

October 2018 News Notes

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Alumni Change Lives

Dr. Amin Amooie recently received his PhD in May at Ohio State working with Professor Joachim Moortgat and began a postdoc at MIT in August. Here he describes how the Friends of Orton Hall fund helped him complete his graduate studies. If you are interested in giving to support the Friends of Orton Hall or other funds, please visit our giving page ([link](#)).

I defended my PhD on May 2018, right after I attended the 10th International Conference on Porous Media & Annual Meeting (InterPore) in New Orleans, Louisiana. During my graduate studies at the School of Earth Sciences, I received multiple Friends of Orton Hall grants to cover my travel expenses, and I am very grateful for this support. Particularly, I presented a poster at the recent InterPore conference, which was an overview of the final chapter of my thesis. This work had not been published, and I had a great opportunity to discuss it with the experts in the field during this meeting. Unlike many other conferences, the poster was hung up for the duration of InterPore (4 days), and I was able to meet numerous researchers and present my work to them while receiving constructive feedback.



A major part of my doctoral research is dedicated to studying the complex fluid dynamics and thermodynamics of convective mixing in porous media. I am motivated by the porous-media convection arising from dissolution of CO₂ into brine during geological carbon sequestration in deep saline aquifers as a promising tool to mitigate climate change. During the 2018 Interpore conference, I focused on the pattern formation and coarsening dynamics emerging in three-dimensional convection. In particular, I showed that gravitational instabilities—triggered at the boundary layer due to the local increase in density following dissolution—develop into columnar plumes of CO₂-rich brine because of self-organization of concentration field in the boundary into a cellular network. The morphology of convective patterns in three dimensions for different types of boundary conditions has implications for numerous density-driven problems in fluid mechanics as well as in environmental and geological settings. I am very thankful to the Friends of Orton Hall and its donors for making all of this possible.

Cryolophosaurus Opening

We are all in awe of Cryolophosaurus!

The Cryolophosaurus *ellioti* official opening took place on October 7, and you can see many attendees enjoyed our new installation. The event included dinosaur namesake and discoverer David Elliot, Professor Emeritus of Earth Sciences, along with dinosaur experts Bill Ausich, Professor Emeritus of Earth Sciences and Director of Orton Geological Museum and Dale Gnidovec, Collections Manager and Curator.

If you haven't gotten a chance to see Cryolophosaurus *ellioti* yet, please come by Orton Hall and check him out!



Attendees at the Cryolophosaurus Opening

Saltzman Field Trip

Prof. Matt Saltzman led an Appalachian Basin Stratigraphy field trip to eastern West Virginia (Seneca Rocks region) and western Virginia (Highland County) on October 11-14, 2018 as part of the Earth Sciences 5618/8800 course. The group was based in Germany Valley, which is an anticlinal valley with an eastern limb formed by the Tuscarora Sandstone that caps North Fork Mountain and western limb represented by vertical Tuscarora beds at the Allegheny structural front.



(Above) Germany Valley - Using a Jacob staff to measure a section of the Trenton Group Ordovician. Outcropping of Ordovician limestone ledges is initially limited in cow pasture, providing an exercise in use of a Jacob staff, but becomes 100% exposed as road on left reaches tree line.

(Right) Arc Hollow – Examining cliff exposure of Black River Group Ordovician carbonates.



Group photo on the Catskill outcrop (Briery Gap, WV): from left to right, Scott Hull, Teresa Avila, Becky Anderson, Prescott Vayda, JJ Kim, Chris Conwell, Billy Eymold, Beau Humphrey, Brittan Wogsland, and Datu Adiatma.

Sections were studied in detail at 6 localities, including the Ordovician Black River and Trenton succession at Dolly Ridge and Arc Hollow, WV; the Ordovician-Silurian Juniata-Tuscarora at North Fork Mountain, WV; the Silurian Rose Hill to Wills Creek at Blue Grass, VA; the Siluro-Devonian Tonoloway-Helderberg succession at Mustoe and McDowell, VA; and the Late Devonian Foreknobs (Catskill) formation at Briery Gap, WV. Another set of smaller outcrops were visited in the Late Ordovician Reedsville and Lower to Middle Devonian Oriskany-Needmore-Marcellus (Millboro) formations. A cold front blew in the first evening and created a spectacular sunset for fajita night. Crisp, clear days on Friday and Saturday were perfect for field work until the rain showers started up on Sunday morning (it always rains on the Catskill day)!



2018 Shell Undergraduate Research Experience Internship Program

For the 11th consecutive year, Shell Exploration and Production Company provided funding to the School of Earth Sciences to support the summer research internship program known as the Shell Undergraduate Research Program (SURE). The SURE program began in summer 2008 after Earth Sciences professors Frank Schwartz and Anne Carey convinced Shell that funds that had formerly supported a few students to attend Shell's drilling camp during spring break would provide greater benefit and train more students if it were used for what has become the SURE program. Since 2008, 129 undergraduates have benefitted from SURE internships including Shell geoscientist Bill Magee who was a member of the initial class in the SURE program in 2008.



Shown, left to right, in the photo at the conclusion of the SURE poster session on July 26 are Shell geoscientist Bill Magee, students Prescott Vayda, Stephanie Owen, Kelly Lang, Alex Covault, Lily Kleban, Becky Anderson, Kira Harris, Nicole Wahlstrom, Professor Anne Carey and student Gus Wulsin.

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Participating in the SURE program, coordinated in summer 2018 by Anne Carey and Derek Sawyer, were nine undergraduate majors in Earth Sciences. The students, their advisors, and their project titles are listed in the table below. Becky Anderson and Prescott Vayda participated in SURE with support from Arts and Sciences competitive Mayers Research Scholarships and the other seven students were fully supported with funding from Shell.

2018 Shell Undergraduate Research Experience Internship Program

Student	Faculty Advisor	Project Title
Rebecca Anderson	Anne Carey	What's Weathering in Taiwan?
Alexandra Covault	Audrey Sawyer	'Til Reduction Do Us Part: Quantifying Legacy Phosphorous in the Lake Erie Watershed
Kira Harris	Ian Howat	Ongoing Retreat of Greenland's Outlet Glaciers
Lillian Kleban	Sue Welch	Weathering of Volcanic Ash
Kelly Lang	Dave Cole, Julie Sheets and Sue Welch	Evaluation of Cores of Niagaran Reef in Michigan After CO ₂ Injection
Stephanie Owen	Derek Sawyer	3D Seismic Investigation of the Caillou and Calumet Salt Mounds in the Gulf of Mexico
Prescott Vayda	Loren Babcock	Exceptional Preservation in the Silica Shale (Devonian) of Northwestern Ohio
Nicole Wahlstrom	Wendy Panero	Surface Flooding Potentials of Model Terrestrial Bodies
Gus Wulsin	Tom Darrah	Comparison of Water Well Sampling Methods for Dissolved Gases

In addition to the many hours the students spent on their research projects, they also participated in professional development and technical workshops weekly. Workshops were presented by School of Earth Sciences faculty, graduate students, and technical staff including Anne Carey, Ann Cook, librarian Danny Dotson, Berry Lyons, Derek Sawyer, Apoorva Shastry, Julie Sheets, Stephanie Sherman, and Sue Welch. On Thursday, July 26, the students showcased their summer research and presented posters to Earth Sciences alumnus and Shell geoscientist, Bill Magee (BS 2009; MS 2011), and to dozens of faculty, staff, students, and administrators who visited the three-hour poster session. Congratulations to the students, thank you to their mentors and workshop presenters, and to Shell for the funding.

New NSF Grant for Basin Research Group

The Basin Research Group led by Professor Derek Sawyer has received a new 2-year NSF-funded award to study submarine landslide hazards off the U.S. east coast. This project is a collaborative effort with researchers at Columbia University to constrain sediment physical properties associated with the Cape Fear and Currituck landslides from velocity analysis of recently acquired open access seismic reflection data.

Underwater landslides pose deadly and destructive hazard threats to populated coastal areas worldwide because of the potential to generate tsunamis. On the continental margin offshore of the heavily populated U.S. Mid-Atlantic, ~15% of the continental slope are scars from large submarine landslides. If a large slope failure were to occur today on the Eastern US Margin, the negative economic and societal impact could be severe.

This study aims to understand the driving mechanisms by examining the role that fluid pressure within the sediments plays in slope failure and the subsequent motion of those sediments. Slope failure can occur gradually or catastrophically, and have different implications for the type and severity of impacts to coastal areas. Our findings will better constrain the preconditioning factors that lead to slope failure and the hazard risk from tsunamis generated by catastrophic failures.

This study will support a graduate student in Prof. Sawyer's group and will utilize open-access seismic reflection data acquired in 2014 as part of the NSF-funded GeoPRISMS Community Seismic Experiment using the R/V Marcus Langseth (Figure 2).

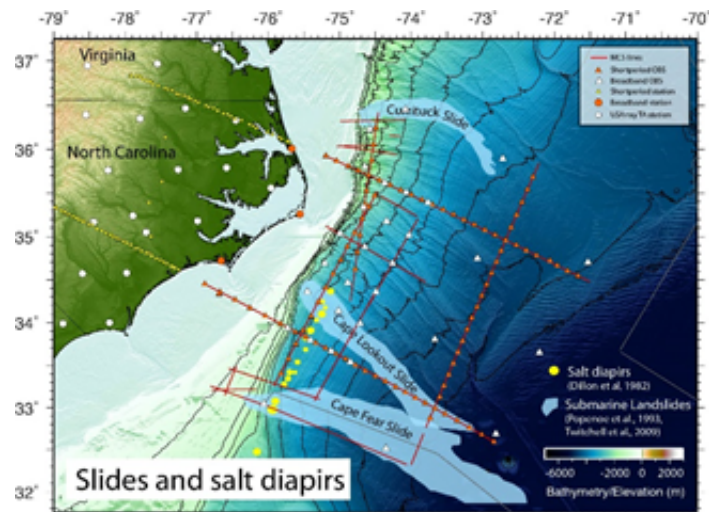


Figure 1. Several of the largest submarine landslides on the modern day seafloor occurred on the continental slope region offshore Atlantic U.S. What caused these slides to form and what hazards they present are the focus of this study.



Figure 2. The R/V Marcus Langseth acquired high resolution seismic data in 2014 that will be used in this study.

SES Alumni and Friends Board Meeting

Our second Alumni and Friends meeting took place on October 5. Board members got the chance to learn more about our school and the college and they continued to work on several initiatives to help improve the school. On Friday afternoon, board members met with students, conducted mock job interviews and shared job search advice over dinner.



SES undergraduate Jessica Va meets with Board Chair Joe Newhart.

SES GRADUATE AND UNDERGRADUATE STUDENT SCIENTIFIC OUTREACH

T-SHIRT FUNDRAISER

<https://www.customink.com/fundraising/SES-OUTREACH>



Help the School of Earth Sciences Graduate Student Club and the undergraduate honor society, Sigma Gamma Epsilon, inspire the next generation of scientists through exciting and compelling new displays and outreach endeavors in Mendenhall Laboratory and Orton Hall! Support SES's efforts and show your commitment to science by purchasing a cool t-shirt, sweatshirt, or hat!

The communication of accurate, evidence-based science is more important than ever. We would like to help do our part! To achieve our goal, we're holding a fundraiser in which all proceeds will go towards a number of outreach and educational efforts facilitating community engagement with our program, including:

1) Developing museum-quality educational display cases in Mendenhall Laboratory and Orton Hall that are interesting and understandable to both scientists and non-experts.

2) Showcasing our many talented alumni to highlight the diversity of subfields within the earth sciences and, more broadly, to help "humanize" the sciences.

3) Purchasing educational tools (such as resin ice cores and portable seismographs) and providing funding for outreach opportunities to improve science communication with the general public.

To contribute, please click this [link](https://www.customink.com/fundraising/SES-OUTREACH).

ANDREA DONNELLAN

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WHERE HAS YOUR DEGREE TAKEN YOU?

I went to Ohio State because I was interested in Earth Science and wanted to go to Antarctica. Much to my surprise I ended up going three times to study the West Antarctic Ice Streams with Ian Whillans. My interest in the ice sheet extended to my doing a senior thesis on modeling of the grounding line of the ice sheet. My one disappointment is that we submitted the work for publication, but it was rejected. I recall words to the effect of "I don't want to discourage this young lady, but..."

I interviewed for a job at the county doing water testing, but wanted to continue with research, so I applied to graduate school. I got into University of Minnesota and Caltech. University of Washington rejected me. I loved the environment at Caltech and the enthusiasm for research, so I went to work with Barclay Kamb, a glaciologist there. I spent six weeks on Variegated glacier studying mini-surges prior to my first year at Caltech. In our first year we were required to do two research projects. The second project was on crustal deformation near Los Angeles and just before my oral exams in the fall of my second year the Whittier Narrows earthquake occurred. For a few reasons I switched then to study crustal deformation for my Ph.D. thesis and continue doing so to this day.

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

I loved that Ohio State was a large school. It felt like a city with sub-communities that provided many opportunities. The group of students was close knit and I am still friends with some of them

MOST MEMORABLE EXPERIENCE?

The field work, both in Antarctica and at field camp was my favorite experience.

ADVICE FOR FUTURE SES STUDENTS?

My advice is probably not unique. Find what you like to do and do it well. Don't go into research or a career path if you don't love it.

“My field and modeling background as well as a minor in Math at Ohio State provided a solid foundation for the rest of my career.”



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