well in Indiana County, Pennsylvania would exceed Pennsylvania Maximum Contaminant Levels (MCL's) for drinking water if introduced into streams of various discharges. Although we modeled different stream discharges, we used data from Blacklick Creek for present stream levels of each contaminant. To model the amount of brine introduced into the streams, we used a range of 5,500 cubic feet (storage tank) to approximately 30,000 cubic feet (three impoundment ponds) for the brine that would be displaced. In our models, the rate of flow of brine varied from one minute (catastrophic displacement) to one year (low-level long-term discharge). The amount of time required for contamination to exceed MCL's ranged between 1 hour and 1 day and was never more than 1.5 days even in the most extreme cases. This suggests that long-term low-level discharge of flowback water would rarely pose a problem for stream health and that only catastrophic displacement events similar to the recent tank spill in West Virginia would result in stream pollution.

ASCE Poster Presentation Award #2

Potential causes for along-strike variability of slow slip events in south-central Alaska

***W. David Watkins*[1], *Harmony V. Colella*[2], *Michael R. Brudzinski*[2], *James H. Dieterich*[3], *Keith B. Richards-Dinger*[3]**
[1]Department of Geoscience, Indiana University of Pennsylvania, Indiana, Pennsylvania, [2]Department of Geology, Miami University of Ohio, Oxford, Ohio, [3]Department of Earth Sciences, University of California-Riverside, Riverside, California

Slow slip events (SSEs) are observed in subduction zones around the world and exhibit a wide range of recurrence intervals, durations, and spatial extents. A ubiquitous feature of SSEs is the along-strike variability of these characteristics. However the cause and long-term effects of such variability is poorly understood. Additionally, it is unclear whether such variability and segmentation of SSEs persists beyond human time scales. Here we employ the earthquake simulator RSQSim to model a megathrust, which consists of seismogenic, slow slip, and continuous creep sections. The slow slip section is segmented to explore potential causes of along-strike variability in recurrence intervals, durations, and spatial extent, by varying parameters such as the effective normal stress, frictional properties, and slip rates. RSQSim enables simulations of long histories of SSEs over all orders of magnitude, which allows for robust characterization of the effects of variation in parameters. Preliminary results show even small variations in these parameters have a significant effect on observable characteristics of SSEs, which begins to illuminate the primary controls on along-strike variability. For example, a decrease in the effective normal stress from 9MPa to 3MPa results in a decrease in the mean recurrence interval and event duration from 35 to 15 months and 44 to 16 days, respectively, but increases the mean propagation speed from ~7 km/day to ~24 km/day. This research builds on the previous study and considers variations in fault geometry (i.e. tears in the fault) and fault roughness in addition to the parameters discussed above. Ultimately this work aims to reproduce observed SSEs in south-central Alaska.

PGS Oral Presentation Award

Conodont Coloration to Determine Thermal Maturation of Late Pennsylvanian Limestone Formations of Western Pennsylvania

Christy L. Miller *and Tamra A. Schiappa, Department of Geography, Geology and the Environment, Slippery Rock University, Slippery Rock, PA 16057* clm4669@sru.edu

The thermal maturity of the Late Pennsylvanian limestone formations of western Pennsylvania were determined by applying the conodont alteration index (CAI). The Pennsylvanian period ranges from 320-290 mya and during this time sea level fluctuated resulting in the deposition of extensive carbonate units; the Vanport, Brush Creek, Pine Creek and Ames Limestones. These formations are important proxies for not only past climate changes but are important oil and gas potential resources. One method used to determine thermal cutoffs for oil, condensate and dry gas generation in sedimentary rock units is the conodont coloration. The CAI is based on color changes in the organic matter present in the fossil teeth of these small chordates commonly preserved in Paleozoic limestones. The CAI is time and temperature dependent making it a good correlation tool for determining maximum burial temperatures. The CAI is determined by comparing samples against a set of laboratory produced conodont color standards with colors ranging from pale yellow to black and identified with numbers from 1-5 to estimate burial temperature ranges. The results of this study indicate that the Brush Creek and Vanport limestones have a CAI of one indicating a burial temperature range <50°-80°. The Pine Creek and Ames limestones have a slightly higher index number of 1.5 indicating a temperature range of 50°-90°. This data indicates that the Brush Creek and Vanport limestones do not reach the thermal cutoff and the Pine Creek and Ames limestones are at the minimum thermal cutoff for possible oil and condensate production.

Join us on Wednesday April 23 at 6:00PM

PGS Poster Presentation Award #1

Morphometric Analysis for Characterizing Submarine Drainage Networks: East Scotian Slope Canyon System, Offshore Nova Scotia

WAGNER, JAMES "SAGE"*, Indiana University of Pennsylvania*, FARNSWORTH, KATIE, Indiana University of Pennsylvania*

Modern, clastic deepwater systems in low latitudes have been extensively studied based on their hydrocarbon potential, but less is known about pro-glacially influenced deepwater environments. This project will focus on detecting relevant morphological changes along the East Scotian Canyon System (ESCS), offshore Nova Scotia. Submarine drainage networks were extracted from a multi-beam bathymetry dataset of 25-meter grid size and were analyzed in ArcGIS to provide a morphometric methodology to characterize submarine drainage networks at fine resolution scales.

Following the Horton-Strahler method, main morphometric parameters (number of streams, streams length, and axial slope gradient) were calculated for each stream segment. Quantitative analyses used for terrestrial fluvial drainage networks such as drainage area, drainage density, stream frequency, basin relief and accumulated stream length parameters were conducted to characterize the system. This work has the potential to expand existing models for deepwater processes and resulting submarine drainage networks to high-latitude margins influenced by proglacial sedimentary processes.

PGS Poster Presentation Award #2

Inorganic Ions Contributing to Elevated Conductivity in Oregon Hollow Wetland: Washington County, Pennsylvania

Nicholas Patton *and Kyle C. Fredrick, PhD, California University of Pennsylvania*

Oregon Hollow is a 2.7 mile long, first-order tributary that enters Gorby Run before it ultimately feeds Pike Run, located in southwestern Pennsylvania. It is of particular interest in terms of chemical contamination as it is bordered by abandoned coal mines, Interstate 43 and local farms. A study was done by students, at California University of Pennsylvania in conjunction with the Washington Watershed Alliance on Pike Run and its tributaries, to monitor water quality indicators in 2012. Oregon Hollow was found to have an abnormally high conductivity of 1100 µS/cm which could have adverse effects on the local streams continuing downstream. In the headlands of the tributary, a small wetland is situated among seeps, mine-slag fill and a road salt repository, conductivity measurements were even higher at 2800 µS/cm. The purpose of this study was to identify the possible contributors to the elevated conductivity in the surface and ground water of Oregon Hollow Wetland. A comprehensive water sampling procedure was performed to collect three above and four below surface samples at predetermined depths and distances. Samples administer through a variety of analytical methods such as: inductively coupled plasma spectrometry, ion selective electrodes and multi-probes. Methods were utilized to determine eleven inorganic ions average concentrations and pH: nitrate (8.66ppm), arsenic (ND), iron (0.234ppm), sodium (266ppm), calcium (233ppm), chloride (298ppm), lead (ND), phosphate (0.0800ppm), nickel (0.00815ppm), cadmium (ND), mercury (ND) and pH (8.43). The primary constituents of elevated conductivity is believed to caused by the upstream salt repository and the local Fishpot and Sewickley limestone; however, more investigation is needed.

Oso Landslide – AEG Members Respond

Photo by the Washington State Department of Transportation

The recent tragedy in Oso, Washington brings home the important work our profession does to protect the public. Unfortunately, we were not able to save those that perished in this recent event, and we wish to express our deepest sympathy to the families and community of Oso. There are a number of charities accepting donations for the community, click HERE for more information on ways to give.

Visit the Oso Landslide page at www.AEGweb.org for the latest news and related links. In addition, AEG is giving open access to related articles from the journal *Environmental & Engineering Geoscience* through the end of this month.

AEG is continuing discussions with local members to identify additional ways to assist and provide critical information and input from our profession.

In addition, AEG is proud of the members and other geoscientists and engineers responding directly to this tragedy. In particular, two of our members are responding through Geotechnical Extreme Events Reconnaissance (GEER) and will be documenting the effects of the landslide on the built and natural environments. Our own **Dr. Jeffrey Keaton** and **John deLaChapelle** will be a part of the GEER Response Team. For more information, click HERE.

Join Us for the 57th Annual Meeting

September 20-28, 2014 | Scottsdale, Arizona

Hosted by the AEG Arizona Section

A GRAND ADVENTURE AWAITS

AEG

ARIZONA 2014

ASSOCIATION OF ENVIRONMENTAL & ENGINEERING GEOLOGISTS

Tentative Technical Sessions/Symposia

- Probability and Reliability Based Design
- Groundwater/Environmental Site Characterization
- Earth Fissures
- Engineering Geology for Mining Projects
- Geological Engineering for Transportation Projects
- Rockslope Mapping & Mitigation
- Unsaturated Soils
- Geophysics
- Dam Rehabilitation
- Landslides
- Wildfires and Debris Flows
- Landfills and Waste Fills
- GeoPhilanthropy

- Field Trips to include the Grand Canyon, Sedona sinkholes, Kartchner Caverns, and an open pit copper mine.
- Short courses including Estimation of Soil Properties for Foundation Design, Interpreting Aerial Photographs to Identify Natural Hazards, LIDAR Scanning and Point Cloud Processing, and MODFLOW—USG.
- Meeting to be held at the DoubleTree Hotel, located in the heart of Old Town Scottsdale, within walking distance of great shopping, restaurants, and nightlife
- An exciting special event at the renowned Zelma Basha Salmeri Gallery of Western American and Native American Art.

www.azaeg.org/aeg2014

Now accepting abstracts for posters and oral presentations!

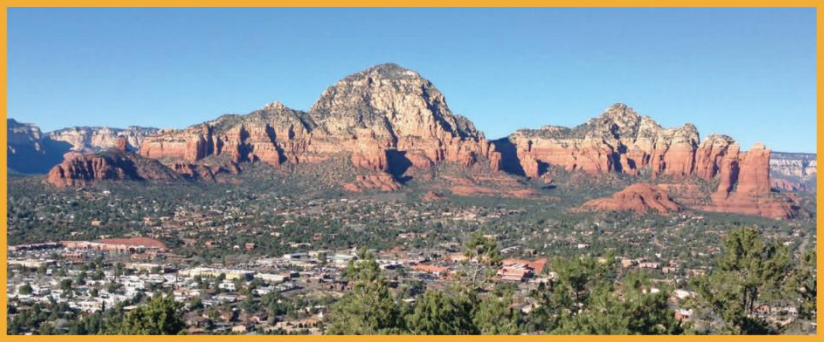

Photo credit: Flickr user NatalieMaynor

AEG 57th Annual Meeting

INSTRUCTIONS FOR WRITING AND SUBMITTING YOUR ABSTRACT

FONT: Type abstract in 10 point Times New Roman font.
TITLE: Bold your title. Your title may not be more than 120 characters in length, including spaces.
AUTHOR(S): Type last name first in capital letters, followed by first name in regular case, followed Company or Affiliation and email address. All co-authors should be listed as first name, last name only and email address. No more than 4 authors may be listed on a paper. Group names will not be accepted as an author. Please see example below.
ABSTRACT: Your abstract is limited to 750 words or less. Tables or photos may be added to your abstract for a fee of $150.00 each; however, you may not exceed the spacing requirement of 750 words or less.
INDICATE YOUR PREFERRED MODE OF PRESENTATION: Oral, Poster, or Either (meaning no preference).
INVITED PAPERS: If your paper was invited for one of the symposia sessions, please indicate the appropriate session on your submittal.

Please have a backup author prepared to give your presentation should you not be able to attend. Rescheduling presentations after July 1, 2014 is extremely difficult for the Technical Program committee and we would really appreciate your commitment to attending the Annual Meeting for your presentation. Please do not submit an abstract if you do not plan to attend the 2014 Annual Meeting for your presentation.

Your abstract will be reviewed for subject and format appropriateness; notifications of acceptance/rejection will be sent by June 1, 2014. Please click on the following link to submit your abstract: http://72.16.203.230/aegpapers/.

Username is AEG, Password is Scottsdale2014 (DO NOT USE YOUR MEMBERSHIP LOGIN)
DEADLINE FOR SUBMITTAL IS MAY 1, 2014.

Sample abstract available at aegweb.org

PRELIMINARY TECHNICAL PROGRAM (Updated March 2014)

Probabilistic and Reliability Based Design
Groundwater/Environmental Site Characterization
Earth Fissures & Land Subsidence*
Engineering Geology for Mining Projects
Geological Engineering for Transportation Projects
Rockslope Mapping and Mitigation
Unsaturated Soils*
Geophysics
Dam Rehabilitation*
Landslides
Wildfires and Debris Flows
Waste Fills*
GeoPhilanthropy
Landfills

*Symposia

Young Professional Travel Grant Application

The intent of the Young Professional Travel Grant is to help defer the cost of attending the AEG Annual Meeting for young professionals when an employer is unable to support their attendance. This is a competitive $500 grant, and will be awarded based on availability of funds and quality of applications. The application is due on August 1st, and the award notification(s) will be sent by August 15th of the annual meeting year.

By submitting this application, you will automatically be considered for a $100 Grant from your AEG Section. The $100 Section Grant will be awarded to one young professional from each section who *does not* receive the $500 Travel Grant for the same year.

Requirements:

- Applicant must be a Professional Member of AEG who is age 35 or under (not 36 until January 1 in the year following the Annual Meeting for which the Grant is given).
- This must be the applicant's the first year attending the AEG Annual Meeting as a Professional Member.

Please Answer the Following Questions:

Name: _____ Email Address: _____

Phone Number: _____ Mailing Address: _____

_____

To which AEG Section do you belong? _____

Will you be registering for the whole meeting? If not, how many days will you be attending?_____

Will you be presenting at the meeting, if so an oral or poster presentation? _____

Were you a Student Member of AEG? _____

When did you graduate from undergraduate/graduate school? _____

How many years have you been a Professional Member of AEG? _____

Will this be your first annual meeting as a Professional Member? _____

What distance will you need to travel to attend the Annual Meeting? _____

Why do you want to attend the Annual Meeting?

_____

_____

_____

Are you involved in your Section (attend meetings, hold a position, visiting professionals program, etc.)? If not, please explain.

_____

_____

Are you receiving any support from your employer or external funding sources? If so, how much support will you receive?

_____

AEG would like to thank your supervisor for letting you attend the Annual Meeting. Please provide your Supervisor's contact information:

Supervisor Name: _____ Company Name: _____

Phone Number: _____ Mailing Address: _____

_____

PLEASE SUBMIT THIS APPLICATION TO AEG@AEGWEB.ORG BY AUGUST 1ST.

Notification of grant will be sent to recipient by August 15th. Grant to be issued as expense reimbursement following the Annual Meeting. Upon submittal of expense report form (to be provided by AEG with award notification), the treasurer will mail the recipient a check.

If after submitting this application you will no longer be attending the Annual Meeting, please notify AEG immediately: aeg@aegweb.org

RENEW YOUR AEG MEMBERSHIP!

Don't let your AEG membership lapse!

Annual Dues Rates by membership class:

- Professional ---------- $140/yr
- First-time professionals ----------1st year only $75!!!
- Affiliate ----------$100/yr
- Teacher ----------$35/yr
- Students ----------**FREE**!!!
- Recent Graduates ----------1st year of professional membership **FREE**!!!

Renew now and see membership class descriptions by visiting the membership page on the AEG website: http://aegweb.org/join

Contact Nate Saraceno (nrsaraceno@gmail.com) with questions.

2014 AO Section Calendar

•April 23 (Wed), 12th Annual Student Night, Foster's Restaurant
•May 1 (Thurs), Abstract Submittal Deadline for Annual Meeting
•Sept 20-28, AEG 57th Annual Meeting , Scottsdale, AZ

CALL FOR MEMBER NEWS

If you would like to submit member news for the AEG News: The Homefront,

please email Nate Saraceno at nrsaraceno@gmail.com

/AEGweb

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Association of Environmental & Engineering Geologists - AEG

Your Section Officers:
Chair: Kristen Enzweiler
Co-Vice Chair: David Plas
Co-Vice Chair: Alex Prvanovic
Treasurer: Nichole Wendlandt
Secretary: Nate Saraceno

Other Section Positions:
Student Liaison: Brian Greene
Short Course Director: Terry Downs
VP Liaison: Vacant
Past Chair: Nichole Wendlandt