

EES NEWSLETTER

Welcome to the 2017 Earth and Environmental Sciences Newsletter. As usual, it gives me great pleasure to gloat about my colleagues' and our students' accomplishments this past year. I hope you enjoy reading about some of the exciting projects our undergraduate majors were involved in and the other usual topics in the newsletter. To sustain and promote even more undergraduate research activity, 1961 Lehigh geology alumnus Peter van de Kamp endowed a large gift to the J. Donald Ryan '43 Memorial Endowment Fund in 2017. Professor Ryan was van de Kamp's undergraduate research mentor and influential in his success. Current EES faculty hope to provide such a positive impact on each student they teach.



The department had a large presence at this year's annual Geologic Society of America meeting in Seattle, WA, including 10 faculty authors, 6 graduate students, an undergraduate and 2 research scientists presenting 21 papers in total and 13 faculty authors, 13 graduate students, an undergraduate student, and 2 research scientists presenting a total of 26 different papers at the fall American Geophysical Union (AGU) meeting in New Orleans, LA. At this year's AGU meeting, Professor Ken Kodama gave the Edward Bullard lecture. From the Eastern Snow Conference, to the American Association of Petroleum Geologists Conference, to the American Association for the Advancement of Science meeting, Ecological Society of America meeting and the Goldschmidt Conference among others, there was an Earth and Environmental Sciences presence. This is a testament to the abundant high quality research being done in the department and its wide audience of dissemination.

The Ryan fund is the endowed account the department uses to fund undergraduate research and student travel to professional meetings. The department relies on the generosity of alumni and friends like you to fund many of the department's activities including seminars, field trips, graduate research, facilities, and instrumentation. All gifts, no matter how large or small are put to work for the benefit of our students. Because of our student's successes and our many opportunities outside the classroom, our undergraduate major continues to grow strong and is now more than 60. Through our varied courses and independent internship and research activities, our students gain wide content knowledge, communication and critical thinking skills, and the mental agility and confidence to find success in their future endeavors. Our students understand the value of high ethical standards in professional conduct and good stewardship of the Earth and its resources. Hiring an EES graduate from Lehigh continues to be a good bet.

EES faculty and students are active around the world, from Ecuador, Patagonia, Antarctica, Mongolia, China, Indonesia, Greenland, Italy, Spain, Sweden, Russia, Colombia, the world's oceans, and the United States, the EES impact is far reaching. EES contributions tap every corner of the planet and even processes on other worlds. It gives me much pride to present some of their contributions to you.

I hope you enjoy the newsletter and that you will keep us in your travel plans for 2018. Please accept this invitation to visit the department in 2018 and thank you to all that visited or contributed to the department in 2017.

I wish you a safe, prosperous, and healthy new year.

Dave Anastasio



Earth and Environmental Sciences Department
Lehigh University, Bethlehem PA
www.ees.lehigh.edu

EES RECOGNITION

Frank Pazzaglia
was recognized by AGU in the online version published in today's issue of Eos, 31 May 2017: [In Appreciation of AGU's Outstanding Reviewers of 2016](#)

Camille Delavaux '14
was one of eleven doctoral students who have been selected to receive the University of Kansas' prestigious Madison and Lila Self Graduate Fellowship for the 2017-2018 academic year.

Zicheng Yu
was appointed by The National Academies of Sciences*Engineering*Medicine as a member of the committee to Review the Second State of the Carbon Cycle Special report.

Ken Kodama
had the honor of presenting the Edward Bullard Lecture at the 2017 annual AGU meeting in New Orleans, LA on Tuesday, December 12, 2017 entitled "Determining the Accuracy of Paleomagnetic Remanence and High-Resolution Chronostratigraphy for Sedimentary Rocks using Rock Magnetics."



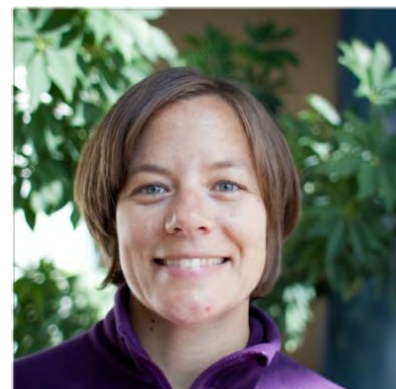
Welcome to EES!

In January, we welcomed **Corinne LaViolette** as Director of Instrumentation to EES. Prior to joining us she was a Research Specialist at Northern Arizona University (NAU). She received her MS degree from NAU where she was awarded a USDA Research Assistantship and applied stable isotope techniques to the study of nitrogen transformation in soil.

As a Research Specialist at NAU, her primary role was to manage the daily operations in an environmental chemistry lab that houses an Inductively Coupled Plasma Mass Spectrometer for trace element analysis. Corinne has a background in both laboratory and field science.

She is excited to be part of a broad range of EES projects and primarily provides technical and fabrication support for research and course activities. Additionally, she is involved in the recent expansion of EES analytical capabilities and the development of laboratory space and instrument procedures.

Corinne likes to do yoga, kayak, bike, spend time outdoors and with family in her spare time.



CLASS OF 2017

Master of Science

Rui Cheng

“Associated effect of temperature and soil moisture on summer forest carbon fluxes in the contiguous US”
(advisor: Felzer)

Megan Clark

“Morphological and geochemical characteristics of volcanic ash: insights into eruption energetics”
(advisor: Sahagian)

Kathleen Jaeckel

“Deformation-enhanced fluid and mass transfer along western alps paleo-subduction interfaces: significance for carbon cycling models”
(advisor: Bebout)

Darwin Janes

“Characterizing defects and dislocations in apatite using scanning electron microscopy: implications for U-Th-Sm/He dating”
(advisor: Zeitler)

Laura Markley

“Characterization of the goethite-hematite ratio in paleosols in the Mid-Atlantic region as a paleoprecipitation proxy”
(advisor: Peters)

Robert Mason

“A high-resolution paleoecological perspective on Temperature Oak Forest Dynamics: Implications for Understanding Contemporary Oak Decline”
(advisor: Booth)

Matthew McGavick

“Extrinsic vs. intrinsic terrace formation processes and tectonically driven river incision along the South Anna River, Virginia.”
(advisor: Pazzaglia)

Rebecca Whiteash

“Mercury bioavailability positively correlated to the mercury:sulfur ratio of dissolved organic matter in an oxic environment”
(advisor: Morris)

Bachelor of Arts

Juliana Clifton

Drew Cohen

Sergio Contijoch

Jacob Fontaine

Reilly O'Brien

Shane Smith

Jonathan Wood

Doctor of Philosophy

Leonard Ancuta

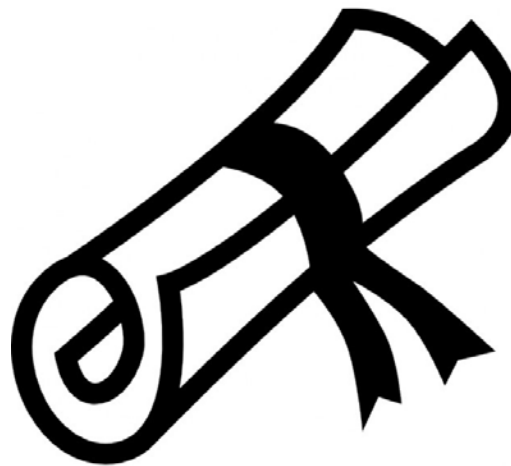
“Toward an improved understanding of intraplate uplift and volcanism: geochronology and geochemistry of intraplate volcanic rocks and lower-crustal xenoliths”
(advisor: Zeitler)

Kalin McDannell

“Methods and applications of deep-time thermochronology: Insights from slowly-cooled terranes of Mongolia and the North American craton”
(advisor: Zeitler)

Jien Zhang

“Detection and effects of climate extremes on hydrology and ecosystems: case studies in California and the Great Plains, USA”
(advisor: Felzer)



Bachelor of Science

Nicole Etzel

Noel Johnson

Robert Smith

Cora Summerfield

Graduated with department honors

Ceara Hogan Tomaino

Guerric Vornle von Haagenfels

DEPARTMENT HAPPENINGS

Outreach

Professor **Joan Ramage** and **Kathryn Semmens Berti** PhD '13 worked with four undergraduates from Lehigh and Morgan State University, including **Krittanon Siroattanakul** '18, to develop a NASA-sponsored Science on a Sphere program for middle school students at the Nurture Nature Center and the Maryland Science Center. They are using the theme of 6-degrees of connection and testing whether the concept of personal relevance is an effective way to engage young learners in earth science. Next summer, other students will work to refine the program based on audience feedback this year.



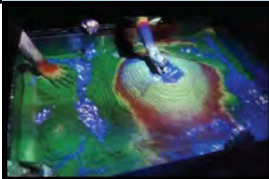
(K. Siroattanakul at Nature Nurture Center)

EES professors **Dave Anastasio**, **Dork Sahagian** and PhD candidate **James Carrigan** have been working in collaboration with professors and graduate students from Lehigh's college of education and the political science department on a geospatial curriculum project at Building 21 High School in Allentown. The project is supported by a National Science Foundation ITEST Grant and seeks to effectively integrate geospatial technology into science and social studies 9th grade classrooms. For more information or to learn how to mentor for this program go to wordpress.Lehigh.edu/initest

On February 9th and September 15th we hosted Woman In Science receptions which allowed our graduate students, faculty and staff an opportunity to mingle with guest lecturers **Tammy Rittenour**, Utah State and **Emily Estes**, University of Delaware.



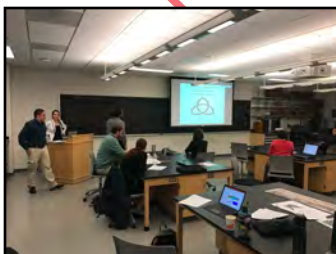
To honor the international visiting scholars and our own international grad students, the EES department hosted a mixer on April 13th in the STEPS Atrium. The event allowed us to enjoy time with colleagues from Mongolia, Spain, China, Colombia and Indonesia.



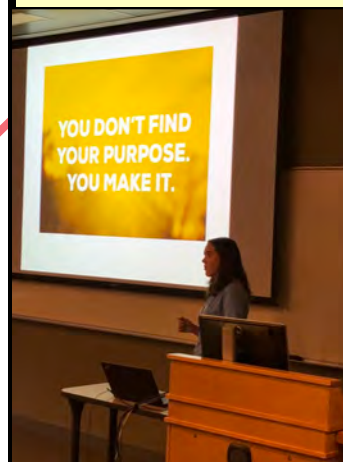
If you were in STEPS at lunchtime on April 5 or November 7th you may have seen undergraduate majors and their friends playing with the our new virtual reality sandbox while eating pizza and learning more about our major at our undergraduate open houses.

ExxonMobil

From October 13 to 15, 2017 we hosted ExxonMobil's **Tom Becker**, MS '02, **Amanda Mosola** and **Joan Otahal** for the 4th year as they taught a short course on *Reservoir Characterization and Modeling* and interviewed students for future positions. Amongst the 21 students in attendance were Lehigh undergraduate **Talia Rodkey** and students from Binghamton University, Cornell University, George Mason University, University of Pittsburgh, Princeton University, Rutgers University, Temple University, University of Connecticut, University of Delaware and Williams University.



Once again, we joined forces with the departments of civil and environmental engineering, energy systems engineering institute and environmental studies to provide undergraduate and graduate students interested in careers in the environment an evening to network with recent alumni who are now active in industry. The event began with a keynote talk by **Molly Mulhern**, BS '11, Consultant, FTI Consulting, "Lehigh ROI: Maximizing your time at Lehigh and positioning yourself for early career success" followed by a dinner where senior undergraduates were able to mingle with the Molly and the other alumni as well as some professors. After dinner, the alumni were able to share their personal career journey, possible internship/job opportunities within their companies, business cards and other company swag with students in attendance. Thank you to alumni **Jack Breiner**, BS '13, **Megan Clark**, MS '17, **Taylor Cummins**, BS '15, **Kristen Falotico**, BS '12, MS '13, **Andrew Gutshall**, BS '97, **Raghida Shariff**, BS '15, **Daryl Strom**, MS '13 and **Pantellis Takos**, BS '16 for helping to make the evening a success.



EES WEEKLY SEMINAR SERIES

Supported by the endowed *Bertolet and Blaustein funds*

EES Seminars are scheduled every Friday at noon in STEPS-Please join us 101

Spring 2017:

January 27, Susan Lang, University of South Carolina, "Linking mantle to microbe in serpentinite-hosted systems"

February 3, Martha Cary Eppes, University North Carolina-Charlotte, "New insights into mechanical weathering rates and processes: climate-dependent subcritical crack growth"

February 10, Tammy Rittenour, Utah State, "Investigations of Climate and Geomorphic Drivers of Arroyo Dynamics, Grand Staircase Southern Utah"

February 17, Helen White, Haverford, "Long-term weathering of oil residues in the marine environment"

February 24, Tom Pratt, USGS, "Shallow faulting in the epicentral area of the 1886 Charleston, South Carolina earthquake"

March 24, Natalya Gomez, McGill, "Ice Sheet - Sea Level - Solid Earth Interactions"

March 31, Zicheng Yu, Lehigh University, "Antarctic Peninsula: Ongoing and Past Change in Climate, Landscape and Ecosystems"

April 7, Ethan Hyland, North Carolina State, "Geochemical techniques for describing past environments, climates, and landscapes"

April 14, David Evans, Yale, "The birth and life of North America: Supercontinents of the distant past and future"

Fall 2017:

September 1, Earth and Environmental Sciences Graduate Students, Faculty and Staff, Summer Photo Presentation

September 8, Sujith Ravi, Temple University, "Ecological interactions within "fairy circles" in the Namib Desert"

September 15, Emily Estes, University of Delaware, "Life in the slow lane: Organic carbon limitation in pelagic sediments."

September 22, Broxton Bird, Indiana University-Purdue University, Indianapolis, "High-resolution lake sediment records of midcontinental US hydroclimate variability: Implications for climate-society interactions"

September 29, Erica Smithwick, Penn State University, "Transformative Learning Spaces for an Uncertain World"

October 6, Elke Weber, Princeton University, "Giving the Future A Chance" Department Sponsors: Cognitive Science, Psychology, Earth & Environmental Sciences, and Environmental Initiative

November 3, Tim Herbert, Brown University "The Earth's 11 Million Year Journey into the Ice Ages"

November 10, David Scholl, USGS "Global Observational Evidence that Great (\geq Mw8.0) Megathrust Earthquakes are Linked to the Subduction of Thick (>1.0 km) Sediment and Bathymetrically Smooth Seafloor"

07 November 16 & 17, D. Foster Hewett Seminar (See below)

December 1, Roman Dibiase, Penn State University, "Fracture density and grain size controls on the topography of bedrock landscapes"

D. Foster Hewett Symposium OCEAN WORLDS

Thursday, November 16, 2017

Keynote Talk

Dr. Kevin Hand, National Aeronautics and Space Administration

Jet Propulsion Laboratory-Caltech

"The Search for Life in Oceans Beyond Earth"

Friday, November 17, 2017

Dr. Everett Shock, Arizona State University

"Uncharted Territory: Ocean World Geology through Organic Chemistry"

Dr. Krista Soderlund, University of Texas Institute for Geophysics

"Exploring Europa with Ocean Circulation Models and Ice-Penetrating Radar"

Dr. Julie Huber, Woods Hole Oceanographic Institution

"Life in the Extreme: Seafloor Fluid Flow and Chemosynthetic Life on Earth and Beyond"



2017 D. Foster Hewett speakers from left E. Shock, J. Huber, K. Soderlund and K. Hand

A special thanks to our graduate students who prepare lunch for the department and our guests prior to the seminar!

Best lunch Spring 2017- **Katie Jaeckel** and **Darwin Jane**
Best lunch Fall 2017-**Katrina Gelwick**

Please join us for lunch on Fridays during the semester at 11am in STEPS 102.



Adam Benfield, Penn State University, BS, '16 Research focus: Holocene climate in Colombia, (*advisor Yu*), Kravis fellow

Heidi Cunnick, Columbia University, MA, '17 Research focus: Carbon Cycling in Peatlands, (*advisor Booth*), University fellow

Katrina Gelwick, Oberlin College, BA, '14 Research focus: Tectonic Geomorphology, (*advisor Pazzaglia*), Teaching assistant

Joshua Gonzales, Arizona State University, BS, '17 Research focus: Tectonic Geomorphology, researching the movement of drainage divides in the Apennines of Central Italy. (*advisor Pazzaglia*), Kravis fellow

Hongcheng Guo, Hefei University of Technology, China, BS, '14 and Louisiana State University, MS, '16 Research focus: tectonics and thermochronology, (*advisor Zeitler*), Teaching assistant

Matthew Huff, The University of Pittsburgh, BS Biological Sciences, '16 Research focus: paleoclimate reconstruction using testate amoebae. (*advisor Booth*), Teaching assistant

Matthew Nikitzuk, Brock University, BS Earth Sciences, '13, MS Earth Sciences, '16 Research focus: Hydrothermal/low temperature alteration of basaltic volcanic glass and its potential to preserve geochemical/isotopic signatures indicative of biological activity and/or paleoenvironmental conditions, (*advisor Bebout*), Teaching assistant

Leslie Tintle, Lafayette College, BA, '16 Research focus: Volcanology, (*advisor Sahagian*), Teaching assistant

Jessica Welkey, Temple University, degree, '16. Research focus: Seismology, (*advisor Meltzer*), Teaching assistant

Some Graduate Student Professional Activities in 2017

James Carrigan participated in Utah State University OSL Summer Short Course, Feedbacks Among Climate Erosion & Tectonics (FACET) II Workshop hosted by Oregon State University and Presented at GSA Annual Meeting in Seattle. (*advisor Anastasio*) Travel funded by EES.

Gabe Epstein was awarded the department scholarship and attended the Lehigh Microscopy School which is sponsored by the Department of Materials Science and Engineering and the Center for Advanced Materials and Nanotechnology at Lehigh University every June. (*advisor Bebout*)

Mariah Hoskins participated in the Lehigh University Graduate Student Teacher Development Workshop. (*advisor Meltzer*)

Jennifer Schmidt is a visiting professor at Wellesley for the 2017-18 academic year. (*advisor Zeitler*)

Adrienne Scott presented posters at the 2017 Geological Society of America (GSA) meeting in Seattle as well as the the 2017 American Geophysical Union (AGU) meeting in New Orleans. (*advisor Meltzer*) Travel funded by GSA, EES, CAS, GSS, and Dr. Meltzer.

Jon Stelling presented a poster at the 2017 American Geophysical Union (AGU) meeting in New Orleans. (*advisor Yu*)

Lillian Soto-Cordero attended Session convener and chair for 2017 Seismological Society of America Annual meeting - Intraplate earthquakes: Central and Eastern North America and Worldwide; co-sponsors: Christine Powell (CERI) and Will Levandowski (USGS) and had a Summer Internship at the USGS-National Earthquake Information Center. (*advisor Meltzer*)

Leslie Tintle spent a year as a research assistant doing research on subglacial volcanoes in Iceland with Dr. Tamara Carley at Lafayette College prior to arriving at Lehigh. (*advisor Sahagian*)

Candace Wygel attended the National Council For Science And The Environment (NCSE) 2017 conference in Washington DC and spent her summer as a TA for field camp. (*advisor Sahagian*)

Zhengyu Xia travelled to Brown University in March and July to do collaborative lab work and gave an oral presentation at AGU in New Orleans in December. (*advisor Yu*)

GRADUATE STUDENTS

On March 3, 2017 we held our annual student Graduate Symposium. The keynote speaker was alumnus speaker **Alex Ireland**, PhD '12 ExxonMobil. His talk was entitled "The Operational Use of Satellite Data for Planning and Reclamation of Boreal Forest in the Oil and Gas Industry". Following the keynote our students were able to showcase their research with their peers, faculty, future students and alumnus, **Alan Benioff** PhD '84, through oral presentations or poster with an abstract in professional meeting format. The event was concluded with a cocktail reception and banquet in the Asa Packer Dining room.

Please mark you calendar for our next Graduate Symposium on March 2, 2018 as we welcome keynote speaker **David Schneider**, PhD '00, Associate Professor and Director, Earth Sciences, University of Ottawa.



2017 Symposium Awards

Best Poster: **Megan Clark**

Best Talk: **Jennifer Schmidt**

Oral Presentations

Rui Cheng
Zhongxiong Cui
Elizabeth Dyer
Darwin Janes
Laura Markley
Kalin McDannell
Jennifer Schmidt
Lillian Soto-Cordero

Poster Presentations

Lorraine Carnes
James Carrigan
Megan Clark
Gabe Epstein
Mariah Chambers Hoskins
Katie Jaeckel
Kaylee Kraft

Congratulations

Heidi Cunnick (*advisor Booth*), **Hongcheng Guo** (*advisor Zeitler*) and **Matthew Nikitzczuk** (*advisor Bebout*) for passing their PhD qualifying exams.

Gabe Epstein (*advisor Bebout*), **Mariah Hoskins** (*advisor Meltzer*) and **Anne Sirait** (*advisor Meltzer*) for passing their PhD dissertation proposal defenses.

UNDERGRADUATE HAPPENINGS

On Friday May 5, 2017 we held our Undergraduate Research Symposium with our Keynote Speaker **Paul B. Myers III**, BS '86, Geophysics, Lehigh University, MS '88 Geology, University of Kansas, MBA '03, University of Calgary, Chief Executive Officer, President and Director, Cambrium Energy Inc. "From Lehigh to Western Canada and the British Columbia Triassic". We were joined by his father **Paul B. Myers Jr.** and **Bob Carson** both emeritus professors of EES. The talk was followed by oral presentations and poster presentations, undergraduate awards and our annual department picnic.

ORAL PRESENTATIONS

Nicole Etzel, "Provenance of Triassic Basin Quartz-Pebble Conglomerates Using Detrital Zircon Petrography and Geochronology" (*advisor Pazzaglia*)

Noel Johnson, "Patagonia peatlands: a clue to past climates and precipitation sources" (*advisor Yu*)

Grant Loescher & Jerry Vogel, "Sequestering Carbon in Appalachian Basin Oil Wells" (*advisor Pazzaglia*)

Cora Summerfield, (Honors Thesis)
"Pedogenesis of the Bryn Mawr Formation (late Miocene) in Cecil County, MD: encoding of past climate and implications for future environmental change in the mid-Atlantic region" (*advisor Pazzaglia*)



(From left: P.B. Myers Jr., B. Carson, D. Anastasio and P.B. Myers III)

SYMPOSIUM AWARDS

Best Talk

Cora Summerfield

Best Poster

Tiffany Bauman

Ceara Hogan Tomaino



ANNUAL UNDERGRADUATE AWARDS

Donnel Foster Hewett Award- Cora Summerfield, BS '17

This award goes to a senior in Geological Sciences Who Best Demonstrates the Potential for Professional Excellence.

Handwerk Prize- Noel Johnson, BS '17

This prize is presented to a student for Outstanding Achievement in the Fields of Chemistry, Materials Science and Engineering, or Earth and Environmental Sciences.

J. Robert Munford- Shane Smith, BA '17

This award is given to the senior major who Demonstrates Substantive Improvement over the Course of their Program of Study, and Attains, in the Senior Year, a Clear Record of Excellence.

POSTER PRESENTATIONS

Jocelin Gregerio Alarcon, "Natural History of the Water Street Park Boulders" (*advisor Pazzaglia*)

Tiffany Baumann, "Tungsten and Molybdenum cycling in deep-sea hot-springs: a possible control on chemosynthetic microbial diversity" (*advisor McDermott*)

Grant Loescher, "Geochemistry, physics, and dispersion of a Gakkel Ridge hydrothermal plume, 87°N, 55°30'E" (*advisor McDermott*)

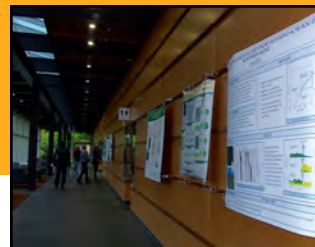
Danika Marziller, "Here Today, gone Tomorrow: How and why glaciers are changing in Iceland and Greenland" (*advisor Ramage*)

Caroline Pritchard, "Increasing Educational Accessibility of the Saucon Rail Trail through Improvement & Expansion of Earth Science Content" (*advisor Anastasio and Berti*)

Ceara Hogan Tomaino, "Examining the mid Holocene Hemlock (*Tsuga canadensis*) Decline at Sydney Bog, ME: timing and multi-decadal dynamics" (*advisor Booth*)

Julian Traphagen and Krittanon "Pond" Siorattanakul, "Probing Central Mongolia with Finite Frequency Tomography" (*advisor Meltzer*)

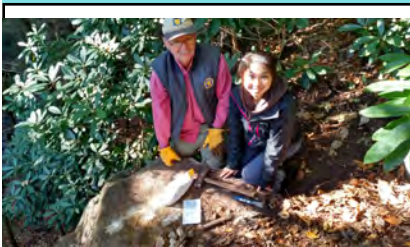
Yuning Zhang, "A 1000-year long pollen record from Thousand Acre Bog in northern Maine" (*Bob Booth*)



As a rising junior and dual EES and CEE major, **Monica Powers '19** spent the summer and fall semester of 2017 working with **Dave Anastasio** on ancient biped migration through the Iberian Peninsula. In 2017 this work led to novel methods to date archeological sites using rock magnetic based cyclostratigraphy in sedimentary rocks and to resolve paleoenvironmental interpretations of the Baza lakeshore. Monica spent more than one-month in Southern Spain, the first half living in a cave house with two Spanish scientists, Dr. **S. Pla-Pueyo** from University of Granada and Dr. **J. Parés** from the Spanish national research center for human evolution plus Anastasio in Orce, Spain, she then two spent weeks in Parés's lab in Burgos, Spain making measurements before continuing the lab work back at EES. Her results shed light on the earliest Europeans and likely extend hominin occupation in the region to more than 1.5 Ma. The funding that made her research and long trip to Spain possible included a CAS undergraduate Research grant, a Ryan fund grant administered by EES, an EI/STEPS endowed Fellowship and a National Geographic Society grant awarded to Anastasio.

Monica reports "My independent research experience gave me an opportunity that broadened my educational horizons greatly. I was given the freedom to take samples, measurements, and explore the Southern Spanish countryside as a real independent geologist. The lab experience and connections I gained while working at the CENIEH (the Spanish National Research Center for Human Evolution) in Burgos, Spain, and also in Lehigh's lab for paleomagnetism, have given me an edge of knowledge that I would not have had access to otherwise."

Monica presented preliminary results at the EI/STEPS annual undergraduate symposium and she will present her final results at the Geologic Society of America meeting in Spring 2018 and at the EES Undergraduate Symposium the last day of the spring 2018 semester.



Ohiopyle Falls, located in Ohiopyle State Park on the Youghiogheny River in western PA, is a site of historic and geologic significance being investigated by undergraduate **Christy Li '18**. The falls, which blocked the passage of

George Washington's journey to Fort Pitt at the start of the French and Indian War, are currently located where the Youghiogheny River crosses the thick, hard Homewood Sandstone (Pennsylvanian), but that is not thought to be their original location. Many waterfalls, like Ohiopyle Falls, slowly erode upstream and cut through the underlying rock because of the focused erosive energy of the river. Christy's research project is to determine how fast Ohiopyle Falls are marching upstream, and then by extrapolating that velocity downstream, estimate where the falls were born. In doing so, she will be testing the idea that integration of the Ohio River downstream of Pittsburgh following an early glaciation ~2 million years ago could have been the trigger for lowering base level, the migration of waterfalls, and the carving of the western Pennsylvania landscape. Christy's research has already involved field sampling of the Homewood Sandstone followed by analysis of that material at the cosmogenic nuclide lab at the University of Vermont to determine an exposure age. The rate of upstream waterfall migration will be modeled using MatLab code that Christy is developing. Christy's project is supported by the Pennsylvania DCNR - Bureau of Topography and Geologic Survey, the PA DCNR Think Outside Program, and the EES Department.

Yuning Zhang '18 worked with Professor Bob Booth on an investigation of the late Holocene vegetation history of northcentral Maine.

Lehigh takes field camp to new heights

Lehigh Field Camp integrated the use of Unmanned Aerial Systems (drones) into classic field geology and environmental sciences projects for the first time this year. The new tool offers Field Camp students the opportunity to use cutting edge technology that translate into valuable and marketable professional skills. Field Camp is once again committed to his mission of excellence and positions itself as leading in the national and international panorama of field education. Field camp students continue to benefit from the generosity of our alumni through the Vic Johnson Fund and a scholarship established by the Imhof family which allowed support of **Danika Marzillier '18**, **Ryan Wheeler '18**, **Carlos Castell Croke '18** and **Julian Trapahagan '18**, Lehigh student attendees in 2017.

The recruiting for next summer is ongoing and the 2018 class is shaping up to meet expectations of excellence and diversity, we look forward to another successful year. If you want to know more about the program, visit the Lehigh field camp website (<http://www.lehigh.edu/~clb208/fieldcamp>) or contact the director (**Claudio Berti**: clb208@lehigh.edu), and if your summer travels take you close to our route, please do not hesitate to join us in the field!

Julian Trapahagan said: "Lehigh Field Camp was a great experience that helped me improve my field skills and reinforce my understanding of geological processes. I will continue to use the knowledge I acquired from Field Camp throughout my career to inform future research endeavors."



Grant Loescher '18 and **Tiffany Baumann '19** met the ROV Jason II during a trip to Woods Hole Oceanographic Institution this summer, as part of their PA Space Grant NASA internships. Grant and Tiffany worked to digest metal-rich particles, for future investigation for enzyme-relevant trace metals. These lab activities have led into their ongoing supervised internship on hydrothermal trace metal inputs in the high Arctic (Baumann) and an honor's thesis project to investigate subsurface temperatures at the hydrocarbon rich Pescadero Basin hydrothermal system (Loescher). **Talia Rodkey '19** also joined the McDermott lab team this semester. Talia's project involves calibration of the Picarro laser spectrometer for quantitative methane isotope work, to inform upcoming analysis of source and plume vent fluids.

Several undergraduates have been doing research under the direction of Professor **Joan Ramage**. **Mariah Mathias '20**, has been developing a study on forest structure and bat habitat. **Sarah Stern '18** is studying glacier changes in High Mountain Asia and **Danika Marzillier '18** received an EI-STEPS summer research fellowship to analyze melt patterns of glaciers in Iceland which she presented at the American Geophysical Union meeting in New Orleans, LA in December.



LIFE AFTER LEHIGH

On Monday, April 3, 2017, Department Chair, **Dave Anastasio** hosted 19 alumni from around the Houston area at a mixer while attending the 100th Annual AAPG Convention and Exhibition. The group mingled and reminisced over hors d'oeuvres and drinks at Sambucca in downtown Houston. Dave really enjoyed seeing everyone and hopes to be able to visit with other alumni in the near future. All alumni should feel free to stop in and say hello whenever you are in or around the Lehigh Valley.

Connect with
Earth & Environmental Science Undergraduates

* Externships * Mentor Program

For more information or to participate please contact
Andrea Skimbo, Assistant Director, Center for Career
and Professional Development, Lehigh University

andrea.skimbo@lehigh.edu



Megan Clark '17, MS EES, Megan is currently a Staff Assistant Geologist at Roux Associates, an environmental consulting firm based out of Islandia, NY. Megan works mostly on brownfields projects in the Long Island and New York City area. Her job responsibilities include air monitoring, environmental sampling, site investigations and remediations, construction oversight, litigation review, and preparation of proposals and reports. Megan is currently working on a project in Sleepy Hollow, NY where she serves as the field representative and site manager.

At Lehigh, Megan learned the importance of time management and how to successfully juggle several things at once. Consulting is a lot like having a large class load, you have different projects happening simultaneously and you need to manage your time and prioritize your work so that all tasks get completed successfully. Megan also appreciates how her experience at Lehigh taught her the importance of doing ethical, thorough, and high-quality science. As a consultant, the implications of the data that you collect and how you interpret that data are very tangible and often high-stakes. In this way, the commitment to

quality scientific research that Megan experienced at Lehigh plays out every day as she works on a variety of consulting projects that strive to solve clients' most challenging environmental problems.

Megan is not exactly sure what the future holds, but she does know that five years from now she will still be using her earth science background and passion to solve problems. She also hopes to have a career in which she is consistently facing unique challenges and learning new things.

Megan thinks it's important to view every challenge as an opportunity. Many of the classes that she took at Lehigh were extremely challenging. However, she learned that these situations are the ones in which you have the most room to grow and learn. Not understanding a topic in class? Do some extra reading or talk to the professor! Taking extra steps to conquer challenging situations will allow you to go above and beyond (and you may actually have some fun in the process). Megan also believes that it is extremely important to take full advantage of the opportunities available to you. For example, she found out about Roux Associates from an email from a current Roux employee, which **Steve Peters** distributed. Megan reached out to that employee and made an important connection that ultimately helped her obtain her current position.



Kalin McDannell '17, PhD EES, came to Lehigh University in 2011 after receiving a M.S. degree in Geology from West Virginia University where he did fieldwork in Alaska studying aspects of Arctic neotectonics. He received his Ph.D. in 2017 working with Dr. **Peter Zeitler** focusing on thermochronology and tectonics in Mongolia and the Canadian Shield. He is now at the Geological Survey of Canada in Calgary working as a postdoctoral research scientist within the department of Natural Resources for the Canadian government. He is working with a team of other geoscientists on the Geomapping for Energy and Minerals research project to investigate the inter-regional variation of low-temperature thermal histories along two sampling transects within Canada. This study involves apatite fission-track and (U-Th)/He thermochronology, as well as detailed elemental data acquisition to help constrain thermal modeling of the landscape and basin sediments.

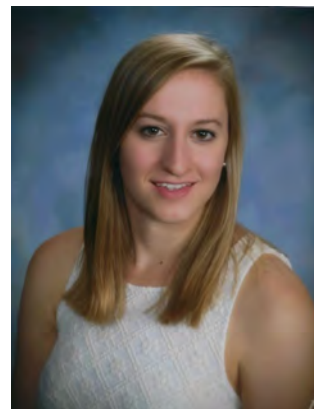
Kalin's Ph.D. research was a natural bridge to the work in his postdoctoral position. However, networking and internship experiences while at Lehigh prepared him well for his current job. Kalin took a basin analysis short course with ExxonMobil, and prior to that, did two internships with Chevron in Houston, Texas working with their Hydrocarbon Charge team exploring hydrocarbon migration efficiency. Five years from now Kalin hopes to finish his postdoctoral work and potentially move back to working into academia. Kalin encourages current EES students to seek out and take advantage of research opportunities offered within the department and to utilize faculty contacts to try to get as much internship, volunteer, and work experience as possible because it will be very valuable later, regardless of career path.

Cora Summerfield '17, BS EES, is working with Professor **Elizabeth Screaton '95**, PhD at the University of Florida School of Geological Sciences in Gainesville, Florida. Her research will be measuring permeability and porosity in northern Florida lake sediment cores.

Cora's experience at Lehigh prepared her to pursue a graduate degree by allowing her to explore her interest in the geological fields, learn how to write and present research, and learn the importance of doing research. Cora used equipment and learned methodology that many students may not have the opportunity to do. Five years from now, Cora hopes to have a job in the hydrogeological field but is unsure as to what that will be. As a Lehigh student, Cora loved having the opportunity to do two years of research and to write a thesis as an undergraduate student under Professor **Frank Pazzaglia**. Her time at Lehigh gave her a glimpse of what graduate school is like and put her ahead of the curve and allowed Cora to build a relationship with professors and fellow students and made STEPS her second home. From this research, Cora was awarded the opportunity to present her research at the annual Geological Society of America meeting in Seattle, WA.

There were also times where Cora felt she was pushed out of her comfort zone to learn new things. For example, Cora had never been camping prior to the field trip with Professor **Dave Anastasio's** Structural Geology and Tectonics course and learned a lot about structural geology but, even though camping is not her cup of tea, it can also be a lot of fun!

Since starting school at the University of Florida, many people have approached Cora to talk to her about how they know about Lehigh or have a connection to Lehigh. While at Lehigh, students are told that the alumni community is extensive, supportive, and successful and according to Cora, it is true! Lehigh's connections and reputation will open doors to some incredible opportunities.



Jonathan Wood '17, BA EES and History, with a creative writing minor, is working as an Environmental Scientist with PennJersey Environmental Consulting located in Milford, NJ. In his position he works 60 percent in the office and 40 percent in the field. While in the office, he prepares basic documents, compiles laboratory data and field logs that will eventually be attached to larger reports, and generally act as a go-to person for coworkers who have small tasks that need to be completed for their own projects. In the field, he tags along with at least one other coworker on many different jobs. He has conducted soil boring and test pit excavation oversight, temporary well installation, and well gauging, to name a few.

While most of the classes he took were not specifically geared towards consulting, he honestly believes that the skills taught in all of his classes at Lehigh, such as critical thinking, creative approaches to problem solving, and asking tons of questions enabled him to get a very competitive position a month after graduation in which he beat out other

applicants who already had years of experience in the field. He does wish that he had taken more geology courses, as most of his field work relies heavily on identifying/characterizing soils and stratigraphy. However, he firmly believes that this will not hold him back from excelling in his field because most of the job is learned as you go. Lehigh provided a very solid background that is allowing him to grow in ways that people from other schools just don't get. He is very thankful for two classes in particular that he took in his senior year that greatly prepared him for working in the consulting field. **Steve Peters** Hydrogeology class and **Jerry Lennon's** Environmental Groundwater Hydrology class both focused on approaching problems that mimic how we actually go about tackling issues in the industry. While he was not as comfortable with some specific tasks when he was starting out, things like having already heard about dealing with the NJDEP in Lennon's class and being very scrutinous with high attention to detail in Steve's class gave him confidence to succeed. It was helpful to already have working knowledge of things like groundwater/bedrock contouring and how to read soil boring logs because he does a lot of that in his work.

In five years, he sees himself as a Project Manager with an environmental consulting firm, speaking with clients and contractors, allocating work to junior employees under him, keeping track of laboratory jobs, staying on top of invoices, and acting as a liaison between the Licensed Site Remediation Professionals (LSRPs) and the junior staff.

Liz Lucas '13, participated in the CCC: California Conservation Corps Back Country Program from April until October where she lived off the grid in the forest while working 40 hours a week repairing and building trails. The work ranged from 1-7 miles of hiking a day carrying upwards of 30-50 pounds on her back using crosscuts to cut out fallen trees, clearing the area of overgrown plants, reinforcing and clearing out water drains, making reroutes from where the trail was too badly damaged, and finally building rockwalls, waterbars, and rock steps.

Liz said *"This was the most challenging thing I have ever done but also incredibly rewarding. I slept in a tent or under the stars for 157 days without modern conveniences, with no connection to the outside world other than mail once a week surrounded only by a crew of 18 people. The days were long and the weeks were short. The pain was worth it."*



FACULTY GRAFFITI

When not dealing with administrative duties, in 2017 **David Anastasio** continued work on three research projects (1) NSF-ITEST project has developed, implemented, and evaluated a series of innovative Socio-Environmental Science Investigations using a geospatial curriculum approach targeted for economically disadvantaged 9th grade students in Allentown, PA, (2) National Geographic Society funded research to develop a high-resolution chronostratigraphy on biped bearing strata around the Baza paleolake, Spain with Baccalaureate student Monica Powers and (3) Tectonic drivers of young, rapid landscape change in the Betic Cordillera, Spain with PhD candidate James Carrigan. He traveled extensively this year to Spain for NGS research and a research planning trip for a pending NSF-REU and to Wyoming and Montana to teach field camp. He also attended the national meetings of the American Association of Petroleum Geologists, Houston, TX, the Geologic Society of America, Seattle, WA and the American Geophysical Union, New Orleans, LA plus a conference on Feedbacks Among Climate, Erosion, and Tectonics, Corvallis, OK. Anastasio authored or co-authored on 7 abstracts and submitted 4 new papers with his colleagues in 2017.

Gray Bebout, working with his graduate students Gabe Epstein (Ph.D.) and Kaylee Kraft (M.S.), has continued with his research emphasis on subduction-zone chemical cycling. In the spring, 2017, Katie Jaeckel (M.S.) completed her research on the extents of deformation-enhanced release of carbon during deep subduction, based on field study in NW Italy. Two NSF grants have been supporting study of fluids along ancient subduction interfaces, in the Italian Alps, and mass-balancing of volatiles at the Hikurangi subduction margin, New Zealand. The work on volatiles cycling at paleo-subduction interfaces is funded by a large, multi-institution PIRE grant (Partnerships for International Research and Education). Bebout will visit the North Island, New Zealand, in January, 2018, to meet with collaborators and initiate sampling of volcanic gases — Gabe will assist with similar work later in the spring, 2018. Bebout continues to collaborate with researchers at the Institute for Planetary Materials (IPM), a research laboratory located in Misasa, Japan. As a new research angle, he has directed some effort to study of nitrogen in Mars-analog materials such as palagonitized volcanic glass and minerals known on Earth to host nitrogen in various forms. Astrobiological work on volcanic glasses from Antarctica and Iceland will be undertaken by new Ph.D. student Matthew Nikitezuk, who will visit labs at the IPM and at JPL (in Pasadena, CA), to conduct high-resolution SEM/TEM imaging, organic geochemistry, and various other microanalytical work.

Claudio Berti continued his term as Field Camp Director and Professor of Practice. During the year he developed new exercises for the introductory labs and invested quite some time in establishing new UAS (drone) image acquisition capabilities for the department. With the use of this new and rapidly evolving technique the department has now access to high resolution topography data in real time. The sky is the limit! Field Camp also move forward and in the summer of 2017, 30 outstanding students from 19 different national institutions benefitted from new and improved exercises in some of the most spectacular setting that the Rockies have to offer to Earth and Environmental students. Recruiting for the summer 2018 is ongoing and it is looking like another successful year.

Bob Booth has had a dynamic research group this year, hosting two 6-month visiting graduate scholars from South China Normal University (Bing Liu, Zhiqiang Wei) and welcoming two new graduate students into his program (Heidi Cunnick, Matt Huff). Graduate student Robert Mason also successfully defended his MS thesis in the spring, which was focused on using pollen and plant macrofossils to gain a millennial-scale perspective on the recent oak decline in the northeastern United States. In January, Bob spent ten days in Colombia as part of a new collaborative project developing paleoenvironmental records from high-elevation peatlands. His field activities were documented in real-time on his blog (amongthetatelytrees.wordpress.com). Bob also attended a workshop in Fort Collins, Colorado as part of his collaboration with Paleoenvironmental (Paleoecological Observatory Network), and presented the results of his NSF-funded research on peatland development and its implications for lake carbon cycling at the Ecological Society of America meeting in Portland, Oregon. He continues to bring forward a global testate amoeba database as part of a large, collaborative effort to expand and develop an integrated database of paleoecological and paleoenvironmental information (neotomadb.org). Several undergraduates worked on independent research projects in Bob's lab during the past year, and he continues teaching a number of popular courses, including ecology, conservation and biodiversity, and wetland ecology.

Ed Evenson continued his almost 50-year quest to better understand what is, and was, happening under glaciers – in both in the subglacial deforming bed and in the debris laden basal ice. Last year Ed made three trips to Sweden to continue his work with Professor Johan Kleman (University of Stockholm) and his recent PhD student Nathan Hopkins who is now on the faculty of Minot State University. Using AMS (anisotropy of magnetic susceptibility) techniques in the mountainous regions of Sweden, his group is attempting to better understand the subglacial thermal regime i.e. was the ice “warm-based” and sliding (which orients particles) or “cold based” and frozen to a non-deforming frozen bed (which does not allow sliding and particle orientation)? Ed, and Nathan also ventured to Matanuska Glacier, Alaska in February (it was cold!) to collect samples to measure the deformation occurring in an active warm based glacial system. Ed is also planning several trips to Alaska this summer to initiate a study of stone nets (a kind of patterned ground) developed in dried up lake basins along the Denali Highway. Ed recently traveled to U. Penn to give his famous (infamous?) lecture “Charles Darwin – Geologist, and the Origin of Darwin's Boulders in Tierra del Fuego”. On the social side – Ed and Laura continue to summer in Mackay, Idaho where they recently built a “guest house” to better accommodate family and friends. If you are in the area – please call (484.515.9461) and stop by.

Ben Felzer's student Rui Cheng graduated in spring 2017, with an M.S. thesis titled “Associated effects of temperature and soil moisture on summer forest carbon fluxes in the contiguous U.S.” She is now doing her doctoral research at Cal Tech. One additional publication from the final chapter of Mingkai's work came out in Global Ecology and Biogeography. As part of his NSF IBSS (Interdisciplinary Behavioral and Social Science) project he helped organize a session at the AAAS annual meeting in Boston in February, titled “Patterns of Resilience to Climate-Related Disasters” and presented a talk with Carol Ember, “Climate extremes, perceived disasters, and cultural transformations”. He attended and presented a poster at AGU in December to follow up on the work presented at AAAS, titled “Using weather data to determine dry and wet periods relative to ethnographic records”. Ben mentored two undergraduate students (Sarah Stankus and Erin Kelly) in a project presented at the EI-STEPS Mixer and Symposium this Fall to explore the effects of deer on the regeneration and carbon dynamics of the Lehigh Forest. He continues to work with 2 undergraduates (Casey Urban and Malcolm Scobell) in their research with CEE professor Tara Troy. This Fall he is the sole professor teaching EES004 (The Science of Environmental Issues), which he plans to alternate with EES250 (Terrestrial Ecosystems) each year. Ben is also chair of the faculty committee on student life this year, which seeks to advise the administration in all aspects of undergraduate and graduate co-curricular student life, and has focused on the bLUeprint grants as a means of supporting innovative and sustainable projects that will enhance the sense of community and faculty-student collaborations.

Ken Kodama has been working up the Greenland samples he collected in August 2016 and finding a weak Earth's field at 1.3 billion years ago, in contradiction to an earlier study, so the Earth's inner core probably had not formed yet. He went to a rock magnetism conference in Utrecht in July and gave an invited talk.

Jill McDermott presented results from last fall's Arctic expedition at the Goldschmidt conference in Paris, France. She also worked with her summer undergraduate PA Space Grant NASA interns Grant Loescher and Tiffany Baumann to present preliminary data regarding the links between hydrothermal trace metal distribution and its ties to microbial community composition at the Gordon Conference in Chemical Oceanography in New London, New Hampshire. Tiffany, Grant, and Jill travelled to Woods Hole Oceanographic Institution on Cape Cod, Massachusetts to collect archived samples, to be analyzed in ongoing guided student internships. This fall, McDermott led hydrothermal fluid sampling at a 3800m deep vent field in the Gulf of California using the ROV Hercules aboard the EV Nautilus. These new samples will be the focus of EES major Grant Loescher's honors thesis. Among the 2017 publications from the McDermott group are two papers in *Geochimica Cosmochimica Acta*. The first describes the geochemistry of the world's deepest submarine hydrothermal system, while the second used noble gas dating techniques on a deep underground aquifer, setting a new record for the most ancient free-flowing water on Earth (up to 2.2 Ga). A paper in *Nature Communications* discusses the little-known evolutionary drivers of microbial populations inhabiting the warm seafloor surrounding hydrothermal vents (hint: it's geochemistry, of course!). Jill also developed and taught a new freshman seminar course, “Life from Stardust: The Origin of Earth and Life” with Physics professor Joshua Pepper.

In May **Anne Meltzer**, EES graduate students Mariah Hoskins and Anne Sirait, and colleagues from the US, Ecuador, France, and the UK completed the field deployment of seismometers to record aftershocks from the Mw 7.8 2016 Pedernales Ecuador Earthquake. The data recorded show a rich range of slip behaviors providing insight into processes generating large earthquakes in subduction zones. In October, Anne and Anne Sirait travelled to Indonesia to meet with colleagues at Universitas Gadjah Mada and Badan Meteorologi Klimatologi dan Geofisika (BMKG) to initiate new research using the Java portion of the subduction zone to study how segmentation of the subduction zone influences seismicity and slip behavior. Research in Mongolia looking at deformation and high topography in continental interiors continues.

Don Morris spent time in Costa Rica in the beginning, middle and end of the year doing research and studying sustainable development and biodiversity conservation. He also directed the EI-STEPS Summer Internship program. On November 10th he went with the Environmental Initiative and Lehigh's UN Program on a trip to the United Nations for a series of policy briefs on environmental and sustainable development issues. The trip was attended by several EES majors and graduate students. The group met privately with UN Assistant Secretary General for Environmental Programs (UNEP) Elliot Harris for an in-depth discussion of global environmental issues and UNEP programs. This meeting was followed by a policy brief at the UN's Division for Sustainable Development where the focus was on the 2030 Sustainable Development Agenda and the UN's Sustainable Development Goals.

In 2017, **Frank Pazzaglia** engaged in a range of research, teaching, and field activities. He worked with several undergraduate students on projects that were presented at the GSA meeting in Seattle. These included a study of mid-Atlantic paleosols by Cora Summerfield, detrital zircon provenance of Newark Basin alluvial fans by Nicole Etzel, and modeling alluvial channel meandering above active faults by Lorrie Carnes. Working with detrital zircons and the opportunity to travel to the University of Arizona laserchron facility represented a new research direction for Frank. Currently he is mentoring undergraduate Christy Li on a project dedicated to understanding the age and origin of Ohiopyle Falls on the Youghiogheny River in western PA. Two new M.S. students, Katrina Gelwick and Josh Gonzales have begun their graduate studies with me and both have chosen exciting projects to pursue. Katrina will be working in northern Italy testing the canonical model for river deposition in response to Pleistocene climate change and Josh will be working in the Pennsylvania Piedmont using river knickpoints to document crustal deformation. He had the great fortune to travel in 2017, attending a Penrose Conference in Italy, and spending three weeks with Lehigh colleagues Anne Meltzer, Peter Zeitler, and Josh Stachnik in Mongolia with the goal of developing new research projects to pursue in the near future.

This summer, **Steve Peters** presented at the 13th International Conference on Mercury as a Global Pollutant. Graduate student Laura Markley completed her MS Thesis on the iron mineralogy of soils from the eastern United States. Laura Markley is currently enrolled in the Ph.D. program in Civil and Environmental Engineering at Syracuse University. A joint project with Dork Sahagian and Jill McDermott explores the chemical weathering rates of volcanic ash particles with MS student Candace Wygel. Steve has developed and offered a new course entitled "Human Health and the Environment" to connect with new health programs at Lehigh University.

Joan Ramage created and taught a new graduate course on LiDAR remote sensing and a new college seminar on how natural features shaped the Underground Railroad, an opportunity for first year students to explore the impacts of topographic conduits and barriers, weather, astronomy, geology, and technology affecting those seeking freedom in the 19th Century. She worked with several undergraduate students last year on projects ranging from glacial hydrology and change in Iceland, bats and their habitat in Pennsylvania, and developing Science on a Sphere educational programs. Joan presented her research on remote sensing of snow in the Upper Indus River at the Eastern Snow Conference in Ottawa and has been active with NASA and Universities Space Research Association.

Dork Sahagian teaches and conducts research in a range of disciplines, including volcanology, tectonics, hydrology, climate change and its impacts, environmental policy, and pedagogical approaches for STEM education for school children. A recently NSF funded project in volcanology involves the reconstruction of eruption energetics on the basis of the morphology of ash particles produced by explosive eruptions. Initial indications are that the more explosive an eruption, the more tiny bubbles are nucleated leading to finer and simpler ash particles. These can remain suspended in the stratosphere much longer than the larger and more complex particles generated by less explosive eruptions, and thus have a greater effect on air travel, water quality, and ultimately climate. On another subject, Dork recently submitted a paper explaining the fundamental cause of river meanders. It is not, as generally accepted by "conventional wisdom," caused by erosion of river banks and sedimentary processes. These are merely a response to the meander instability that also exists in many other systems without sediments at all such as the Gulf Stream, freely falling water from a faucet, and even derailed trains and jackknifed tractor trailer trucks. Why do tropical plants sometimes have such big leaves, while leaves in cold climates are usually much smaller? This was the topic of discussion at a weekly "Environmental Change" seminar where a paper of interest is critically explored by faculty and grad students. This discussion led to the writing of a comment paper in response, suggesting that perhaps length of dry season has more control on maximum leaf size than day/night variations between leaf and air temperatures, as suggested in the discussion paper. Dork continues efforts not only in education of our college and grad students, but also of school children, policy-makers, and the general public.

Zicheng Yu attended the PAGES (Past Global Changes) Open Science Conference in Zaragoza, northern Spain and then had field work with David Anastasio on old lake/peat sediments ("To the lake, the ancient lake...") near Orce in southern Spain in May; he co-organized a PAGES C-PEAT (Carbon in Peat on Earth through Time) workshop on tropical peatlands in Honolulu, Hawaii in early June. Zic spent more than a month in Beijing and Changchun, China for research collaborations and family visit in July–August and chaired a session on paleo carbon cycle at the 10th International Carbon Dioxide Conference in Interlaken, Switzerland in late August; presented at PMIP4 (Paleoclimate Modelling Intercomparison Project) Conference in Stockholm, Sweden in late September. Zic attended a meeting of Review Committee on the 2nd State of the Carbon Cycle Report (SOCCR-2) at the National Academies in Washington DC in late November; and organized a session on the Southern Hemisphere westerly dynamics—where his two PhD students (Jon Stelling and Zhengyu Xia) presented at American Geophysical Union (AGU) annual meeting in New Orleans in mid-December.

Peter Zeitler's 2017 saw some big changes, as Ph.D. students Lenny Ancuta, Kalin McDannell, and Jen Schmidt all defended their dissertations and moved on. Filling their shoes, Hongcheng Guo started work on his dissertation in the fall. Peter, Bruce Idleman, and Kalin published two papers on a new method of noble-gas analysis we developed that is generating lots of attention: let the cumulative ramped heating begin! Along with Anne Meltzer, Frank Pazzaglia, and Josh Stachnik, Peter spent several weeks in western Mongolia (picture below) and the Mongolian Altai, scoping out new research projects and getting the chance to experience more of the local culture; while in Mongolia, he also attended and gave a talk at International Conference on Astronomy and Geophysics in Mongolia, 2017, in Ulaanbaatar. In August, Peter traveled to France to give an invited talk at the Goldschmidt Conference in Paris.



STAFF GRAFFITI

2017 has been an exciting year for **Corinne LaViolette** as she made the transition from northern Arizona to the Lehigh River valley. In addition to working on several EES projects and facilitating operational needs related to EES research and courses, she fabricated and tested a vacuum evacuation line manifold complete with a digital thermocouple vacuum gauge. This instrument is used in the field to remove air from vials used for sample collection and gas analysis.

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In addition to keeping much of the major instrumentation in EES operating smoothly, **Bruce Idleman** was busy during 2017 with several field-based projects in Alaska. On one of these, an investigation into the tectonic affinities of the basement beneath the eastern Aleutian arc, he is collaborating with his daughter Lauren, who began the study while an undergrad at Colgate University. He also continued development work on a time-of-flight mass spectrometer for geochronological applications, traveling to the UK in August to consult with scientists working on similar instrumentation. Bruce also had a hand in some of the noble-gas research being conducted in the EES geochronology lab. In June he and faculty member Peter Zeitler received NSF funding for research on crystal defects in apatite and their impact on helium diffusion. Together with former graduate student Kalin McDannell, Ph.D. 17, they published three papers summarizing preliminary results from this research and their implications for U-Th/He dating.

EES GIFTS 2017

All gifts, no matter the size, contribute to the success of our program. We wish to thank the following alumni and others who have generously donated to the EES Department in 2017.

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Please accept our apologies if we missed your name on the above list, and we will acknowledge your gift in the next newsletter. We are grateful for all the support to the department and its scholarly activities. Gifts are used to support undergraduate and graduate education and research activities to make much of which is reported in this newsletter possible.

EES ENDOWED ACCOUNTS



Raymond Kravis Fellowship in Earth and Environmental Sciences

The Kravis Fellowships were established in 1987 to honor Raymond F. Kravis '24, who graduated from Lehigh with an Engineer of Mines degree. Since that time, many outstanding Earth & Environmental Science graduate students have benefited from this generous endowment.

Born in London, England, Kravis grew up in Atlantic City, New Jersey. Shortly after graduating from Lehigh, he moved to Tulsa, Oklahoma, where he served as Chairman of the Board of Raymond F. Kravis and Associates. After spending a number of years as an independent oil and gas industry consultant, he widened the scope of his operations by incorporating his business in 1962.

Through his expertise, the company became one of the country's leading oil and gas consulting engineering firms. His skill in matters of mergers and acquisition completions, estate evaluations and, for example, his innovative use in 1938 of the production oil and gas payment method, gained him the respect of those who selected him and his company to work for them.

He was known for building his business in the late 1930's by pioneering the procedure under which oil and gas properties were purchased with a loan that was paid back with the proceeds of oil or gas produced from that property. By the time he retired in 1987, he had built his company into a leading consulting and engineering firm and he was an authority on mergers and acquisitions and estate evaluations. Kravis advised Joseph Kennedy, the father of President John F. and Robert F. Kennedy, on oil investments.

Ray Kravis was a member of the Independent Petroleum Association of America, American Petroleum Institute, Society of Petroleum Engineers of AIME, American Association of Petroleum Engineers and, the National Society of Professional Engineers. He was a major benefactor of Lehigh University. As a ten-year member of the Lehigh University National Campaign Cabinet he made numerous gifts to Lehigh.

Among other honors received by Raymond Kravis is an Honorary Doctor of Engineering degree from Lehigh University.

Raymond F. Kravis passed away in October of 1993 at the age of 92.

J. Donald Ryan '43 Memorial Endowment Fund

Peter C. van de Kamp graduated with a geology degree from Lehigh in 1961. He continued studies in geology and geochemistry at McMaster University where he earned a M.Sc. He continued his education at the University of Bristol, United Kingdom, earning a Ph.D. Afterward, van de Kamp joined Shell Development Company in Houston, Texas as a Research Geologist. After four years in research on sedimentary rocks and petroleum reservoirs, he went to work at Shell Oil Company as an Exploration Geologist in Denver, Colorado.

van de Kamp left the corporate world in 1973 to work as a consulting geologist in petroleum exploration and development in California, which evolved into exploration and development work in geothermal energy in the western states and various foreign sites. He sited and drilled numerous successful wells for hot water and steam production to feed five electrical power plants. Various professional publications resulted from pursuing research on the mineralogy, geochemistry, and alteration of shales and sandstones.

van de Kamp met his wife, Tommie, while studying in Canada. They were married in 1964 in London and raised two sons. Until 2014, they operated a farm in Oregon from which they produced and sold one hundred varieties of apples from over two thousand trees, as well as, currants and gooseberries and other products made from the various fruits. The van de Kamp's parted with the farm in 2014. He has expressed how he is blessed with a great family and a career that fit well with his curiosity about the earth and working with creative, imaginative people.

After recently contacting and meeting with EES chair, David Anastasio, van de Kamp revealed a desire to "give back". Due to his experience with an internship as an undergraduate, he expressed strong interest in supporting undergraduate research and decided to generously gift the J. Donald Ryan '43 Memorial Endowment Fund to benefit undergraduates.



Peter C. van de Kamp '61

An Invitation to Get Involved and Support Your Department

The faculty and staff would like to extend an invitation to alumni to stay in contact with EES and to get involved with your Department. Contact us and let us know how you would like to be involved. Some activities and events open to all alumni include:

- The weekly Friday lunch, ST 102 and seminar, ST 101 (11 AM-1:00PM)
- The Graduate Student Symposium, **Friday, March 2, 2018**
- Undergraduate Symposium, **Friday, May 4, 2018**
- *Department picnic and awards presentations follow the Undergraduate Symposium on Friday, May 4, 2018*

Many of the programs we offer in EES that allow us to excel in education and research are made possible by endowed accounts and annual donations by alumni. We are always looking to augment our resource base for graduate and undergraduate research, EES field programs, and Departmental laboratory and educational facilities. If you are in a position to donate, please fill out the form below with your gift and send it to us. We will acknowledge receipt as soon as it arrives. Please make your check payable to Lehigh University and we thank you, in advance, for your consideration and support.

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