THE OHIO STATE UNIVERSITY

SCHOOL OF
EARTHSCIENCES

April 2018 News Notes

Alumni Change Lives

Tricia Hall (M.S. 2017) did her graduate work with Prof Terry Wilson. She is now working at Haley & Aledrich in Cleveland as a geologist. Here she describes how the Friends of Orton Hall fund helped further her graduate studies. If you are interested in giving to support the Friends of Orton Hall or other funds, please visit our giving page (link).

The Friends of Orton Hall funding I received to attend the American Geophysical Union Fall Meeting was critical in advancing my thesis research. I am grateful for the chance to attend AGU, and for having the opportunity to communicate my research with others as well as receive valuable feedback. The most rewarding aspect of my trip to AGU was meeting with my collaborators to discuss important next steps for the project. My research, "Sediment Volume Record of Paleogene-Neogene Transantarctic Mountains Erosion and Landscape Modification, McMurdo Sound Region, Antarctica", focused on the interplay of tectonics and climate within the Southern Victoria Land Basin. Cenozoic sedimentation patterns are documented via interpretation of seismic reflection profiles calibrated to drillhole data in McMurdo Sound. This provides better constraints on the coupled Transantarctic Mountains-West Antarctic Rift System and on ice sheet advance and retreat through multiple climate cycles. The study aimed to test the view that cold based ice sheets in arid, polar deserts minimally erode the landscape by calculating sediment volumes for critical climatic intervals, with intense focus on the early to middle Miocene shifts from warm based to cold based ice sheets. The combination of sediment volume calculations, provenance information, and seismic facies characterization provides insight into depositional mechanisms and ice sheet behavior.

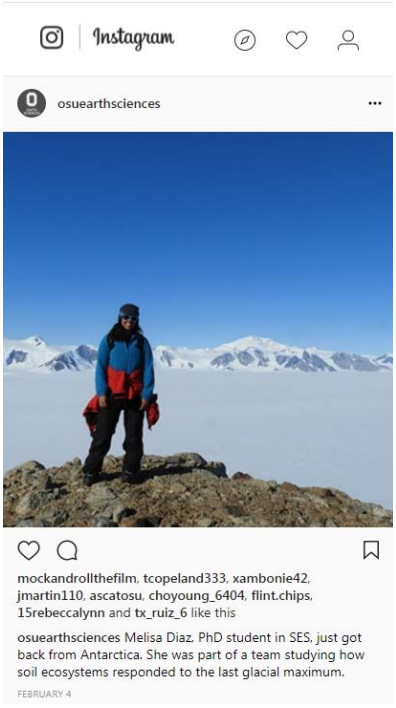
Giving Back to the Bownocker Fund

Dr. Donald P. McGookey (Ph.D, 1958) has contributed $25,000 to the John A. Bownocker Fund (link). The Fund supports an annual lecture by a luminary Earth Scientist; the lecturer also receives the Bownocker Medal. Recent Bownocker medalists have been Dr. Lucy Jones (link), and Dr. Kathy Sullivan (link). Years ago, however, the Bownocker Fund also supported graduate student fellowships at OSU. Dr. McGookey (pictured at left with his wife, Doris this Valentine's Day) received one of these; he tells the story:

"I attended OSU from the Fall of 1956 to December, 1958. The first year I was a graduate assistant, primarily with Dr. Edmund Spieker, and also with Dick Goldthwaite, both wonderful people. In 1957 and 1958 I had the Bownocker fellowship, which provided complete freedom to concentrate on (and expedite) my studies and dissertation. It wasn't much money, but enough to help support 3 small children and a wife. (My wife typed theses, etc. the old fashioned way and we had on campus housing.) My life as a geologist has been a continuous learning experience. I spent 17 years with Texaco doing fieldwork throughout the Rockies, then 3 years in an office on the 27th floor of the Chrysler Bldg, NYC working on projects all over the world. I was Chief Geologist for a number of years and ended as Exploration Manager in Midland, Texas. I got tired of moving and put out my shingle in Midland for the next 31 years. I found enough oil to be comfortable in old age. I still lecture and contribute occasional geologic papers. Looking back, the Bownocker Fellowship was an enormous honor and an expediter to my career."

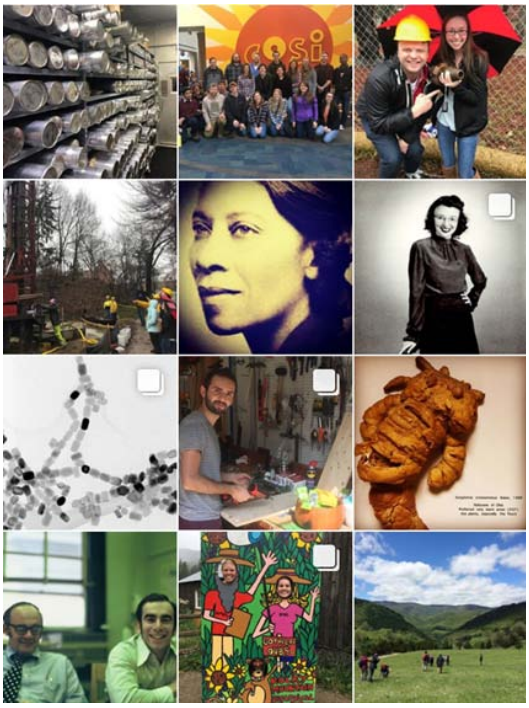
Dr. McGookey has authored multiple books, which can be found on Amazon and in the Orton Geological Library (link). We are so grateful to Dr. McGookey for giving back to the Bownocker Fund!

School of Earth Sciences on Instagram



We are excited to announce that the department of Earth Sciences now has an Instagram page. To get updates and keep up with SES news please follow us @osuearthsciences (link).

This is also a good reminder that SES has a Facebook page as well (link), which is co-managed by SES faculty, students, and alumni.



Faculty Profile: Elizabeth M. Griffith

I am one of those few geoscientists that knew they wanted to study geology in college. My parents both majored in geology at the University of Dayton, but I didn't know it was for me until I went on a paleontological dig circumnavigating Nebraska with a group of Girl Scouts in high school. You can see my major discovery caught on film in the photo below (I think it was a bone from a small rodent?). I was pretty excited and totally hooked on studying Earth's history!

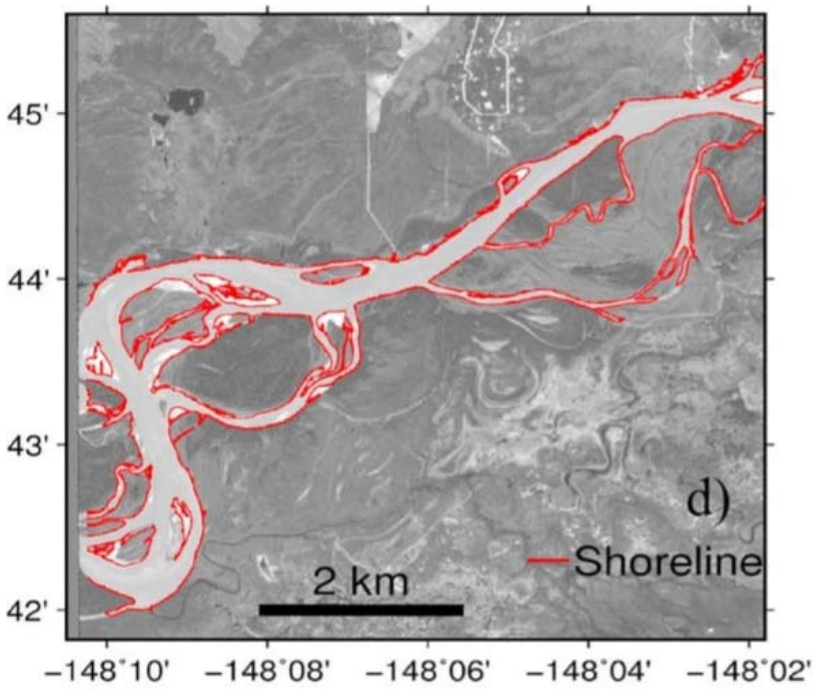
I grew up in St. Louis, Missouri and went to college not far from home in Rolla at what was the Missouri School of Mines (now named Missouri University of Science & Technology). I have since transitioned into the marine realm after getting a BS in Geology and Geophysics and working for two years in industry as a field engineer for Schlumberger Wireline (onshore in Bakersfield, California and offshore in Aberdeen, Scotland). I now focus my time and effort (and my students') on using geochemical techniques, including stable and radiogenic isotopes, to uncover Earth's secrets.

While on an oil platform in the North Sea, I had an interview on the satellite phone in the solitary telephone booth with a professor who I hoped would be my Ph.D. advisor at Stanford University. Somehow, I managed not to ruin my chance to get an offer and decided to return to school to study paleoceanography. I studied seawater calcium isotopes and Cenozoic carbonate depositional history of the oceans for my dissertation and eventually published six papers from this work – including one paper in *Science*. I thoroughly enjoyed my time in graduate school… met my husband Ashley (the other Dr. Griffith in SES), got married and had our first child. Together we traveled to Rome, Italy for a postdoc opportunity for Ashley. But after a year we returned to the US after securing tenure-track assistant professorships in NE Ohio (at Univ. of Akron and Kent State Univ.). We were recruited away to the University of Texas at Arlington in the Dallas-Fort Worth area a couple years later. However, when Ashley interviewed last year and was offered a job at The Ohio State University, we knew our home would be back in Ohio. I was thrilled to have a position offered in the School of Earth Sciences for me as well. Currently I teach Introduction to Geochemistry and co-teach Advanced Oceanography in the fall semester.

I have been working with huge efforts from my Ph.D. student (Samantha Carter) who traveled with me from Texas and help from Matt Saltzman's students and several other faculty to build what I consider a dream lab: including a metal-free clean lab for careful sample preparation and a new generation thermal ionization mass spectrometer to measure isotope ratios of Ca, Sr, Nd and others. Please visit us and ask for a tour of the labs! You might also find one of five undergraduate students working in the lab processing deep sea sediment cores or imaging modern stromatolites from the Bahamas (currently four senior thesis students and one student worker). I enjoy working with students in the lab (and occasionally in the field) making new discoveries. Current research in my lab is looking at constraining changes in carbon cycling in the oceans over "hyperthermal" events in the early Eocene as potential paleo-analogs for a changing climate, reconstructing provenance of Indus Fan sediments from the Miocene to present day related to changes in monsoon intensity and understanding stable isotopic fractionation of calcium and magnesium in modern stromatolites from a hypersaline lake in the Bahamas.

Postdoc Chunli Dai Measures Arctic River Elevations from Space

Arctic rivers are poorly observed despite their potential sensitivity to climate change and importance to global hydrology. This is due to the sparsity of gages and lack of a reliable space-based method for measuring river stage and discharge. Dr. Chunli Dai is a postdoc working in Prof Howat's lab. In her recent paper in GRL, she demonstrates that ArcticDEM, a collection of openly available repeat Digital Surface Models derived from submeter resolution satellite imagery (link), provides a powerful new data source for measuring river surface elevations and discharge from space. She applied these data near the Tanana River, Alaska, and compared ArcticDEM results to airborne and ground observations finding that ArcticDEM is able to detect short-term variability in river height. Thus, ArcticDEM enables remote sensing measurements of currently unobserved rivers, improving our understanding of Arctic hydrology.



The method works by a combination of detecting river shorelines and measuring shoreline elevations — water decorrelates too fast to be captured using photogrammetric imaging. This graphic (left) shows the detected river shoreline (red) for the selected region of the Tanana River near Fairbanks, Alaska.

Dai, C., Durand, M., Howat, I. M., Altenau, E. H., & Pavelsky, T. M. (2018). Estimating river surface elevation from ArcticDEM. Geophysical Research Letters, *45* (link).

First Alumni Board Meeting

The inaugural School of Earth Science Alumni and Friends Advisory Board Meeting took place on April 12. This new board is led by chair Joe Newhart (BS 1969), who also received our Distinguished Alumni award this year. Board members include:

Joe Newhart, Chair, BS 1969
Joe Studlick, MS 1977
Jory Pacht, PhD 1980
Julie (Ditkof) Mansfield, BS 2009
Rob Swift, MS 2011
Jake Harrington, BS 2015
Heather McCarren, BS 2003
Denis Balcer, BS 1990
LeeAnn Munk, PhD 2001
Dave Zilkoski, MS 1979
Wendy Bohon, MS 2008

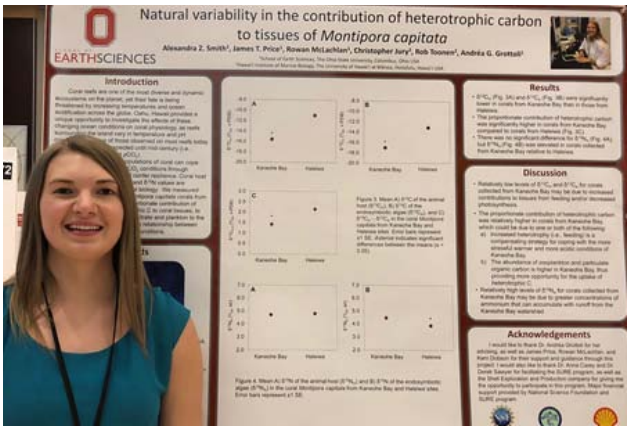
The board plans to assist in career development for students, outreach and engagement, and help establish external partnerships for collaboration.

SES Success in Undergraduate Denman Research Forum

Over 700 research projects were presented at the Denman Undergraduate Research Forum held on April 3, 2018. Nine students currently majoring in Earth Sciences presented their research to hundreds of visitors.

Student presenters and their advisors were:

Becky Anderson, advised by Anne Carey
Cole Bradley, advised by John Olesik
Ally Brady, advised by Frank Schwartz
Seth Bryson, advised by Mike Barton
Dan Gilbert, advised by Berry Lyons
Nikki Kinash, advised by Ann Cook
Lily Kleban, advised by Anne Carey
Karina Peggau, advised by Larry Krissek
Alexandra Smith, advised by Andréa Grottoli

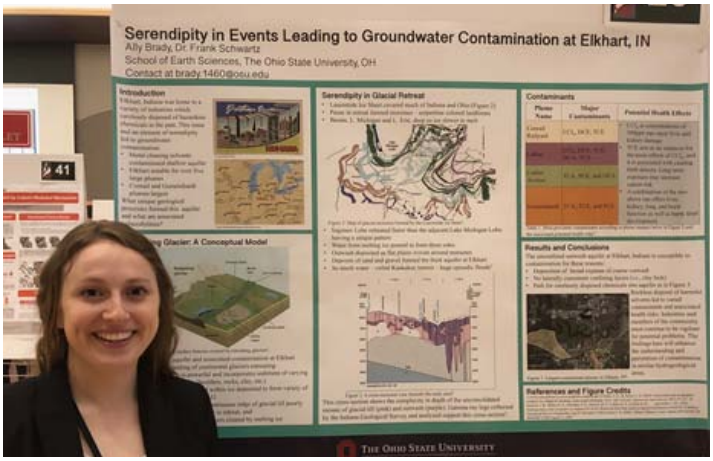


Alexandra Smith with her poster

Also presenting were three students doing research in Earth Sciences:

John Armstrong, Biology major advised by Andréa Grottoli
Katherine Giesy, Zoology major advised by Andréa Grottoli
Sarah Solomon, Evolution and Ecology major advised by Andréa Grottoli

Undergraduate juniors Alexandra Smith (BS Geology, concentration Earth System Science) and Sarah Solomon (BS Biology, concentration Ecology and Evolution) both were recognized with wins at the event. Smith won 2nd and Solomon won 1st place in the Water and Earth category. Both students study corals in the laboratory of SES Professor Dr. Andréa Grottoli. Alexandra's project uses stable isotopes to determine how much coral feed under various natural conditions in Hawaii. Sarah's project focuses on how corals consume their different classes of lipids when bleached. Both students will be conducting research in the Grottoli lab full-time over the summer. Additionally, among SES majors who presented, Ally Brady won 3rd place in the Water and Earth category and Karina Peggau had the opportunity to discuss her poster on Antarctic icebergs during an interaction with Mr. and Mrs. Denman during the poster session in the Ohio Union.



Ally Brady with her poster

Karina Peggau at the Denman poster session

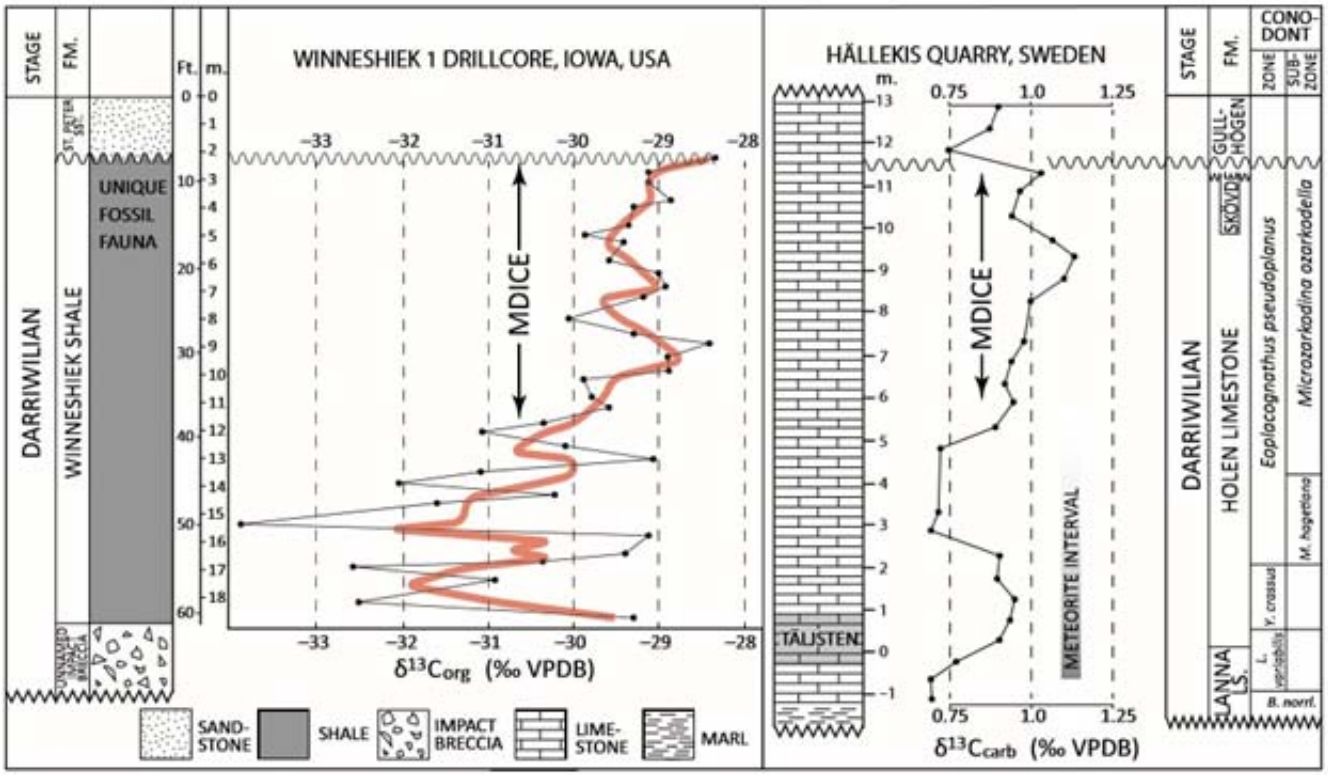
Congratulations to all of the participating students on their research success and making SES proud!

New SES Paper on the 'Great Ordivician Meteorite Shower'

One of the most notable paleontological discoveries during recent years was made in 2005 when a previously completely unknown Middle Ordovician deposit with exceptionally preserved fossils was found at Decorah, Iowa. The fossil-bearing stratum is a shallow-water shale (Winneshiek Shale) that was deposited as a filling in a meteorite crater with a diameter of approximately 5 km. Only a single outcrop of this shale is known and this exposure is most of the time submerged by the Upper Iowa River. The Winneshiek Shale contains a uniquely preserved fauna including several remarkably preserved arthropods (such as eurypterids with an estimated size of 1.7 m) and previously unknown conodonts but there are no trilobites, brachiopods, corals and other calcareous fossils. Because there are no graptolites or other biostratigraphically highly diagnostic fossils, the precise age of this deposit and the meteorite impact has not previously been established more precisely than Middle Ordovician.

In a recently published study, Bergström et al. (2018) used $\delta^{13}C$ chemostratigraphy on drill core samples through the Winneskiek Shale to date this deposit as middle Darriwilian (Eoplacognathis pseudoplanus Conodont Zone). It turned out that the Winneshiek isotope curve shows a striking similarity to a narrow Darriwilan interval in south-central Sweden. This Swedish interval has yielded an exceptional amount of meteoritic material, including more than 100 meteorites at one locality. In popular terms, this short-ranging interval of greatly increased transport of extraterrestrial material to the Earth's surface is known as the 'Great Ordovician Meteorite Shower'. The new data indicate that the Decorah impact was a part of this, apparently global, event that in terms of number of impacts caused by extraterrestrial bodies may have been unique through the entire Phanerozoic.

Stig M. Bergström, Birger Schmitz, Huaibao F. Liu, Frederik Terfelt and Robert M. McKay, 2018. High-resolution $\delta^{13}C_{org}$ chemostratigraphy links the Decorah impact structure and Winneshiek Konservat-Lagerstätte to the Darriwilian (Middle Ordovician) global peak influx of meteorites. *Lethaia*, (link).



Comparison between the Winneshiek Shale $\delta^{13}C_{org}$ chemostratigraphy and the $\delta^{13}C_{carb}$ chemostratigraphy of part of the Hallekis Quarry succession in south-central Sweden with its detailed conodont biostratigraphy.

ALUMNI SPOTLIGHT

ABBIE BOWMAN

Research Scientist for Applied Geology and Environmental Science

bowman.1159@osu.edu

> *The School of Earth Sciences forced me to come out of my shell and take on new challenges that I would not have if I were a part of a larger department.*

WHERE HAS YOUR DEGREE TAKEN YOU?

After graduating with my B.Sc. in 2016, I completed an internship with the Ohio EPA as an aquatic macroinvertibrate intern for the Division of Surface Water. I knew nothing about insects at all, but I quickly became captivated by the field of entomology! So much so that I am currently applying to graduate programs in caterpillar parasitology. Currently, however, I work as a scientist for Applied Geology and Environmental Science. Most of the work I complete is for the Department of Energy on the decontamination and decommissioning of the Portsmouth Gaseous Diffusion Plant in Pike County, Ohio that previously produced enriched uranium for the United States Atomic Energy program and the U.S. nuclear weapons program.

HOW DID YOUR EXPERIENCE AS AN SES STUDENT PREPARE YOU FOR THE FUTURE?

The School of Earth Sciences presented me with lots of experiences that forced me to work with other people and adapt to a diverse set of challenges. Although working with classmates in the field was difficult, the skills I developed in these exercises have proven invaluable as almost all of my current work is a team effort!

WHAT ADVICE WOULD YOU OFFER TO FUTURE STUDENTS?

Get to know everyone in the department! Looking back on my undergraduate career, the memories I made with my classmates and professors still warm my heart!

MOST MEMORABLE EXPERIENCE AS AN SES STUDENT?

Going to field camp! It was a blast being in Utah with a bunch of strangers that quickly became family. So much sweat, so much laughter.

Fall Alumni Gathering: Save the Date!

The Alumni Committee is excited to announce the date for our Fall Alumni Gathering! This year, the Alumni Gathering will be on Saturday, October 6, before the Indiana game, which is also Homecoming. The event will begin three hours before kickoff (note that kickoff time is currently TBD; kickoff is likely to be either noon or 3pm). Please direct any questions about this event to Prof Derek Sawyer (sawyer.144@osu.edu). Event details and RSVP request will follow in a separate email.

Brevia

Congratulations to Deon Knights and Amelia Nelson on winning GSA Graduate Student Research Grants. Deon's grant will support summer field work in Louisiana contributing to his PhD research. His grant is entitled "Quantifying Nitrate Attenuation in a Coastal Freshwater Wetland." Amelia's grant will support summer field work in Colorado contributing to her MS research. Her grant is entitled: "Hydrologic controls on streamed microbiology and geochemistry in an alpine river."

Congratulations to Earth Sciences undergraduate majors, Becky Anderson, Alexandra Smith, and Prescott Vayda. Each of them has won a $4000 Mayer's Undergraduate Research Summer Fellowship for 2018. In addition, all three students have been awarded competitive Arts and Sciences Honors Undergraduate Research Scholarships for the upcoming academic year. Becky's research concerns "Petrographic analysis and chemical weathering sources in the Choshui River watershed on the high-standing oceanic island of Taiwan." Alex's research is on the topic of "Natural variability in the contribution of heterotrophic carbon to tissues of Hawaiian corals." Prescott's research is on the topic of "Exceptional preservation of fossils in the Devonian Silica Shale of northwest Ohio and southern Michigan." All three students expect to graduate in Spring 2019 and receive a BS in Earth Sciences with Research Distinction. Congratulations to Becky, Alex, and Prescott, and to their faculty research mentors, Anne Carey, Andréa Grottoli, and Loren Babcock.

Karen Tyler has passed away. Karen was a longtime staff member and draftsperson for the Geology Department. Karen worked for the Geological Survey Department at Kansas University before moving to OSU. She will be missed.