



Buy a Tire for Field Camp?

by EES Department Executive Officer Tom Foster

As the other articles in this issue of the newsletter demonstrate, the Department is alive and well with vibrant students, energetic faculty, and an active Alumni organization. One thing that has changed since most of you left is that the proportion of the University's budget funded by the state of Iowa has decreased quite drastically. Consequently, the University has embarked on many rounds of efficiency reviews designed to allow us to deliver more with less. For example, in order to reduce costs, the University has 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. We muddled along but 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, and we didn't have a single flat during the 2015 field season! The down side is that the University made the Department pay for the new tires, which was a considerable expense that ordinarily would have been passed on to the students as a course fee. Fortunately for us, our alumni have strongly supported the Department through the UI Foundation, so we were able to purchase the tires using our Foundation Funds instead of charging the students. We are going to have to buy some more tires this year to replace ones that have worn out, so we have decided to acknowledge donors to the EES Development Fund (a non-endowed fund used exclusively for student field and research support) by writing their

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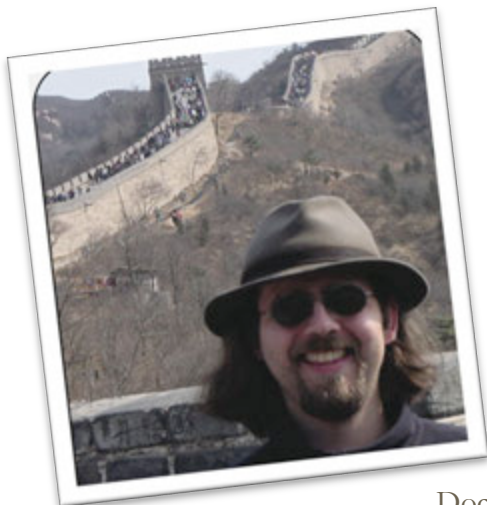
BS 1987, MS 1990

Student and Researcher profiles:

Permian-Triassic mass extinction and more...

names on Suburban tires used for field camp and sending them a photograph of "their" tire at work in the field!

The generous support of our alumni over the last thirty years has allowed us to weather many small "crises" like this and avoid saddling students with additional costs. We greatly appreciate your generosity.



Faculty Profile:

Brad Cramer, Assistant Professor

My research focuses on the Paleozoic history of the Earth system including paleoclimatology, paleoceanography, geochemistry, paleontology, and stratigraphy. Our research group utilizes stable and radiogenic isotope chemostratigraphy, bulk rock geochemistry, conodont, graptolite and chitinozoan biostratigraphy, and sequence stratigraphy to produce high-resolution event stratigraphies for major global change events of the Paleozoic. We currently have one Post-

Doc, two PhDs, two Masters, and three undergraduate students in our working group. Details of the University of Iowa MicroPaleontology Lab are available at www.bradley-cramer.weebly.com.

I recently introduced a new 'Big Ideas' course with Ty Priest from the History Department. This history General Education course 'History and Science of Oil' was fully booked last semester and will be doubled in size (hopefully to 150 students) for Fall 2016. I also teach Chemical Evolution of the Oceans as well Global Stratigraphy.

Faculty Profile:

Ingrid Ukstins-Peate, Associate Professor

I have been teaching the Natural Disasters class for the last few years, and have been really excited to see the enrollments expand from about 40 when I started teaching it to over 200 in a semester now. I co-teach our summer field classes - Field Methods and Field Analysis - in Montana each year. We have from 15 to 25 students in Methods, many of them having only taken one introductory geology class, and we teach them to construct their own geologic map. In addition to these regular department classes, I also teach courses through the Honors Program that include conducting experiments on how volcanoes work and learning more about the impact of volcanic eruptions on culture by studying Vesuvius and Pompeii.

I have a NASA-funded project to study eolian weathering of basaltic lavas at Askja Volcano, Iceland, as an analog for formation and transport of Mars clastic deposits. I had a reconnaissance field season last summer and will be conducting field work in August again this year. CGRER (U. Iowa) awarded me a seed grant to study a record of climate change during the last 20 ka by analyzing the chemistry of lake sediments from Laguna Lejia, a high-altitude lake on the Altiplano of Chile. I have projects on basaltic monogenetic eruptions in the Andes, and Monturaqui meteorite impact crater, also on the Altiplano.



Professor Emeritus Profile:

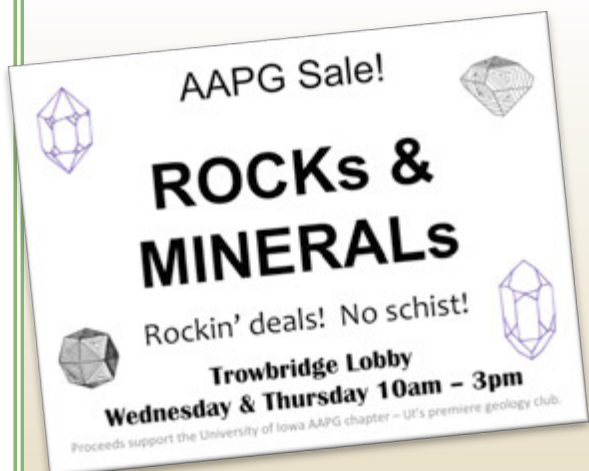
Phil Heckel

After teaching for 40 years, I retired in 2011 [but only from getting a paycheck], and the Department has kindly provided me with enough space to continue my ongoing research. I completed and edited a 2013 issue of the journal *Stratigraphy* [v. 10, nos. 1-2], entitled 'Pennsylvanian genetic stratigraphy and biostratigraphy of midcontinent North America' which comprises six articles and includes alumni authors and coauthors Jim Barrick and Lance Lambert on conodonts, and David Work on ammonoids. I have served on two thesis committees, where I have learned a lot from the bright students and new faculty. I have also been working with alumnus Brian Witzke [retired from the Iowa Geological Survey] and with Illinois State Geological Survey geologists on projects involving visiting old type sections and type areas of named fossils and marine units cited in the literature, in order to recollect and process for conodonts so that we can reconfirm or revise their correlations with other units in the Midcontinent and Illinois basins. This type of research is not currently supported by



Caption: Phil at streambank outcrop of Logan Quarry Shale along Route 36 in Parke County Indiana, with hammer spanning level of Gondolella pulchra acme zone, which allows correlation with Carrier Mills Shale of Illinois and with Upper Tiawah cyclothem of the Midcontinent Basin.

funding agencies, but is critical for establishing biostratigraphic 'ground truth' for the basic data required for modern geochemical stratigraphic studies that are more accurately refining the history of the Earth. In doing this, I also continue to greatly enjoy traveling the backroads through small towns, eating at local cafes, talking with interesting folks, and hiking through neat countryside, in early spring before the bramble comes up and in mid-fall before open hunting season starts.



AAPG Student Chapter Update

Shortly after our fall field trip to the Laramie area of Wyoming fundraising for the Fall 2016 trip began. We have so far raised just over \$1000 through the AAPG holiday rock and mineral sale along with our mug and pint glass sale. The club thanks all students, faculty, alumni and friends who helped make both fundraisers a success, with your support our club is heading to the Baraboo District of Wisconsin for next year's trip.

This semester has already seen some exciting club events with a lecture from the AAPG Visiting Geoscientists Program.

Visiting petrophysicist Eric Pasternack discussed his outlook on the role of shale gas in energy independence and the ever-changing job market of the energy industry, and shared advice and stories from his experience working in the oil industry for over 30 years.

Graduate Student Profile:

David Tarailo – PhD student

Advisor: Chris Brochu

Research topic: My research project is entitled "Recovery of Terrestrial Tetrapod Communities Following the Permian-Triassic Mass Extinction" and it entails looking at the structure of terrestrial ecosystems during the interval surrounding the Permian-Triassic boundary in order to see how they recovered following the end-Permian mass extinction.

Experiences I value at UI: The most rewarding aspect of my time at the University of Iowa has been the opportunity to meet and spend time with the other graduate students in the department. The EES department has attracted a very high caliber group of students who are incredibly helpful and supportive of one another. It's a great community to be a part of. The teaching experience here at UI has also been very valuable to me. I've been afforded the opportunity to teach a wide variety of classes, often with a lot of freedom as to how to present the material, and as a consequence have grown a lot as an instructor since I first arrived here three years ago.

Future plans: Following graduation I hope to pursue a career in academia so that I can continue my research. I find the Permo-Triassic to be a fascinating interval of time and I hope to earn the opportunity to continue to study it.



Graduate Student Profile:

Mike Sara – MS student

Advisor: Ingrid Uktins-Peate

Research topic: Quantifying morphological and chemical trends in mafic eolian environments from Askja, Iceland as an analog to Mars. I am trying to generate morphological and geochemical trends in mafic sands from Askja, Iceland. Askja basalts are unique because of the relatively high iron and magnesium contents, similar to Mars. These basalts have been weathered chemically and physically, creating the

volcaniclastics we see there today. We will generate trends based on major and trace elements, grain morphology, and ripple/dune characteristics associated with the composition and grain morphology.

Experiences I value at UI: Despite being a first year graduate student at Iowa I have already had some great experiences. My research project presented me with an opportunity to travel to beautiful Iceland, a country I have never visited before, and perform field work there in the summer of 2015. I have already learned an enormous amount not only through classes and my research but also from my fellow students. So far in my experience at UI my most valuable experiences have been with the new friends I have made here. We have struggled through homework together and even climbed ridges in the middle of the night in Wyoming on a field trip. I am looking forward to making new memories and traveling to new places over the next year and a half.



Alumni Profile:

Grant Smith



Grant grew up in Manly, Iowa a small farming and railroad community in north central Iowa. After ash from Mt. St. Helen's eruption was on the car outside his home, Grant was fascinated by the earth's dynamic character. Grant received his bachelor's degree in

Geology from the University of Iowa in 1987. He received the Lowden Award for

outstanding field work the same year. Grant continued his academic career and received his Master's in geology from Iowa in 1990. His interest in structural geology and metamorphic petrology and the fact that he owned a 4 wheel drive truck enticed Dr. Foster to have a discussion over a beer about how he had the perfect project for Grant near beautiful Steamboat springs, Colorado. It did not take too much convincing. Working with Tom Foster, Mark Reagan, and Dick Hoppin to research the structural, metamorphic and volcanic origins of the Farwell Mountain area in north central Colorado. His Master's thesis was titled "Geology of Precambrian rocks on Farwell Mountain, Colorado".

After receiving his master's degree (actually while

finishing) Grant started working for Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) in Kansas City, Missouri. One of his first assignments as field geologist was at the Trans World Airlines (TWA) aircraft overhaul base in Kansas City. That began a long career with the aviation industry. Still working on that site over 25 years later; the site involved the investigation and delineation of chlorinated solvents, heavy metals, and petroleum contamination in soil and groundwater. Grant designed and implemented several remedial solutions and still oversees the long term monitoring of that site for the Kansas City Aviation Department.

After 18 years working in the Environmental Division at Burns & McDonnell and building a specialized practice for aviation clients, Grant changed career paths and became the Director of the Commercial Fueling and Ramp Services Group within the Aviation & Federal Global Practice at Burns & McDonnell. The Commercial Fueling Group has over 70 engineers that design complex fueling storage and distribution systems for Airports, Trucking, and Marine facilities. The Ramp Services side designs all systems that support aircraft at the gate. This includes passenger boarding bridges, preconditioned air units, 400 Hertz power supply, potable water and fuel hydrant systems. Although Grant's current work is often far from his training as a geologist from the University of Iowa, the core building blocks of research and problem solving have made it possible to be successful in his career.



Congratulations again!

PhD student Diar Ibrahim won the 2015 "Vincent Nelson Memorial Best Poster Award" at for the Eastern Section of the American Association Petroleum Geologists. The title of his poster is, "*High-resolution sequence stratigraphy and provenance of the Ordovician St. Peter Sandstone in Iowa and Illinois: Insights into the evolution of mid-continental intracratonic basins of North America*".

Undergraduate Student Profile:

Daniel Coulthard – BS anticipated 2016

Advisor: David Peate

Research Topic: Textural and compositional characterization of the cinder cone derived Búðahraun (boo-da-hrown) basalt flow which is located far from the major volcanic rift on the Snæfellsnes (snie-fell-sness) Peninsula, Iceland



Experiences at UI: Being able to apply what I have learned to real world problems, whether it be in the field or in a laboratory, has been an invaluable experience to me. The field classes offered by the EES department in Montana and at the Iowa Lakeside Labs have been highlights of my time spent here, and conducting research under my advisor has helped me decide to and prepare myself to pursue an advanced degree.

Future Plans: Once I have finished my undergraduate degree, I plan on going on to graduate school to pursue a PhD in Igneous Petrology. Once I have taken a crack at that I would like to stay in academics as a research scientist or as a professor.

News & Upcoming Events

Upcoming presentations....

- Kathryn Rathbun, PhD student - A new geologic map of Monturaqui meteorite impact crater, Chile: implications for satellite-based geologic mapping of small craters (Lunar and Planetary Science Conference)
- Kathryn Rathbun, PhD student – A preliminary report on the structure of Monturaqui crater, Chile (Lunar and Planetary Science Conference)
- Kyle Kissock, MS student - The provenance of early and middle Pennsylvanian sandstones of the midcontinent: detrital zircon evidence for the unroofing of Appalachian orogenies in Iowa (GSA-NC)
- Tawny Tibbits, PhD student - Nondestructive Sourcing of Granite Ground Stone Tools from Belize Using pXRF (Jakobsen Conference)
- Jane Gilotti, Professor - The Carboniferous Wandel Sea basin in Holm Land records local syn- to post-orogenic exhumation of the North-East Greenland Caledonides (GSA-NE)
- Art Bettis, Professor - Rate, magnitude and impact of legacy sediment accumulation on a headwaters watershed in eastern Iowa (GSA-NC)
- Art Bettis, Professor with student Katie Goff - Weathering profiles of Quaternary sedimentary materials of east-central Iowa (GSA-NC)

Undergraduate Student Profile:

Tanner Hartsock – BS anticipated 2017

Advisor: Ingrid Ukstins-Peate

Research Topic: My research topic involves utilizing Earth analogs for studying the alteration of igneous protoliths on the Martian surface. Askja is a caldera style volcano located in the central highlands of Iceland. Like Mars, this remote region of Iceland is a cold desert environment dominated by eolian sediment transport. Mars basalts are also compositionally different from most terrestrial eruptions, with high magnesium as well as high iron. Few places on Earth have Mg- and Fe-rich basaltic volcanics being reworked by eolian processes in a cold desert environment, and for this reason Askja is among the best terrestrial analogs for Mars. The Askja region was also used as a training site for the Apollo Lunar missions in the 1960s.

Experiences I value at UI: More than anything else, I value the comradery that exists within the Earth and Environmental Science department here at the University. I have formed what are sure to be life-long friendships with fellow undergraduates, as well as with graduate students and even professors. I also appreciate the wide variety of field opportunities that have been made available to me during my time here. For example, Field Methods (EES:2831) in Montana was one of the highlights of my life, and over spring break I will be a part of a field based tectonics class travelling to the Rio Grande rift in New Mexico (EES:5820). I also plan on traveling to Iceland this summer to gather more data for my research as part of Dr. Ukstins-Peate's NASA funded research project on eolian weathering of basaltic deposits.

Future Plans: After graduation in the spring of 2017, I plan on continuing my research and attending graduate school to pursue a Master's degree in igneous petrology. I plan to eventually receive my PhD and end up working in academia. Ultimately, I hope to make an impact in the world of planetary geology as we progress toward Mars and beyond.



Welcome Hannah!

Hannah is the newly-hired professional Academic Advisor for the department of Earth and Environmental Sciences. She has a Bachelor of Science in Psychology from St. Ambrose University and a Master of Science in Academic Advising from Kansas State University. Prior to joining the University of Iowa, she worked as an Academic Advisor at Bellevue University in the Omaha, NE area. Hannah provides advising assistance to all EES students with 24 semester hours or higher. These services include (but are not limited to) registration authorization, degree planning, changes to course schedules, and career and professional school discussions.

Monitoring Human Induced Seismicity in the Midwest

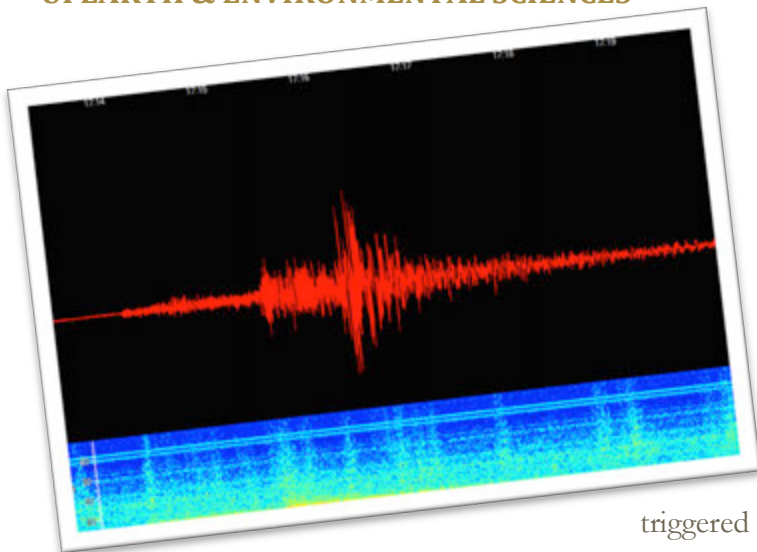
by Dr. Bill Barnhart

Over the past 5 years, the Midwest United States has become a hotbed of earthquake activity. While not traditionally thought of as “earthquake country,” the numbers of significant earthquakes in Oklahoma, Kansas, and Colorado have increased exponentially due to a phenomenon termed induced seismicity – earthquakes

triggered by anthropogenic processes such as wastewater

disposal or hydrofracturing. This phenomenon is important for researchers because it poses a new hazard to communities in the Midwest, and it represents an opportunity to analyze earthquakes in a closely monitored environment.

This past year, the EES Geophysics Program acquired a seismometer for the purposes of earthquake monitoring, teaching demonstrations, and outreach opportunities. The seismometer and wall display that shows real-time recordings were acquired through funds from the University of Iowa. The instrument, a Guralp broadband seismometer, was finally installed in the basement steam tunnels of Trowbridge Hall on Friday, February 12. Less than 24 hours after installation, the seismometer recorded its *(continued on next page)*



Welcome Kenny!

I am excited to be joining the University of Iowa with a joint appointment as a research specialist for the Central Microscopy Research Facility and as the electron probe microanalyzer laboratory manager for the department of Earth and Environmental Sciences. I will manage the microprobe and SEM labs housed in the EES department and assist with LA-ICP-MS and other analytical techniques across the university.



I was educated at Colorado School of Mines, Rensselaer Polytechnic Institute and The University of Alabama. My background is in metamorphic petrology. My research includes using mineral trace elements as recorders of metamorphic PTtD paths, specifically, recorders of prograde metamorphism and chronometers of peak and post peak metamorphism. In addition, my research includes field work and thermodynamic modeling. I plan to continue to be active in research while working at UI.

Just prior to joining UI, I worked for the Colorado Geological Survey as a minerals specialist. My main task at CGS was to remote target and field survey potential frac proppant sand deposits as an assay of potential frac sand resources throughout the state.

When I have spare time, I like to cook, camp and collect rocks and minerals. I also enjoy reading classic literature.

(continued from previous page) first earthquake – a magnitude 5.1 induced earthquake originating in Oklahoma. This was the largest earthquake in the Midwest since the November 2011 magnitude 5.6 earthquake in Oklahoma. The seismic record, shown in the figure, depicts a textbook record of a regional earthquake, clearly showing the arrival of P- and S- body waves, followed by a train of large amplitude surface waves. This record, along with many more to be recorded by the Trowbridge seismic station, will be used in introductory seminars, geophysics and hazards courses, and elsewhere to teach students about geological hazards, earthquake location methods, and analysis of seismic waverforms in understanding the deep interior of the Earth.

Alumni Perspective

by Amy Sullivan (B.S. '83, M.S. '86)

Busy life? – I bet! Can't get your head above water? I can relate! Need something for stress relief? I have a really good suggestion. I have found connecting virtually and “on location” with the faculty and students on line and at Trowbridge is a good way to detox! <http://clas.uiowa.edu/ees/> I have participated on the Earth and Environmental Sciences Department Advisor Board in the 2014 and 2015 annual meetings. I realize many alumni have contributed over the years. If you feel out of touch or left out in any way I implore you to please forgive! Trowbridge looks almost the same on the outside, but it is a new world on the inside. The ground floor has been revamped and refreshed! These few reflections provide my perspective on some of the tangible aspects I have seen since October 2014.

In terms of alumni engagement, Tom Foster has really stepped up to the plate by providing personal insight and engaged dialogue on departmental highlights and needs. Emily Finzel, Alumni Relations Committee Chair, is coordinating the new departmental newsletter. Brad Cramer and Tyler Priest are inviting external speakers for their course, *“Energy and Society: The History and Science of Oil”*. Chris Harms, Department Secretary, is always ready to help everyone. October 4th 2015 the department hosted a field trip with stops to view the Silurian strata at Stone Mill Quarry and the Pennsylvanian section at Wildcat Den State Park. There were over 30 students and alumni in attendance. It was an exceptional afternoon. Adam Blind, Assistant Director of Development with the Iowa Foundation, has attended the Advisory Board meetings and is “at the ready” to aid the department. The Iowa Geologic Survey is very connected to the department and provides a full overview at the board meetings. Dean Chaden Djalali, UI Alumni Association Dean's Chair in the Liberal Arts and Sciences, has also attended the Board lunch meetings. To me this qualifies as an engagement renaissance.

Let me reference *“Who will build the 21st century? Addressing critical demographic gaps in the geosciences”*, (Cramer et al., GSA Today, v. 25, no. 12, doi:10.1130/GSATG243GW.1). This article on the potential critical shortage of geoscience workforce personnel is a collaborative article between 13 co-authors across the U.S., U.K., and France. I mention this article because it shows Brad Cramer and Ryan Clark, who are right there in Iowa City, know the future academic geoscience goals are important, but the we, all of us, must address the humanities science engagement and education There will always be a need for alumni to lead and serve. I encourage you to reconnect with your past and advance the department for the future. (Want to visit?, Contact me, Amy Sullivan, amy.e.sullivan@mindspring.com)

Recent Graduate Profile:

Jess Miller-Camp

2015–present

Museum Scientist

University of California, Riverside

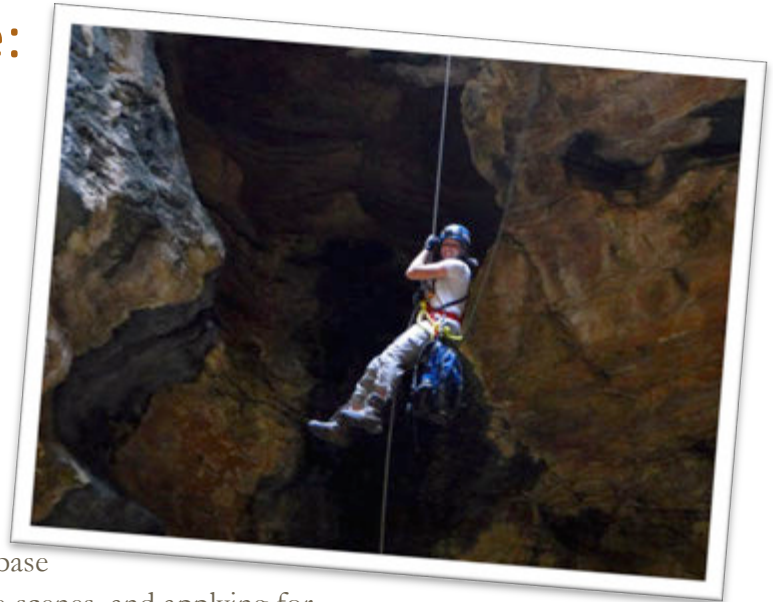
2016 (May, projected) Ph.D. Earth Science

2010 M.S. Geoscience

I joined UCR's Department of Earth Sciences last November. Among other duties, I take care of the geology collections and create exhibits for our hall museum. My current major projects are improving the collections' database

(making it more efficient and complete behind-the-scenes, and applying for grants to put it online and fund student workers who will gain experience entering data, doing specimen photography, and georeferencing) and revamping an exhibit called "Where in the World?", which maps out the places people in the department do research on, as well as discussing the geographic flexibility and earth science degree grants.

I am a student of Chris Brochu and will be defending my dissertation at UI on April 21. The topic is "Patterns in Alligatorine Evolution" and includes the phylogenetic, biogeographic, and ecomorphological history of the group, as well as how their diversity has tracked climate change through the Cenozoic. I will be speaking about some of that as an invited speaker at the Tate Conference in Wyoming in June. I've also continued work related to my Master's thesis under Hallie Sims on *Lystrosaurus*, a dicynodont therapsid which survived the end-Permian mass extinction, and will be re-submitting a paper on the taxonomy of Chinese *Lystrosaurus* with my NSF EAPSI host, Jun Liu, later this year.



Working in the field

by Kathryn Rathbun, PhD student

In November 2015 Ingrid Ukstins Peate, Stephen Drop (undergraduate field assistant), and I undertook an expedition to Monturaqui Crater, located at the southern end of the Salar de Atacama Basin in the northern Atacama Desert as part of my PhD dissertation research. The goal of the project was to map the site in detail to compare with remote sensing-based maps in an effort to

quantitatively assess how reliable remote mapping is for

small craters, since this method is used almost exclusively in the planetary science

field. I successfully mapped the geology of Monturaqui in detail, with particular emphasis on the ejecta deposits. We made several other major discoveries, including the preservation of the uplifted rim sequence and possible overturned fold at the rim.

We want to hear from you!

The Earth & Environmental Sciences Department has recently initiated an effort to reinvigorate department-alumni relations. One step in this process is to increase our efforts to keep everyone connected by facilitating the distribution of news from our alumni.

So please send us updates throughout the year regarding personal or professional changes that you'd like to share with our community and they will be published in a new section, Notes from Alumni, in the bi-annual newsletter. These can include items such as job changes, promotions, awards, publications, or family developments.

We would also like to include short articles from our alumni that highlight new research developments or exciting career paths. Please share the wisdom you've accrued with our students! Contact Emily Finzel (emily-finzel@uiowa.edu) if you are interested in making this type of contribution.

Largest known crocodylian skull

by Dr. Chris Brochu

One of my current projects focuses on the history of crocodiles in Africa since the beginning of the Neogene. For this reason, I've visited museum collections where both modern and fossil specimens from the region are housed. During the summer of 2015, I saw what I believe is the largest known crocodylian skull.

The skull to the left is from a very large false gharial, *Tomistoma schlegelii*, at the Natural History Museum in London. It's the longest known skull from a modern crocodylian species. (It's not from the largest known crocodylian. This one was around 5.5 m (18') long and lived in Borneo. Saltwater and Nile crocodiles longer than 6 m (20') are known, but their skulls are shorter.)

The skull in the middle is from *Euthecodon*, a large crocodile from the Pliocene near Lake Turkana in Kenya. It's currently at the National Museum of Kenya in Nairobi. At 147 cm (4' 10"), it appears to be the longest known crocodylian skull, living or extinct.

The length of the animal itself is difficult to estimate. The methods used to derive body length from skull length in modern crocs might not work for *Euthecodon*. Another giant crocodile with a more conventionally shaped head, *Crocodylus thorbjarnarsoni*, was found in slightly younger deposits in the Turkana Basin. The skull was shorter, but we estimated a possible body length of 8.2 m (27') for the largest *C. thorbjarnarsoni* skulls. For the early humans living in that area at the time, jumping into the water to avoid a lion would not necessarily have helped.

The human skeleton to the right is scaled to my height (5' 9").





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EARTH & ENVIRONMENTAL SCIENCES

SPRING 2016

**We would like to invite you to attend the
2016 Earth & Environmental Sciences Department Alumni
Advisory Board Annual Meeting!**

Preliminary Agenda

Sunday, October 23

- Presentation of research posters and talks by students and faculty
- Field trip to explore the Critical Zone Observatory with Dr. Art Bettis
- Dinner with students and faculty at the Airliner restaurant

Monday, October 24

- Annual meeting including and update on the department from DEO Dr. Tom Foster
- Reception following a special departmental seminar

The meeting agenda and lodging and transportation information will be sent in summer.
Questions in the meantime? Please contact Chris Harms (christine-harms@uiowa.edu)