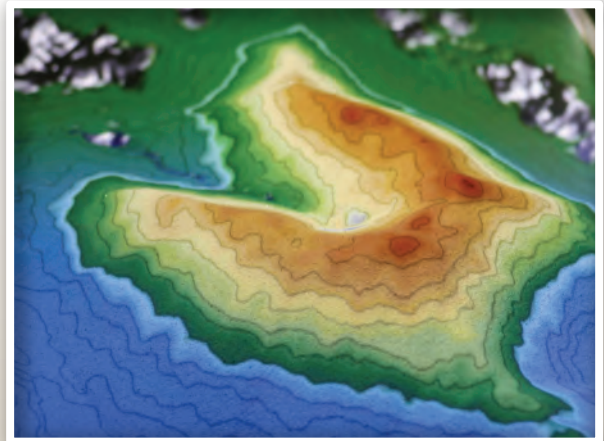




## Shaping watersheds using an Augmented Reality Sandbox

The Department of Earth & Environmental Sciences recently received an Innovations in Teaching with Technology Award to build an augmented reality sandbox. The sandbox uses 3D visualization applications and a hands-on sandbox to teach earth science concepts. The augmented reality sandbox allows students to generate topography by shaping real sand, which is then enhanced in real time by an elevation color map, topographic contour lines, and simulated water. This system will allow us to develop hands-on projects that teach geographic, geologic, and hydrologic concepts such as how to read a topographic map, the meaning of contour lines, watersheds, catchment areas, levees, and much more. In short, students can simply mold the sand by hand and bring to life a “real” landscape that allows them to explore and better understand earth science concepts.



## Assistant Professor of Hydrogeology

The Department of Earth & Environmental Sciences at the University of Iowa has begun a search for a new tenure-track Assistant Professor position with interdisciplinary interests in the broad field of hydrogeology. We seek an outstanding researcher with expertise in, but not limited to, physical hydrogeology, groundwater and shallow subsurface flow, surface/ground water interaction, fluid flow through rocks, geothermal energy, reactive and/or contaminant

transport, or environmental hydrogeology. The candidate is expected to develop an active, externally-funded research program, mentor graduate and undergraduate students, and teach introductory geology courses as well as upper division and graduate courses in hydrogeology and related fields. The application should include a cover letter, a

curriculum vitae, a statement detailing current and future research activities, a statement of teaching interest, and contact information for three referees. Referees will receive directions by e-mail regarding the electronic submission of letters. Review of applications begins November 17, 2017 and will continue until the position is filled.

### Inside this issue...

#### Faculty profiles:

**Art Bettis**  
Professor

**Jane Gilotti**  
Professor

#### Where are they now?

**Liz Maas**  
BS 1998, MS 2004

**Sierra Isard**  
MS 2014

#### Student and researcher profiles

**Reports from field trips, field work, and field camp**

## Faculty Profile

### Art Bettis, Professor

My research interests include terrestrial sediments that are transported by wind, water and gravity and the processes that transform them into soils. My research group utilizes traditional and emerging methods to reconstruct depositional and soil forming histories to better understand how the modern landscape evolved, and how it is responding to climate change and human use. My interests are eclectic within the broad area of Quaternary geology, and included projects ranging from studies of loess and alluvium in Alaska, South America and the Midwest to investigating the earliest landscapes inhabited by vertebrates in Sumatra and *Homo erectus* in

Java. For the past four years my research has focused closer to home as I oversee the Clear Creek Watershed component of the Intensively Managed Critical Zone Observatory. This is a multi-institutional, multi-disciplinary NSF-funded project aimed at understanding the dynamics of the Critical Zone – from the top of the vegetation canopy to the bedrock surface. Last year's alumni field trip visited some of the project's field sites and discussed what we are finding and puzzling over.



Over the past few years colleagues, students and I have developed a “flipped” course for first and second year Environmental Science majors. We use an integration of on-line “content” and classroom interaction that challenges students to be better critical thinkers and to relate the science they are learning to current issues and controversies. Part of this project has involved transforming the traditional labs into activities that are much more hands on and that foster exploration and discovery. One big plus for the students (and/or their parents), other than the academic benefits, is that the course uses no text books or lab manual – easy on the pocketbook and the environment. Over the past 17 years I've had the opportunity to teach a wide variety of classes and the ones that I've enjoyed the most are those where I've been able to get students into the field. That's where I fell in love with earth science and where I continue to realize just how much we don't know.



## Faculty Profile

### Jane Gilotti, Professor

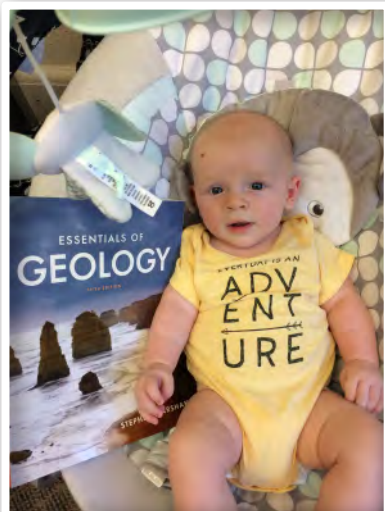
I am a Professor of structural geology, metamorphic petrology and tectonics in the Department of Earth and Environmental Sciences. My latest NSF-funded research project, “Displacement History of the Pearya terrane, Ellesmere Island – Evaluating a Strike-slip Origin for the Canadian Arctic Margin,” is a collaborative effort with co-PI Bill McClelland (EES) and PI Justin Strauss of Dartmouth College. The project got underway in August 2017 with a 3-week field season along Yelverton Inlet (> 82°N), which was organized by the German Federal Institute for Geosciences and Natural Resources and the Geological Survey of Canada. Ph.D. students Karol Faehnrich from Dartmouth and

Karolina Kościńska from Krakow University joined us for the fieldwork. My work focuses on the early displacement history of the Petersen Bay Fault Zone, the structural boundary between the exotic Pearya terrane and the North American margin. I continue to work on problems related to collisional tectonics and eclogite facies metamorphism in the Caledonides, Cordillera and the Arctic.

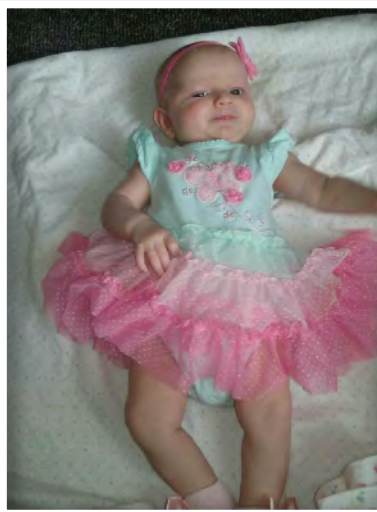
I teach Introduction to Structural Geology, Geologic Field Methods and Geologic Field Analysis, all of which are required courses for the B.S. in Geoscience. I also lead a field trip in the Fall semester for the student chapter of AAPG and rounds out my course load with graduate student seminars and directed studies. I have chosen the topic of Arctic Tectonics for the Fall Tectonics & Petrology seminar and am also teaching a special topics course on deciphering the deformation history of ductile shear zones. Finally, advise M.S. candidate Brandon Caswell on an Ar-dating project of shear zones from Ellesmere Island that will involve using the Noble Gas Laboratory at the University of Vermont. Furthermore, a plan is in place for Kościńska to join the department as a post-doc on the NSF project once she finishes her Ph.D. in Spring 2018.

## It's a boy! And a girl! And a boy!

This summer several faculty and staff welcomed new additions to their families!  
Congratulations to them all!



Felix Oliver Barnhart was born to Bill Barnhart and Mary Kosloski on June 9th, 2017



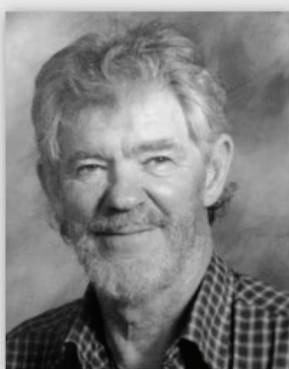
Molly Elizabeth Horkley was born to Kenny Horkley and his wife on July 5, 2017



Breck Tyler DeHague was born to Hannah Whitcomb DeHague and her husband on July 28, 2017

## In Remembrance

### John H. Carman 1935-2016



John H. Carman, 81, of St. Cloud, FL died Thursday, Dec. 8, 2016 in Madison, FL after a long illness.

John joined the Geology Department at the University of Iowa in 1968. Early in his career he also carried out research at The Goddard Space Flight Center in Greenbelt, MD and The Geophysical Laboratory in Washington, D.C. In 1977 John left the University to pursue his own research interests, and he continued to work on various projects off and on until illness impeded further progress.

## Conference presentations

### American Geophysical Union Fall Meeting

Bill Barnhart - Geomorphic Evidence of a Complex Late-Cenozoic Uplift and Lateral Displacement History Along the 2013 M7.7 Baluchistan, Pakistan Strike-slip Rupture

Bill Barnhart - The 2015 Gorkha Earthquake and the Structure of a Himalayan Intracontinental Subduction Channel from Geodesy, Seismicity, and Seismic Imaging

Clayton Brengman (PhD) - Earthquake Relocations in the Middle East with Geodetically-Calibrated Events

Katherine Peterson (MS) - InSAR Analysis of Post-Seismic Deformation Following the 2013 Mw7.7 Balochistan, Pakistan Earthquake

Kathryn Rathbun (PhD) – Monturaqui meteorite impact crater, Chile: A field test of the utility of satellite-based mapping of ejecta at small craters

Bryan Stressler (MS) - What Can We Learn About Stress Changes in Subduction Zones From Geodesy?

Ingrid Ukstins - Insights from Askja sand sheet, Iceland, as a depositional analogue for the Bagnold Dune Field, Gale Crater, Mars

# Alumni Perspective

by Steve Daut, MS Geology, 1980

As a student of earth and environmental sciences, you have learned one very important principle: Everything is in a state of dynamic change. Accepting this principle is the key to success. Not only in your career, but in your life.

You may find that you are drawn to a career in a seemingly stable academic or governmental position, but budgets change, students come and go, and current experience shows how quickly government's priorities can shift. In private industry, the boom and bust cycles of energy and mining are the stuff of legend, and with changing government priorities, environmental regulations that drive the industry may change directions in unexpected ways.

Career change statistics suggest that you can expect to change careers 5-7 times in your lifetime. The Bureau of Labor Statistics show that although employment in natural resources and mining is more stable than the overall labor market, it still experiences about 5% turnover every year. And frankly, though an unexpected career change can be traumatic at first, it can actually be the best thing that ever happens to you.

Let me share my career path as an example. When I graduated from the department with a Masters Degree in 1980, I was recruited into the oil industry, which was booming at the time. After 7 years, the industry took a hard downturn, but I stayed on top of it and spent a very successful seven year career as a consultant, transitioning into environmental. In my third career, I was able to continue growing my career as vice president of an environmental consulting firm. This allowed me to take a downshift at age 50, following a long held passion to help those in need, and I became the development director, then CFO of a conjugate care facility for people with developmental disabilities. That was career 4 and 5. I retired at 62, wrote and published a book entitled *Buddha Science*, and now am following yet another passion as a storyteller. Call that careers 6 and 7.

It was the training I received from the Department of Earth & Environmental Sciences at the University of Iowa that allowed me to find a successful current through constantly changing waters, and that success allowed me to emerge from the waters and walk upright into whole new lands. Goofy metaphors aside, I still love geology - my friends often bring me their rocks to identify and ask me to explain the geology of areas we explore. But a career is a journey, and no matter where you end up, I suggest that you settle in and enjoy the journey. With apologies to Buzz Lightyear: "To geology and beyond!"



## Conference presentations

### **International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)**

Jennifer Thines (PhD) - Using mineral chemistry from Afro-Arabian flood volcanics to quantify formation mechanisms of large volume silicic pyroclastic eruptions

### **Society of Vertebrate Paleontologists**

Adam Cossette (PhD) - The record of Deinosuchus east and west of the Western Interior Seaway

Larkin McCormack (MS) - A new occurrence of the phytosaur (Archosauriformes, Phytosauria) *Pravusuchus hortus* from the Monitor Butte Member (Upper Triassic; Chinle Formation) of Utah

### **Japan-American Geophysical Unions Joint Meeting**

Mark Reagan - Initial findings of post-cruise research on IODP Expedition 352 hard-rock cores I: Petrology and geochronology

### **Goldschmidt Conference**

Art Bettis - Geochemical fluxes through intensively managed critical zones

### **AAPG Mid Continent Section Meeting, Oklahoma City 2017**

Stephan Oborny (PhD) - Expanding the Build-and-Fill Model: 'Phyllod-Alagal' Carbonate Mound Development

## Conference presentations

### Geological Society of America Annual Meeting

Alex Maruszczak (MS) - Geochemistry of off-axis basaltic glasses from the Snaefellsnes Peninsula, Iceland

Danny Coulthard (MS) - Fore-arc basalt to boninite magmatism: Characterizing the transition from decompression to fluid flux melting after subduction initiation

Carsyn Ames (MS) – Insights for provenance analysis from U/Pb geochronology applied to modern watersheds: Talkeetna Mountains, southcentral Alaska

Emily Finzel – Fore-arc basin detrital record of Mesozoic-Cenozoic tectonics in the northern Cordillera, south-central Alaska

Emily Finzel – Detrital zircon microtextures and U-Pb geochronology of Upper Jurassic to Paleocene strata in the distal North American cordillera foreland basin

Phil Kerr (MS) - Evidence for Middle Wisconsin glaciation in North Central Iowa

Jane Gilotti - Using a Precambrian terrane boundary to estimate slip on the Wegener fault, Nares Strait

Stephan Oborny (PhD) - Using High-Resolution Event Stratigraphy (HiRES) to Revise the Chronostratigraphic Correlation of Wenlock-Pridoli (Silurian) Strata of the Central and Western Appalachian Foreland Basin (Ohio, West Virginia, Virginia)

Kathryn Rathbun (PhD) - A new geologic interpretation of Monturaqui meteorite impact crater, Chile



## Graduate Student Profile

**Sarah Losso - MS student**

**Advisor:** Jonathan Adrain

**Research:** My research is focused on the description and phylogenetic analysis of dimeropygid trilobites from the Early Ordovician. Our extensive fieldwork based revision of the Ibex region of western Utah and Franklin County of southeastern

Idaho has uncovered many new species and more specimens of previously described taxa. I am describing at least nine new species from the base of the radiation of Dimeropygidae. Description of early members of the Dimeropygidae will help resolve the basal phylogenetic structure of the group.

**Experience I value at UI:** The most exciting and rewarding experiences have been the opportunities to travel, both for fieldwork and to academic conferences. This summer I went on fieldwork to Utah and will be going to Idaho in October to collect bulk samples for processing. I also attended The 6th International Conference on Trilobites and Their Relatives in Tallinn, Estonia. Research here has allowed me to explore new parts of the world as well as given me a better understanding of the geology and paleontology so that I can appreciate such opportunities even more.

**Future Plans:** Following completion of my Master's degree I plan to pursue a PhD and ultimately a career in academia focused on invertebrate paleontology.

## Alumni News

Stephanie Drumheller-Horton (left), PhD 2012, is part of a team of researchers that have identified a prehistoric ancestor of the modern-day crocodile that lived 95 million years ago in what is now Texas.



## Senior Field Trip to West Texas



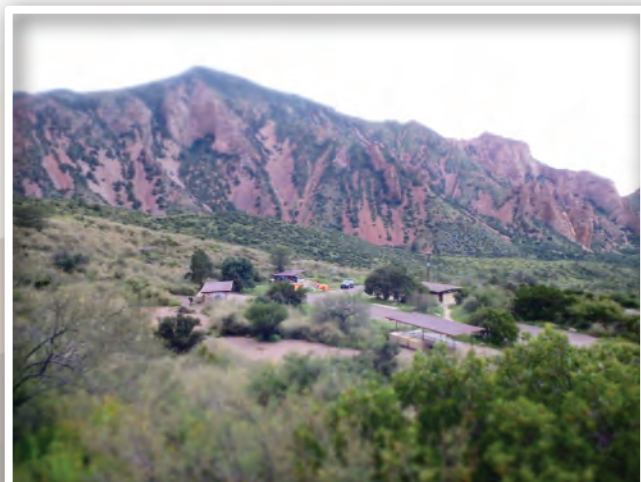
Looking at the ash flows of the Wasp Spring Formation in Tuff Canyon, Big Bend National Park



Examining tool marks on the underside of beds in the Brushy Canyon Formation



Tarantula in Big Bend National Park



Home sweet home in the Chisos Mountains, Big Bend National Park



Roadside turbidites with El Capitan reef in the background, Guadalupe Mountains



## Graduate Student Profile

**Jacob Siebach - PhD student**

**Advisor:** David Peate

**Research:** My doctoral research is focused on off-axis volcanism on the Snæfellsnes Peninsula in Iceland. This area was once the center of volcanic activity in Iceland, hosting the subaerial portion of the Atlantic Mid-Ocean Ridge (~10 Ma). Subsequent tectonic motions have moved the rift and hot-spot system about 200km eastward effectively ending volcanism in the region. However, in the last 3 Ma the Snæfellsnes Peninsula has experienced renewed and substantial volcanism. The focus of my research is to understand what might be driving this recent volcanism. Using varied analytical tools and methods I aim to investigate three characteristics which might explain the melt generation and transport in the area; 1) Mantle Temperature, 2) Mantle Composition and 3) Melt transport. I will evaluate mantle temperature by using a combination of Olivine-Spinel and CPX geothermometers. Mantle composition will be assessed with multiple methods including high precision trace element analysis of Olivine, isotopes, and bulk rock chemistry. Melt transport will heavily draw on spatial and temporal analysis between the previously mentioned datasets. The broad approach using multiple methodologies and techniques will allow for a more comprehensive understanding and interpretation of the data; facilitating the discussion and evaluation of multiple possible explanations for the unexpected volcanism.

I was able to spend 3 weeks this past summer in Iceland collecting samples. The field work not only increased the spatial resolution of my dataset but also provided me the invaluable experience of obtaining a clearer understanding of the field area as well as, identifying macro and microscale nuances along the Snæfellsnes Peninsula.

**Experience I value at UI:** While I still have plenty of time to continue to discover the benefits of being the UI, so far I have found there are a couple things which I have and continue to value. The faculty and staff have been more than helpful regarding any question I might have, whether it is research, policy, or mentoring. I also really appreciate the amount and variety of quality analytical equipment that is available to me. Since my passion is geochemistry it is very helpful to have access to the equipment, but also help from support staff and supervising faculty when needed. The graduate student community as a whole is pretty tight knit and everyone is willing to help show, explain, or help fellow students with any problem that may arise. All of these aspects combine to bring great value to doing research here.

**Future Plans:** I will complete my doctorate in the spring of 2020. Currently I find myself leaning more toward staying in Academics than finding an industry job, but I am open to either. I would also be fine with moving internationally for future job opportunities.



Undergraduate students on a beautiful day at Kelly Reservoir in Montana during EES:2831 Field Methods



Undergraduate Clint Henning in Montana during EES:2831 Field Methods

# From the field...

5-31-17  
2:30 PM

Wow!  
You never know  
where you'll find  
Iowa Geo Students.  
My first visit up here.  
Had a fun walk up  
Cat Ck ~ 1/2 mi;  
mostly intrusive rock  
granodiorite(?) with some  
quartzite also 3 Quadrants  
Sorry I missed you  
all. Plan to stop at  
Knobby Pine in Dillon  
but will probably be  
gone back to Bozeman  
by the time you get  
there.

Say hi to Tom  
Foster. I was  
his TA from '83 to  
'85.

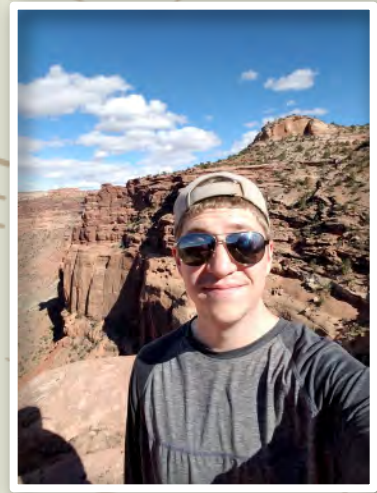
Go Hawks!

Jerry Nunn  
Iowa Geology  
BS. 82  
MS 86

This note was left on the UI vehicles during the EES:2831 Field Methods course in Montana this past May. You never know where a Hawkeye is going to be found!



Students sliding down the great sand dunes in Colorado on the EES:1180 National Parks Field Trip



MS student Dean Hester at Canyonlands National Park on the EES:1180 National Parks Field Trip

Professor Jane Gilotti and future post-doc Karolina Kościńska search for garnet-staurolite-kyanite assemblage adjacent to the Peterson Bay fault, northern Ellesmere Island



Tent setup during a 12-hour wind storm in Western Kansas on the EES:1180 National Parks Field Trip



Associate Professor Ingrid Ukstins sampling modern coral on Kiritimati Island, central western Pacific



## From the field...



MS student and IGS staff member Phil Kerr using a Giddings soil probe to collect Quaternary cores for his research on the Iowan Erosion surface and Middle Wisconsin Glaciation



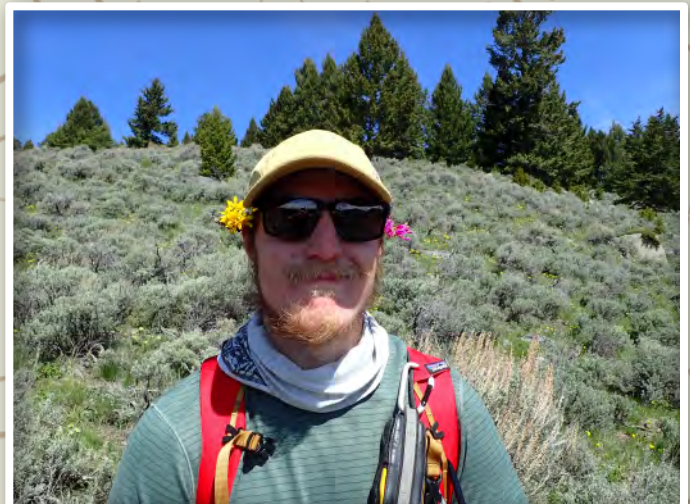
Graduate students Jacob Siebach and Alex Maruszczak eating fermented dried Greenland shark! According to some locals, it tastes great, to others.....no so much. The taste was rough but the smell stuck for days.



Undergraduate student Nick Lefler enjoying the view at Gibson Dam Overlook at Sun River Canyon in Montana during EES:2831 Field Methods



Undergraduate students Nate Zito (left) and Kendall Ritchie (right) honing their mapping skills in Montana during EES:2831 Field Methods



Undergraduate student Berkley Grimm enjoying the flora in Montana during EES:2831 Field Methods



## Alumni Profile

**Liz Maas, BS 1998, MS 2004**

I completed my Master's thesis in the Department of Geosci-ence (now, the Department of Earth and Environmental Sciences) with Dr. Frank Weirich in 2004. My thesis work focused on the use of prescribed fire in wetland environments. Since prescribed fire is more actively used as a management tool in both native and reconstructed environments I was curious to discover what the temperatures might be in a wetland. I hypothesized that wetlands, being wet wouldn't burn as well as prairies. I discovered this was not the case as fuel loads in wetlands can be greater than that found in prairies and corresponding temperatures can be just as hot.

After I graduated, I was hired by MMS Consultants, Inc., a local civil and environmental engineering firm, as their wetland scientist. I performed wetland delineations, worked with engineers to design mitigation plans for the wetland impacts associated with many of the developments happening in Johnson County. These projects included working with local, state, and federal agencies to acquire the proper permitting for these impacts. After 3 years, I left the engineering firm and decided to start my own native landscape restoration business, Transition Ecology, LLC. I continued to do wetland delineation, mitigation design, and permitting but included other services like timber stand improvement (TSI), seed mix design and planting of native habitats, and offered prescribed fire services. My research did indeed prepare me for work in this field and owning my own business gave me the flexibility to start my family, yet remain gainfully employed and involved in my field.

As an avid environmentalist, I feel strongly that the best way we can reduce our own carbon footprints is through diet. I am a supporter of the local food movement and recently received a grant to teach local, small scale food production, nutrition, storage, and cooking to 15 local immigrant families. The Flavors of Home Program has been a successful project with families exhibiting their pollinator pots at the Johnson County Fair this summer.

In 2007, I started teaching part time at Kirkwood Community College in Iowa City, as an instructor for an environmental science class. After five years, I was hired full time to teach both biology and environmental science, which I continue to do today. I am active in the conservation community, donating my time to the Bur Oak Land Trust; a local non-profit land trust that protects natural areas for future generations. I continue to do some consulting in the summers and am always willing to help out with a prescribed fire.



Undergraduate students David Kampf (left) and Noah Lebsack, David Kampf, Nathan Zito, Kendall Ritchie and Matt Trembath (right) in Montana during EES:2831 Field Methods

## Recent Graduate Profile

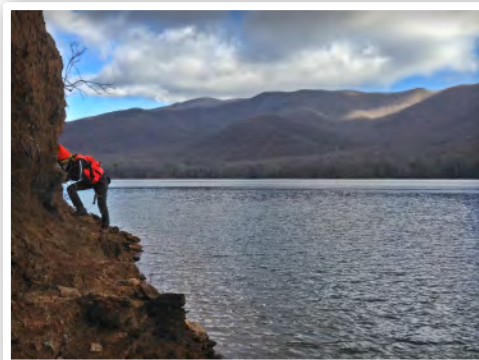
### Sierra Isard, MS 2014

I completed my M.S. degree in the Department of Earth and Environmental Sciences in 2014 with Dr. Jane Gilotti. My research involved bedrock mapping in Yukon, Canada, and uncovering the origin and terrane affinity of a low-grade meta-basaltic unit through U-Pb zircon geochronology, zircon geochemistry, and whole rock and trace element geochemistry.

Shortly after graduation, I began working for the North Carolina Geological Survey (NCGS) in Asheville as a time-limited Geologist with their mapping program. In 2016, I obtained my professional geologist license, and earlier this year I secured a full-time geologist position with the NCGS. One of our primary purposes is to produce 1:24,000-scale geologic bedrock maps for scientific knowledge, natural resource development, and hazard mitigation. Our current projects involve bedrock mapping in meta-sedimentary and meta-igneous units of the Tugaloo terrane in the Eastern Blue Ridge and western Inner Piedmont. Some of my favorite moments involve working in the watershed containing the city of Asheville's reservoir, an undeveloped 22,000-acre site (see photo), and mapping by canoe in southern NC. Notably, we will finish mapping on Mount Mitchell, the highest point east of the Mississippi, this year. My primary responsibilities are bedrock mapping, thin section analysis, heavy mineral collection and analysis, miscellaneous GIS work, and structural interpretation. The culmination of our yearly work is typically presented at the annual southeastern Geological Society of America meeting.

Another aspect of my job involves investigating landslide hazards. Western North Carolina has many structures and roadways constructed on or below steep slopes and cut banks. The NCGS regularly responds to inquiries from the public or local officials about slope instabilities. We visit properties to collect structural data and provide knowledge on the extent and type of movement, possible future movement or hazards, and some simple suggestions for mitigation. I am also involved in a joint slope stability research project with the NCGS and USGS. Western North Carolina had one of the most active wildfire seasons on record last year. We are in the process of installing and maintaining a network of rain gauges to determine if the burned areas are more susceptible to slope failures.

In addition, I design and present educational material at community outreach events. I was the lead individual integrating our collection of historical mining documents (roughly 5,800 files) into a geodatabase format that allows for streamlined visualization and retrieval. I also assist citizens, businesses, and other government agencies with information and service requests to help them understand the geology of their property or areas of interest.



## Undergraduate Profile

### Brittany Stolfus - BS anticipated 2019

**Advisor:** Brad Cramer

**Research topic:** My research topic focuses on conodont biostratigraphy around the Devonian Carboniferous boundary. This is important globally because this boundary is currently under revision by the International Commission on Stratigraphy. We have some of the most important rocks for this interval in southeast Iowa. This work is in collaboration with and part of an internship for the Iowa Geological Survey. Once completed we will have a high resolution global correlation of D-C Boundary strata in southeast Iowa.

**Experiences I value at UI:** The Earth and Environmental Sciences department has brought opportunities into my life that I didn't expect to have while in my undergrad, such as the many field and research opportunities. I've been given opportunities to travel and see real world examples of what we learn about in our text books through the field trips offered. For example, in the past year I've taken field trips to the Bahamas (Carbonates Trip), Montana (Field Methods), and Southwest Texas (Senior Field Trip).

**Future plans:** I plan on completing my undergrad with a 5th year victory lap to gain more experience and knowledge before going on to complete my masters.



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The University of Iowa  
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EARTH & ENVIRONMENTAL SCIENCES

FALL 2017

## 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, or dispensing any other advice you may have. Your responses will be included in the Alumni Perspectives 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?*