



## EES ROCKS!

by EES Department Executive Officer Tom Foster

The middle of the Fall semester has rolled around again and Emily Finzel has put together another splendid issue of the Department Newsletter. As outlined in the articles that follow, the Department has many things to celebrate among its students, faculty, and alumni, as well as some sad news to report such as the passing of former State Geologist Don Koch.

Our number of majors continues to grow, primarily due to the increasing popularity of our Environmental Science degree, which is now approaching 200 students; Geoscience has remained fairly constant at about 50 undergraduate students and 40 graduate students. We also have increased the number of students from outside the Department that take our courses by about 15% a year over the past two years (our total enrollment is now back over 2200 students per year).

Overall, the Department continues to do well in spite of a challenging fiscal situation faced by the College and University. We have been able to mitigate some of the financial impacts on the Department because of our strong alumni support through the UI Foundation. We have two main types of funds: a cash fund called the Development Fund, where contributions are directly spent on student projects over the course of a year, and a number of endowed funds, where the principle is invested in the Foundation's long-term investment pool that generates a predictably consistent long-term quarterly return. These funds allow the Department

to weather many small "crises" like buying tires for field camp, but most of the funds are used to support student research and travel to professional meetings. We greatly appreciate the generosity of all of you who have contributed to these funds over the last thirty years.

### Inside this issue...

#### Faculty profiles:

**Emily Finzel**  
Assistant Professor

**Kate Tierney**  
Lecturer

#### Where are they now?

**Lon Drake**  
Professor Emeritus

**Susan Heathcote**  
MS 1979

#### Student and Researcher profiles:

**Alligators, earthquakes, and biogeochemical perturbations**



## Faculty Profile:

### Emily Finzel, Assistant Professor

My research interests can be broadly classified as basin analysis, a method for deciphering the spatial and temporal formation and evolution of sedimentary basins. I would brand my expertise as sedimentology/stratigraphy, however, basin analysis requires familiarity with and integration of a wide variety of earth science fields. In my current research, I decipher the tectonic record contained within a stratigraphic section by applying several different tools,

including sedimentologic analyses, geologic mapping, detrital geochronology, detrital geochemistry, petrographic provenance analyses, and detrital thermochronology.

My standard teaching load at the University of Iowa involves three courses that are required for a B.S. degree, including Sedimentary Geology, Geologic Field Methods, and Geologic Field Analysis. I also team-teach two upper-level undergraduate/graduate elective courses that alternate in the spring semesters: Mineral and Petroleum Exploration and Tectonics and Basin Analysis. In addition, I rotate into the Tectonics and Petrology Seminar. Furthermore, I have just had a new course approved that is intended for undergraduate majors in their junior year called Career Path Planning for Earth and Environmental Sciences that will be offered in spring 2017.

## Faculty Profile:

### Kate Tierney, Lecturer

This is my second year here at Iowa and I am settling in nicely. I am teaching Geology of the U.S. National Parks, Sedimentary Geology and a First Year Seminar focused on climate change. Each of these classes is fun and challenging in its own way. National Parks more than doubled in enrollment this year, including many first year students who are interested in jobs involving the outdoors.



In addition to classroom teaching, one of my goals here at Iowa is to increase student involvement in field trips and to increase the number of field experiences available to students. This year, I will be running a spring break field trip to San Salvador Island, Bahamas to see the modern carbonates growing there.

My research focuses on Permian Limestones using lithostratigraphy and stable isotope chemostratigraphy. Using these methods, I've been focused on untangling the problems that have plagued selection of a Global Stratotype Section and Point for the Cisuralian, in particular the Kungurian Stage boundary. Slowly, the evolutionary hopscotch of conodonts and reiterative evolution picture is becoming more clear. I'm also part of a study examining lithium isotopes in marine limestones as a proxy for continental weathering. Results are a long way off, but exciting, none the less.

## Professor Emeritus Profile

Lon Drake

Hi Gang,

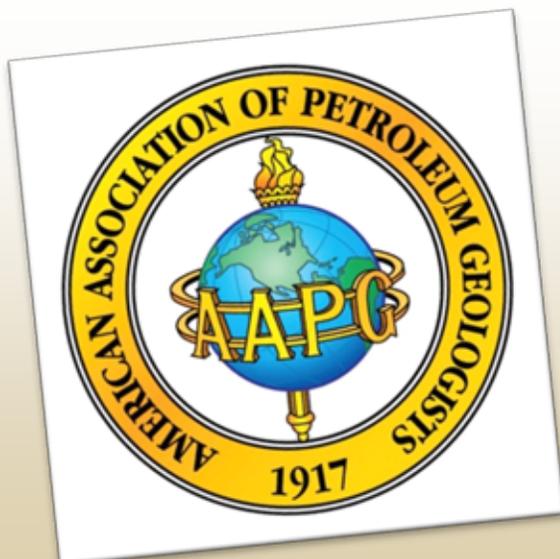
My program still remains focused on practical green field applications. After retiring from the U. in 1999, my consulting encompassed oil spill cleanups, landslide remediation, wetland design, stormwater management, groundwater protection (especially from landfills) and LEED design. Retired again in 2010, and I'm now into getting children from several private schools into the great outdoors and loving it. Also launched a four acre home project to reestablish some of our rarest native butterflies by planting the rare native trees and shrubs they are obligate to; and it is true that if you build it, they will come. Also now doing a weekly green blog for Bur Oak Land Trust on conservation topics, check it out. The Iowa Master Naturalist program launched last summer and I'm one of their teachers.

Barb and I celebrated our 50<sup>th</sup> wedding anniversary in 2012. Our health is holding ok and everything is still more-or-less repairable. I swim a mile Monday, Wednesday, and Friday and bike Tuesday and Thursday. I still shoot a couple of deer every year



and eat a lot of venison. Still hosting Todd and Sheila Ririe's annual homecoming visit. Still living in that kinda funky solar recycled house I build in the mid 1970's, and don't complain about the monthly \$32 utility bill.

Cheers,  
Lon



## Thank you from the AAPG Student Chapter

The AAPG Student Chapter would like to thank the alumni who donated to the department for student travel. This past September, with your financial support, three of our student chapter members participated in the AAPG Student Expo in Houston, TX. The AAPG Student Expo is a major career-networking event for geoscience students interested in the energy industry. This year our members presented their research to industry representatives, participate in short courses, and interviewed with potential employers. We thank you for giving us this excellent opportunity!

## Graduate Student Profile:

### Adam Cosette – PhD student

**Advisor:** Chris Brochu

**Research topic:** My research project entails looking at the evolutionary trends and phylogenetic relationships of alligatoroids – a group including the American alligator and its living and fossil relatives. To re-evaluate relationships within this group I have focused on ancient species near the split with the group's last common ancestor. Previously, many of these fossil forms have been poorly sampled giving me the opportunity to name new species. Studying these fossil species has important implications for our understanding of their living relatives' relationships, biology, and biogeography as well as informing conservation efforts.



**Experiences I value at UI:** The most rewarding aspect of my time at the University of Iowa has been the opportunity to teach. As a teaching assistant I am often provided with freedom in how I present class material. This independence has allowed me to tailor lectures and labs to inform upon current events and the interests of students. While at UI I have also grown as a scholar with the support of my fellow graduate students. The department has attracted a strong group of students from diverse disciplines who are always willing to lend assistance. It's a great community to be a part of and their insights have benefitted my studies.

**Future plans:** Following graduation I hope to pursue a career in academia so I may continue to teach and conduct my research. I find vertebrate paleontology to be a fascinating avenue to understand fossil and modern species through the lens of their evolutionary history. I hope to earn the opportunity to continue studying it.

## News & Upcoming Events

**Donald L. Koch's** life was celebrated on Saturday, October 29th at North Hickory Hill Park in Iowa City, Iowa. After receiving his Bachelor of Science degree in geology from the University of Iowa in 1959, Don began work with the Iowa Geological Survey as a laboratory technician and then a Research Geologist. He advanced through a series of promotions including Chief, Subsurface Geology; Assistant State Geologist; Acting State Geologist; State Geologist and Director; and State Geologist and Bureau Chief. While working full time, Don completed his Master of Science in geology and subsequently completed courses toward a PhD. His research responsibilities and publications at the Iowa Geological Survey included paleontology, stratigraphy, groundwater hydrology, coal geology, oil exploration, and underground storage of natural gas and liquefied petroleum gas. He led the State's scientific exploration of Coldwater Cave in Winnishiek County. A scholarship fund has been established in Don's name to benefit geology students. Checks can be made payable to: EES - U of I Foundation with Don Koch Memorial on the memo line.

### 2016 GSA Annual Meeting in Denver, CO

- Daniel Coulthard, MS student - Geothermobarometry and textural analysis of Flankbzone alkali basalts from Snaefellsnes, Iceland
- Erika Danielson, MS student – Preliminary biochemostratigraphy of the Mulde interval (Homerian), Wayne Formation, Tennessee, USA
- Emily Finzel – Provenance of Early-Middle Pennsylvanian sandstones of the midcontinent: detrital zircon evidence for the unroofing of the Alleghenian orogeny in Iowa

## Alumni Profile: Susan Heathcoate M.S. 1979



Keweenaw age rocks in Northeast Iowa, completing her master's degree in Geology, in 1979.

After graduation, Susan was hired by Mobil Oil Corporation as a petroleum geophysicist and began her career in Dallas, Texas where she spent a year being trained in all aspects of the collection, processing

Susan grew up in Stratford, Iowa, a small farming community in central Iowa near the confluence of the Boone River and Des Moines River. That is where Susan first learned to love the outdoors exploring and hiking at Ledges and Dolliver State Parks and canoeing on the Boone River. Susan's 37 year-long career had a few twists and turns, but eventually ended up bringing her back to her roots and her passion for protecting Iowa's land and water.

and interpretation of seismic data for petroleum exploration and development. Susan worked at Mobil for 11 years in Denver, Colorado and Bakersfield, California – with a short overseas assignment in Stavanger, Norway --where she helped evaluate prospects for new oil and gas reserves in offshore Northern California, Cook Inlet and the North Slope of Alaska, and in the North Sea.

Susan attended the University of Iowa as an undergraduate, where she decided to combine her interest in science and her love of the outdoors and pursue a Geology degree. After marrying Richard Heathcote, a fellow U of Iowa geology student, she finished her undergraduate studies at the University of Arkansas in the honors program, which included completion of a senior thesis involving collection and interpretation of gravity and magnetic geophysical data to delineate the Wharton Arch, a large subsurface structure in a remote area of the Ozarks.

Susan and her family returned to Iowa in 1990, where she found a new career as an environmental consultant working to assess and clean up contaminated properties. After six years of consulting, Susan was looking for a change and heard about the Iowa Environmental Council, a new nonprofit that was looking for a program director to lead a new initiative to improve water quality in Iowa. Susan joined the Council in 1996 and helped develop a Water Quality Action Plan for Iowa that was released in January 1998. Since that time Susan has continued to provide leadership for the Council on water quality policy and advocacy including agricultural nonpoint source pollution, livestock manure management, water quality monitoring, water quality standards, and restoration of impaired waters.

After completing her bachelor's degree in Geology in 1976, Susan returned to the University of Iowa where she continued to pursue her interest in geophysics with a thesis project that used gravity and magnetic data to interpret a large geophysical anomaly in the



## Congratulations Mattie!

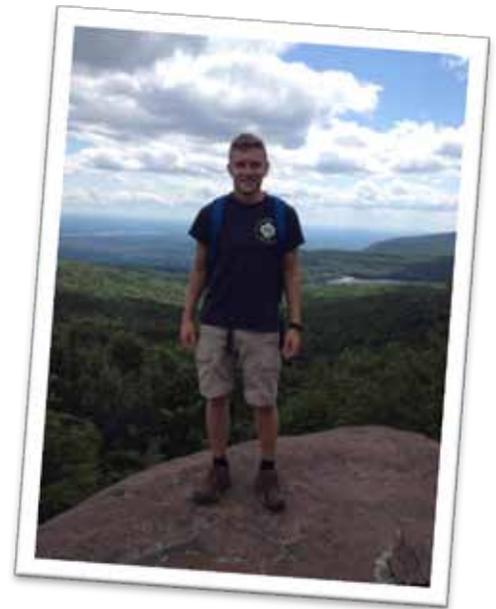
Each year the department holds a poster competition the Friday before Homecoming. MS student Mattie Reid won the **2016 Annual Homecoming Best Poster Award**. The title of her poster is, "*Testing tectonic models for the accretion of the Wrangellia composite terrane using detrital geochronologic dating and Hf isotopes, south-central Alaska*"

## Graduate Student Profile:

### Bryan Stressler – MS student

**Advisor:** Bill Barnhart

**Research Topic:** My Masters' thesis research is focused on investigating the robustness of Coulomb stress change calculations, which are frequently used to evaluate earthquake-triggering relationships. In particular, we are focusing on subduction zone environments where geodetic observations of earthquake deformation are limited to onshore regions. This limited spatial coverage impacts the resolution of fault slip models, which propagates in calculations of Coulomb stress change. We are implementing a series of synthetic tests to characterize the reliability of these calculations and will apply the results to investigate aftershock triggering following the 2010  $M_w$ 8.8 Maule, Chile earthquake.



**Experiences at UI:** As a graduate student in the EES department I have been fortunate enough to work on interesting earthquake-related research with Dr. Barnhart. Each earthquake presents a unique opportunity to learn something new about earthquake processes. During my first year as a graduate student I was able to contribute to a publication on the September, 2015  $M_w$ 8.3 Illapel, Chile earthquake. I have also had several chances to travel for conferences and course field trips, which have been excellent opportunities to communicate my research to the scientific community and to relate what I have learned in the classroom to observations in the field.

**Future Plans:** Upon completion of my Master's degree I intend to gain work experience in industry or consulting, applying my knowledge of geophysics and earthquake hazards to real-world problems.

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## News & Upcoming Events (continued)

- Lucas Gosney, undergraduate – Investigating the correlation between watershed surface geology and detrital zircon age data in modern river samples
- Sam Mraz, undergraduate – Provenance of Upper Jurassic to Lower Paleocene strata near the Black Hills Uplift, South Dakota
- Mattie Reid, MS student – Testing tectonic models for the accretion of the Wrangellia composite terrane using detrital geochronologic dating and Hf isotopes, south-central Alaska
- Stephan Oborny, PhD student – Catch-down cyclothems from the Pennsylvanian of Kansas

### 2<sup>nd</sup> European Mineralogical Conference in Rimini, Italy

- Jane Gilotti – U-Pb SIMS analysis of jadeite-bearing orthogneiss at Tavagnasco, Sesia Zone, Western Alps, Italy
- Bill McClelland – Detrital zircon geochronology of paragneiss adjacent to jadeite-bearing orthogneiss at Tavagnasco, Sesia Zone, Italy

### 2016 INQUA Loess Fest Conference, Eau Claire, WI

- Katie Goff, MS student – Weathering zone chemistry of modern and buried soil profiles of east central Iowa

## Undergraduate Student Profile:

### Terryl Bandy – BS anticipated 2017

**Advisors:** Brad Cramer and Bill Barnhart

**Research Topic:** For my research I worked with a couple of different professors in our department. For my senior thesis with Dr. Cramer, I am working on utilizing the Portable X-Ray Fluorescence (pXRF) handheld to analyze the chemical composition of the Schlamer #1 core that was drilled in Southern Illinois. The main goal of the project was to see how well the pXRF works for High-Resolution Biogeochemical studies. To do this we scanned the Schlamer #1 core with the pXRF handheld every 2 inches. We then came back in and drilled powder samples from the same horizons that we scanned with the pXRF and we ran them through the ICP-MS to test and see if we were getting the same chemical signatures. We were able to find large geochemical perturbations that occurred before the Ireviken and Mulde positive carbon isotope excursions during the Silurian.



I also did a summer project with Dr. Barnhart where we were working on making High-Resolution DEMs (digital elevation maps) of Southern California. For this project we were using optical satellite imagery to map active fault zones. We used the optical imagery from World View 1, 2, and 3 to co-reference each pixel with one another to make the actual DEM. We processed all of our data sets to a 2 meter resolution so that we could compare with LiDAR acquisitions that were conducted in years prior to our project. We found that our DEMs produced comparable results to the LiDAR. This was exciting because it meant that these maps can be made readily available for other geologists to use for other studies or they can also be used in civil response procedures and building locations.

**Experiences I value at UI:** I have fallen in love with The University's Department of Earth and Environmental Sciences mainly because of the atmosphere that has been developed within the school. It is really nice feeling, like you are part of not only a school but also a family. Many of the students and faculty that I have met here through my studies have been amazing mentors for those of us who want to pursue careers in the Geologic Sciences. I also really like the help and support that this department provides for its students. The department is very helpful in the fact that if you are having a problem in a class or if you are needing help applying to grad schools you know that there will always be someone around that is more than happy to help. The University of Iowa has also provided me with many opportunities that I would not have had otherwise. Like the coming Spring Break class trip to the Bahamas to study modern day carbonates. This department and the university have provided me with many amazing experiences and hopefully many more to come.

**Future Plans:** I am working on applying to a handful of graduate schools. I want to continue studying Stable Isotope Geochemistry and Earth History. I hope that after getting my Masters and PhD degrees that I will either be able to work in industry for a few years and then come back into academia, or I wouldn't mind going straight into academia because I ultimately want to help teach the next generation of geologist and help provide new data to the scientific community as a whole.

## AAPG Student Chapter Fall Field Trip

The AAPG Fall Field Trip took place on October 7-9, 2016 and visited the classic outcrops of the Baraboo area. Fifteen graduate students participated in the trip and enjoyed relaxed, informative visits to Van Hise rock, Dott's Detour, the East Bluff of Devils Lake, Parfrey's Glen and more. Discussions of structural and stratigraphic components of Baraboo geology were facilitated by Dr. Gilotti and Dr. Finzel. Dr. McClelland was along to provide additional



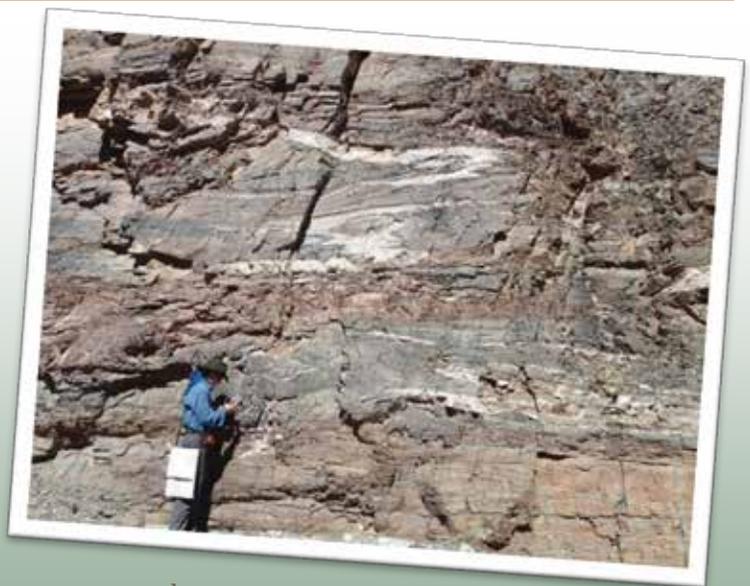
commentary as well. The beautiful weather helped make this one of the best fall trips yet. This was the sixth consecutive Fall field trip run for undergraduate and graduate students at Iowa; the fourth sponsored by the AAPG student chapter. The trips have been highly successful in providing new and old students with opportunities to get out and see great regional geology during the day and get to know one another by the campfire in the evening. Funding for the trip is largely provided by the University of Iowa AAPG student organization.



## Working in the field

by Patty Webber, MS student

In August 2016, Bill McClelland and I spent a month in La Rioja province of northwestern Argentina to regionally map and collect samples in the Sierra de Maz. The goal of our research is to characterize and better understand the deformation history of this mountain range. We plan to accomplish this primarily through the use of U/Pb dating analyses to determine the timing of metamorphic events. Our focus this field season was on sample collection and preliminary mapping of the area, with the intent of returning next summer to do more detailed work in Maz, and Sierra de Espinal. My thesis, still in the initial stages, will be focused on the structural geology of the range with an emphasis on exploring the broad-scale tectonics of the region.

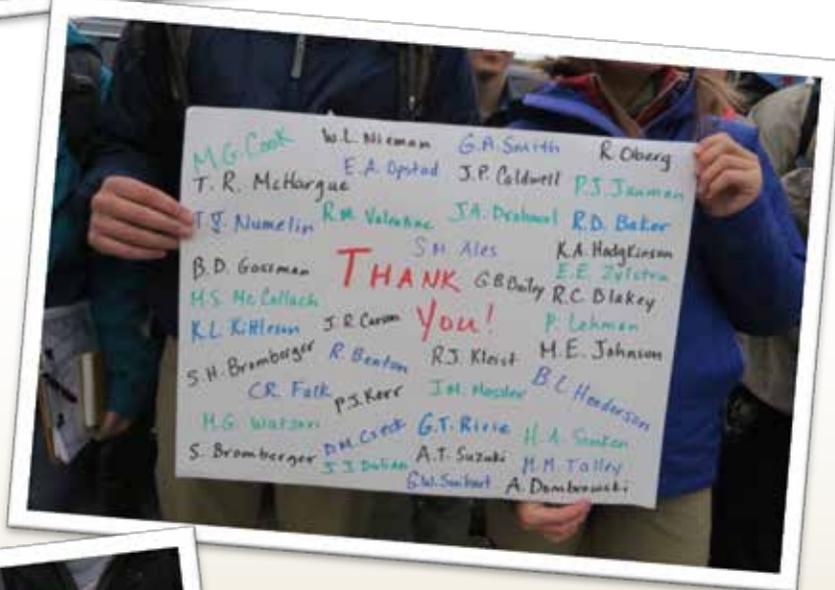


# Thank you for your "tireless" support!



As many of you know, the University recently decided to equip the Suburbans we use for field camp with 4-ply highway tires, which simply aren't up to the roads near Dillon, MT, where we teach our two main summer field courses. As a result, we experienced many flats, resulting in lost field time as well as safety concerns on the highway.

Over the last few years we slowly upgraded the vehicles to 10-ply tires using the EES Development Fund (a non-endowed fund used exclusively for student field and research support). We haven't had a single flat tire in two years now!



We would like to take this opportunity to acknowledge donors to the EES Development Fund! But we are still in need of more replacement tires! If you would like to purchase a tire, we will acknowledge your generous contribution by writing your name on a tire in the field and send you a photograph of your tire at work!

## Graduate Student Profile:

### Erika Danielson – MS Student

**Advisor:** Brad Cramer

**Research Topic:** For my Master's thesis I am using an event stratigraphy approach to demonstrate global sea level changes during the Homerian (upper Silurian) Mulde Event. I collected samples for high-resolution carbon isotope chemostratigraphy, conodont biostratigraphy, and petrographic analysis from Homerian strata in Tennessee, Indiana, and Ohio. I aim to correlate these sections at high resolution, and demonstrate global sea level changes during the onset of Mulde Event through comparisons to the UK and Sweden.



**Experiences I value at UI:** One aspect of the geoscience program here I am most grateful for is the ample opportunities for field trips and conference travel. This fall is the start of my second year in the program and already I have presented research and participated in workshops at six national and international conferences, largely thanks to department support. These have been invaluable experiences for me to make connections and grow as a geoscientist. I have also participated in several fun and challenging field trips where I've learned a ton (and I have several more planned!). I value the close community among the students and the dedication and support from professors and staff which have given me the opportunity to meet and work with amazing scientists, grow professionally, and make some great friends.

**Future Plans:** I will graduate in the spring of 2017 and intern with Anadarko Petroleum for the summer. Following that I plan to pursue a career in industry and I hope to continue working as a geologist with a focus in stratigraphy and sedimentology.

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## 2016 Earth & Environmental Sciences Alumni Advisory Board Meeting

The 2016 EES Alumni Advisory Board meeting was kicked off with a field trip to the Critical Zone Observatory field sites for alums, faculty, and students on Sunday afternoon with pizza at the Airliner Sunday evening. The trip was a great success and will be run again next year with the annual meeting. Thanks to everyone who participated!

### Future Meeting Dates

Starting in 2017, we will revert back to the Friday-Saturday meeting format. We have decided to implement this change in order to better integrate student involvement by introducing a career fair and poster session on Friday afternoon after a morning meeting, followed by a special alumni speaker at our weekly seminar.

**2017** Friday, October 13 to Saturday, October 14

**2018** Friday, October 12 to Saturday, October 13

**2019** Friday, October 4 to Saturday, October 5



## Working in the field

by Carsyn Ames, MS student

Dr. Emily Finzel, Dr. Eva Enkelmann (University of Cincinnati), and I collected 20 modern river sediment samples throughout the southern part of Alaska. Sampling involved collecting sand-sized sediment from pre-selected areas, sketching and photographing sample sites, and describing the lithology of clasts found around sample sites. We are using detrital apatite and detrital zircon grains from these samples to obtain U-Pb ages. These ages will allow us to determine the provenance signature of the watersheds. In addition, comparing the zircon and apatite ages will help us determine which zircon grains are reflecting a first-cycled versus recycled sediment input.

## News & Upcoming Events (continued)

### 2016 SVP Annual Meeting in Salt Lake City, UT

- Adam Cossette, PhD student – A new alligatoroid from the early Paleogene Black Peaks Formation of Texas
- Dean Hester, MS student – A Reevaluation Of The Crocodyliform *Batrachomimus patosbonensis* Montefeltro et al. 2013 from the Late Jurassic of Brazil: Implications For Neosuchian Phylogeny, Biogeography, and divergence timing

### 2016 AGU Fall Meeting in San Francisco, CA

- Bryan Stressler, MS student – Characterizing static stress changes in subduction zone environments: limitations of resolution from onshore geodetic observations
- Katherine Peterson, MS student – Geometry and Kinematics of Active Faults in the Northern Malawi Rift, Africa

### 2016 Goldschmidt Conference in Yokohama, Japan

- Mark Reagan – Volcanic Glasses from IODP Exp. 352 Cores

### Recently awarded grants

- Bill McClelland – Collaborative Research: Origin of long-lived crustal shear zones as transforms or subduction zones? (NSF)
- Bill McClelland – Collaborative Research: The Kaltag-Porcupine Fault system of northern Yukon: Evaluating large-scale terrane displacement in the Arctic and beyond (NSF)
- Mark Reagan – Collaborative Research: Subduction Initiation and development of the nascent Izu Bonin Mariana arc: A Petrologic and Geochemical Investigation of IODP Expedition whole rocks and glasses (NSF)

**Congratulations** – Former PhD student Eric Wilberg was recently awarded a Taylor & Francis First Place Award for Best Student Article in the Journal of Vertebrate Paleontology for his article title, “A new metriorhynchoid (Crocodylomorpha, Thalattosuchia) from the Middle Jurassic of Oregon and the evolutionary timing of marine adaptations in thalattosuchian crocodylomorphs”



Department of Earth & Environmental Sciences  
The University of Iowa  
115 TROWBRIDGE HALL  
IOWA CITY, IA 52242

EARTH & ENVIRONMENTAL SCIENCES

FALL 2016

## Share your perspective

*Please share the wisdom you've accrued throughout your career with our students by answering one or more of the questions below. Your responses will be included in the next newsletter. Send them to [geology@uiowa.edu](mailto:geology@uiowa.edu) and indicate whether you would like it to be anonymous or attributed to you. Thanks for sharing!*

*What made you competitive in your field?*

*What were your lucky breaks?*

*What type of preparation would have made your career path easier?*