



**WHEATON
COLLEGE**
For Christ & His Kingdom

CONTACT

The Alumni Newsletter of Wheaton College's Department
of Earth and Environmental Science



Structural Geology students return to Baraboo, WI and the Van Hise Rock for the first time since 2019!

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FROM THE GEOLOGY COORDINATOR: A CHAIR OF OUR OWN

ANDREW LUHMANN

I have taken over the department responsibilities that Doc Mo previously held before his retirement, and I became our official department chair on May 1. We lost our chair position last year as a cost-saving measure, but our administration has given their approval to return it.

One exciting piece of news for the department this year is the hiring of a new geology faculty colleague: Dr. Bolton Howes (see more about Dr. Howes on page 13). The position is a bit of a hybrid, and it is certainly a positive move for our department. Dr. Howes will carry half of the teaching load of a typical tenured or tenure-track faculty member, and the other half of the position will be to serve as the Director for our Field Station (see the announcement about our new name for the Black Hills program on page 2). We are thrilled to have Dr. Howes join our department!

We are grateful for you, our alumni. You are certainly important to the success of our programs. In the past year, some of you gave a guest lecture in our classes or presented a talk at our Donut Time. Others have allowed us to highlight you in letters that we sent to prospective students to help

recruit the next Wheaton class. Still others have provided our students with job and internship opportunities or sent us job announcements that we have shared with all in our department. In addition, students have benefited from resources provided by endowed funds that you have contributed. Thank you for these and all of the other ways that you help us!

We are planning a trip next year to the Pacific Northwest for our current students to see and learn about the geology there. We invite you to join us to see some incredible geology and to share your expertise and wisdom with our current students.

In addition, Karen Riley, a wonderful colleague and friend, has been our Office Coordinator this past year. She previously held that role for the Chemistry Department, but she became the Office Coordinator for both of our departments as another cost-saving measure. Our administration has also given us approval to hire our own coordinator, which will allow Karen to return to focus on the needs of the Chemistry Department. Thank you, Karen, for serving us so well!

Want to see the photos in this issue in color? Download pdf versions of CONTACT at wheaton.edu/geology

BLACK HILLS GETS A STRATEGIC PLAN AND A NAME UPDATE

CHRIS KEIL,
DIRECTOR OF THE WHEATON
COLLEGE FIELD STATION

A summer in the Black Hills has been a part of the Wheaton experience for all geology majors and many environmental science and biology majors. Add to them all the fortunate non-science majors who discovered the joys of “completing their science requirements” in the Black Hills. The College regularly gets feedback from alumni that the learning in the Black Hills was one of the most formative experiences of their time in college.

To ensure that this tradition of powerful field education continues, Becky Eggmann, Dean of Natural Sciences, led a year of strategic planning for the Wheaton College *Field* Station. That’s right! The Station is now the Field Station. The strategic planning team, with the input of others, believe this name change better reflects the breadth of the work that goes on there. In recent years, courses at the Station have included art, Bible, education, and anthropology. The relationships we’ve built with the local Lakota community and the accompanying cross-cultural experiences for students in all courses are better captured with the name *Field Station*.

Another outcome of the strategic planning process is to restructure Station leadership. For decades, the director of the Station was an additional duty during the academic year by one of the participating faculty. Over the decades, the requirements and responsibilities of running the Station have grown. The basics of getting from one summer season to the next took all the effort the director could spare. Everyone recognized unrealized potential and possibilities for the Station, but the director did not have the “bandwidth” to tackle those opportunities. The strategic planning team creatively combined resources to create a tenure-track position that will be half-time geology faculty and half-time director of the Wheaton College Field Station. We are excited about the possibilities that will emerge with a director able to dedicate more time to the Station.

The strategic planning team developed a mission and core values to guide the new director. These are nothing new for those involved with the Field Station. Rather, they are a crystallization of the thinking, motivation, and assumptions that have been underlying Station operation for years. We are confident that articulating these clearly will help the new director chart a successful course into the

future for the Wheaton College Field Station.

Mission

A center for field science, cultural studies, and the arts, the Wheaton College Field Station brings people together for place-based learning in Christian community committed to simplicity and renewal of all creation.

Core Values

We are here

The Wheaton College Field Station is surrounded by the Black Hills National Forest, located just west of Rapid City, South Dakota. When we say, “we are here,” we mean that at the Field Station all our learning programs put place at the forefront of the learning. We recognize and respect the particularity and sacredness of the space we are part of. It has unique and special geological, ecological, and cultural features, which students come to know by experience.

The value “we are here” also invokes and affirms the often necessary reminder from indigenous cultures of their ongoing presence in and relationship with the space — past, present, and future. Further, “we are here” means that our programs are focused, enriched times of learning, relationships, and play that students and teachers alike find restorative and transformational.

We are together

Together-ness is fundamental to the Wheaton College Field Station. We live in Christian community; we are together more than alone. We even share residences and meals family style. We study together, believing that our learning works best when it is collaborative. We play together, exploring natural and cultural wonders of the region. We are committed to safety, access, and equity of participation.

When we say “we are together,” we also mean

that we are together with the local community — partnering with and learning from local experts and communities in our learning, worshiping with local congregations, and seeking by means of reciprocal giving to contribute to the good of the region as well as the good of the Wheaton College Field Station.

And most fundamentally, we mean that we are together with nature, with the ecosystems, geology, and weather that make up the Black Hills; we recognize our interrelatedness and seek our mutual flourishing. We are in this together.

We seek less

Part of what makes time at the Wheaton College Field Station so special and effective for learning is the focused, simple way of life here. We seek to attend to the place and its species and people by putting less of a focus on possessions and distractions. Thus, we live simply, by design. Accommodations are unfussy and close to the natural world — and we wouldn’t have it any other way.

We seek renewal

Fundamental to learning at the Wheaton College Field Station is the life-changing belief that individuals, communities, and ecosystems can be healed and restored in the Kingdom of God. Though our learning often involves increased awareness of ways that brokenness manifests in ourselves, in creation, and in communities, we believe in, seek, and learn to participate in the renewal of all creation made possible through the life, death, and resurrection of Jesus Christ.

The strategic planning team led by Dr. Eggmann included Chris Keil, Ray Lewis, Steve Moshier, Kristen Page, and A.J. Poelarends with invaluable help from Fran Titcomb and the exceptional word crafting skills of Tiffany Kriner.



We love welcoming back our Black Hills alumni for breakfast during Homecoming.

DOC MO'S MEMOIRS

STEPHEN MOSHIER,
EMERITUS PROFESSOR OF GEOLOGY



Doc Mo and Carol enjoyed a retirement trip to Greece in May 2023.

My first months of retirement have been full of travel and continuing projects. In May, Carol and I spent two weeks in Greece. The first week, we stayed in Athens for four nights, walking to all the main archaeological attractions. Then we moved to a town east of the city, rented a car, and drove all over southern Attica. The second week, we joined our church group for

an Aegean Sea cruise, visiting islands figuring in Paul's and John's journeys recorded in Acts. We visited Carol's family in Texas for both solar eclipse events, in October and April. In August, I attended my 50th high school reunion in Corning, New York.

I enjoy spending one or two days each week in the department. I am working with Katy Foltz and Maureen Keil on new displays for the museum. Most of my time on campus involved curating and updating the catalog of our sedimentary rock collection, something I should have done when I was getting paid!

When I joined the faculty in 1991, the sedimentary rock teaching collection consisted of less than one hundred well-documented and thin sectioned specimens — but they were mostly all from West Texas! There were also disorganized samples from all around North America, collected and donated by students and alumni. I commissioned Eric Mickelson to create a spreadsheet of the existing collection when he was a student back in the middle 90s. With the addition of samples retrieved during some 30 years of class field trips and inclusion of my collections, the total catalog is approaching one thousand specimens. We also have a permanent collection of specimens and thin sections at the Field Station for teaching our Sedimentary Geology course.

I finished writing the book on the Perry Mastodon. That was the easy part. Now I am looking for a publisher. There are so many untold stories involving the discovery, preparation, reconstruction, what I call the second life of the beast on campus, and natural history of our favorite proboscidean. Hopefully the book will soon be available everywhere books on campus mastodons are sold.



Students and faculty love decorating Perry at Christmas time.

MANEIRO'S MUSINGS

KATHRYN MANEIRO,
ASSISTANT PROFESSOR OF GEOLOGY

It's been a full year back to teaching, research, and service after being on leave in the 2022-2023 school year. It's almost unbelievable that I am completing my sixth year at Wheaton already. Time flies!

At the end of this year, I was awarded a Junior Faculty Achievement Award from Wheaton. Since we were hosting faculty job candidates the last two weeks of the semester, the department cleverly assigned me to accompany candidates to chapels — including Honors Convocation. You can imagine my surprise when the Provost started reading an extremely kind citation acknowledging my work. The rest of the department and my husband plus daughter were hiding in the back of the chapel cheering me on so I wouldn't spot them and ruin the surprise!

Last summer I returned to the "classroom" by teaching four weeks in the Black Hills as part of the Sustainability Summer program. We went on field trips all over the Hills to explore sustainability topics from water to waste to food production and more. I will return in the same role again this coming summer. My daughter, Bristol, and my in-laws accompany me and enjoy spending time getting to know the students and exploring the Hills.

For upper-division geology courses, I taught Igneous and Metamorphic Petrology and Structural Geology this year. Both classes have weekly labs that require a lot of student effort. In Petrology, students spend quality time with petrographic microscopes and hand samples, which culminates in a challenging Lab Final Exam where they must identify igneous and metamorphic rocks spread out in a fictional map area to tell the tectonic story of the fictional area's history. In Structural Geology, students spend quality time with the fictional Bree Creek Quadrangle (based on Tolkien's familiar character names) wrestling with stereonet and learning the basics of structural interpretation. For Petrology, we took a field trip to the St. Francois Mountains in Missouri, and for Structural Geology, we spent a weekend in Baraboo, Wisconsin. The field trip to Baraboo was the first return to Baraboo since 2019 – adding a new Van Hise Rock picture to the department poster showcasing field trips past (see cover photo!).

I also continue to serve as the Theme Coordinator of the Aequitas Fellows Program in Sustainability. This year we had two enrolled cohorts, so I taught the first-year Aequitas Sustainability seminar and the new second-year Aequitas reading courses. Next year we will welcome our third cohort, with the first cohort preparing to undertake a year-long sustainability cohort project in partnership with the faculty and staff Environmental Sustainability Committee at Wheaton!

Finally, my research continues to roll along. Senior Ethan Paul (GEO '24) worked on a senior thesis project with me providing temperature and pressure estimates on rocks from Western Australia, which helps constrain the metamorphic conditions that impacted Earth's oldest



Ethan Paul (GEO '24) hard at work creating plugs for thin sections to support his research with Dr. Maneiro.

known materials (zircon) in the Jack Hills of Western Australia. Ethan has submitted an abstract and plans to present his findings at the Goldschmidt Conference in Chicago, Illinois in August 2024. I also made a spring break visit to Boston College, where I have started the process of drilling out growth zones in a garnet from Greenland that might be Earth's oldest garnet! Work will continue on this project over the next couple of years. Additionally, Boston College has just upgraded their microdrill, and they have offered me their old one. With the addition of a micro-slab saw and a microdrill, I will soon be able to do some additional sample preparation in-house at Wheaton. I am also wrapping up my next manuscripts and preparing to write my faculty Faith and Learning paper.

LUHMANN'S LETTER

ANDREW LUHMANN,
ASSOCIATE PROFESSOR OF GEOLOGY

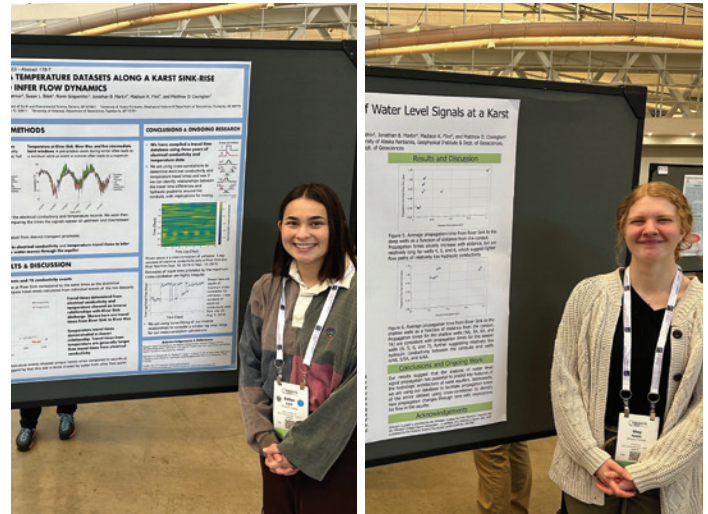
This past fall, I had a lot of fun with our upper division students in Process Geomorphology. We had three relatively local class field trips, including one to see glacial features in Kane County. April Phinney ('20) and Andrew Graber ('16) joined the class remotely to share about their research. April gave a talk about her MS research using luminescence to reconstruct fire history, and Andrew presented his research as a postdoc at the USGS on debris flows.

In addition, the Geomorphology students each completed a research project in one of two suggested options. Some students ran their own set of experiments with our Emriver™ stream table. They considered variables like vegetation and flow rate, and we also purchased the Emriver™ Wave Maker this past year to consider the impact of waves on coastal landforms. The students took pictures before and after their experiments to create 3D structure from motion models with Agisoft Metashape Professional software. They then imported their created digital elevation models (DEMs) into ArcGIS Pro to calculate and illustrate the DEM of difference to highlight the changes that resulted from each experiment (see figure below).

Another group of students pursued a research project that explores the karstification of various landscapes, which was defined as the land area drained via sinkholes, and how that depends on factors such as bedrock or climate characteristics. Students explored several different locations in the U.S., and their analyses are informing a larger analysis that is being led by my colleague Matt Covington at the University of Arkansas.

I also taught Water, the Essential Resource last fall, and there was a great group of students in the class from numerous majors across campus. We went and visited the Jardine Water Purification Plant for one of the class field trips, which is the largest water filtration facility in the world. It uses water from Lake Michigan to provide water for Chicago and many of the northern and western suburbs.

I taught two sections of our introductory Dynamic Earth and Environment this spring. One of the fun changes has been incorporating a song that I play as the students are walking into the class that is relevant to the topic of the day. Elijah Owens ('23) gave me the idea by giving me a list of songs that were provided at



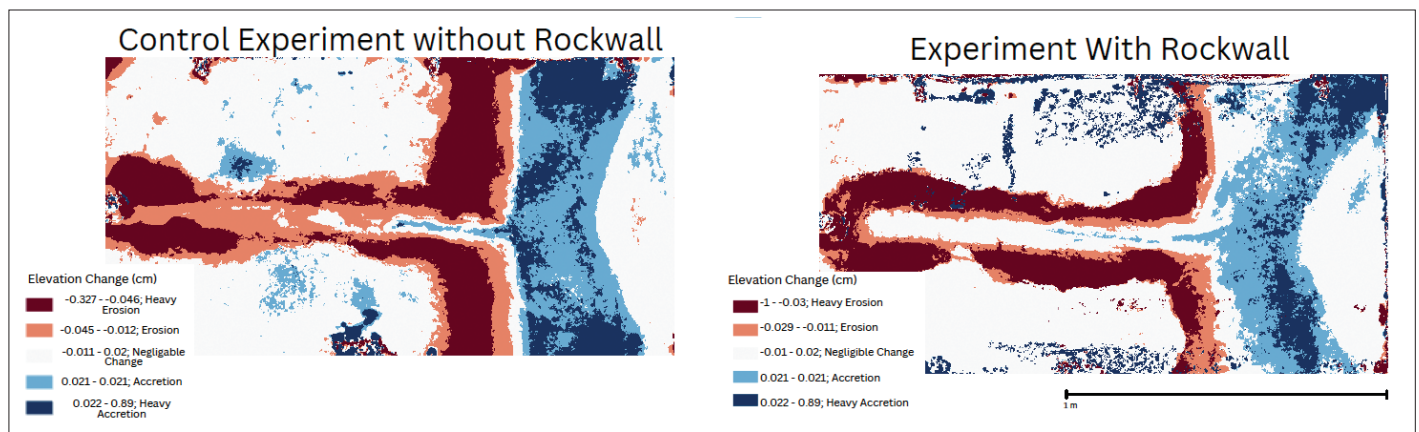
Esther Lam (ES '24) with her GSA poster.

Meg Noble (GEO '25) with her GSA poster.

a talk that he attended at GSA. My son Ben and my wife Audrey have been helping me add some more current songs, although we have worked in some older ones as well. The students might spend the rest of their lives associating Taylor Swift's *Shake It Off* with earthquakes, Louis Armstrong's *What a Wonderful World* with sustainability, and Imagine Dragons' *Radioactive* with geologic time.

I spent this past summer working with Esther Lam (ES '24 Environmental Science major) and Meg Noble (GEO '25 Geology major) on the hydrologic dataset from the Santa Fe River Sink-Rise flow system in north-central Florida that I collected with a large team of researchers. They both presented their findings to infer flow dynamics and hydrologic architecture in the aquifer at the 2023 Geological Society of America annual meeting in Pittsburgh. Dr. Maneiro and I traveled there with several of our students, and it was fun to connect with some alumni as well! Esther, Meg, and I continued our analyses this spring.

My family and I will be heading to Calgary this fall, where I will be spending my sabbatical at the University of Calgary. I will be working on research about carbon sequestration, saline lakes, and critical minerals with Dr. Ben Tutolo and his research group. We are looking forward to exploring Calgary and the surrounding area, perhaps planning an upcoming trip for our students and alumni. Let me know if there is a place that we should be sure not to miss.



Results from Carson Frear's (GEO '26) Process Geomorphology research project with our Emriver stream table assessing the ability of a rock wall to resist wave-based coastal erosion, illustrating elevation changes without (left) and with (right) a rock wall.

KEIL'S CORNER

CHRIS KEIL,
PROFESSOR OF ENVIRONMENTAL SCIENCE

It has been a year of both routine and excitement.

Part of the regular routine was teaching our now-combined introduction to earth and environmental science class “Dynamic Earth and Environment.” A couple years into the new course, many of the rough edges and lab adjustments are behind us. Excitement with teaching this course last fall was teaching back-to-back (well... before and after chapel) sections of 55 students each in the big Buyse lecture hall. It is great that the course has so many students! Dr. Luhmann had 123 students in his two sections spring semester. Spreading the Earth and Environmental Science goodness with so many students is a joy. We’ve gotten a number of new majors from the course, and we hope for more. For me, a fun challenge of teaching large sections was figuring out how to scale-up all the hands-on and minds-on learning I am committed to bringing to class sessions. So we bought lots of rocks, balances, beakers, and more. Working out the logistics was another challenge, but we developed some good systems, and I had great teaching assistants. Thanks Abigail, Eli, and Jolene! I’ll be doing the same in the fall, and I’m confident it will be even better.

After a break in my experimental research, partly because of the pandemic and partly because of other projects, I’m working on getting back into a routine of experimental studies on indoor air pollution transport. The environment of my particular expertise is the industrial environment. My research over the years has been on physical and chemical modeling of workers’ inhalation exposures when handling chemicals. I’ve got a number of projects lined up and have at least one student who will be helping. Hopefully I can convince a few more to explore this atypical branch of environmental science.

The exciting part about my scholarly work in the past year is that I finally finished a writing project I started on my sabbatical back in 2019. The writing was interrupted by the pandemic and stayed on the back burner for a couple years. But I finally finished the writing, and in late spring in 2023, the American Industrial Hygiene Association (AIHA) published *A Case-Based Introduction to Modeling Occupational Inhalation Exposures to Chemicals*, which I edited and wrote most of the chapters. The audience is a rather niche market, but I’m confident it will help reduce environmental health risks to



Enjoying the solar eclipse – (L to R) Dr. Maneiro, Dr. Luhmann, Prof. Katy, and Dr. Keil

workers. I recently found out the book is receiving the AIHA *Critics Choice Award* for “exceptional writing, innovative approach, and impact on the profession.”

I’m regularly kept busy with Black Hills work year-round. I’m either wrapping up the previous summer or preparing for the upcoming field season. We’ve been working on strategic planning for the Black Hills for over a year and a half, and we are excited about the future for the Field Station. There is an article on page 2 that highlights the Station. Summer 2024 is fast approaching, and we are excited to have a large number of students preparing for field studies in the Hills.

We’ve also got several students doing internships and research this summer. If you know of any opportunities at your organization in the future, let us know!

LEEDY LODGE RENOVATIONS

Leedy Lodge has been the center of community in the Wheaton in the Black Hills program for over 70 years. As one of the oldest structures at the Field Station, the Lodge began as the kitchen and dining hall, before becoming the primary indoor gathering space for current students. Thanks to generous donations (with employer matching funds!), we’ve been able to do some phased renovations of the building. Phase I included a new roof and furniture upgrades. In Phase II, we will upgrade the bathroom and make it ADA compliant and improve the operation’s laundry space. Phase III will refinish the classic wood floor and extend the knotty pine wood

paneling all the way around the room (the back section currently just has finished drywall). We are almost positioned to initiate Phase II. Will you consider a gift to help us complete the renovations? Contact us at black_hills@wheaton.edu if you are interested in participating in ensuring that the Leedy Lodge remains a high quality community space for the Wheaton College Field Station.

KATY'S KOMMENTARY

KATY FOLTZ,
LAB MANAGER | BLACK HILLS PROGRAM MANAGER

Hello all! After a busy Spring 2023 semester with the Grand Canyon Trip, Steve's retirement party, and completing my third summer at the Black Hills, Fall 2023 and Spring 2024 semesters have felt lighter, even as the workload stays the same. I attribute that to having another year of responsibility under my belt. I am fully immersed in the role of coordinating our introductory Dynamic Earth and Environment Labs. I oversee lab scheduling, field trips, and providing materials for all six lab sections, while teaching four of those sections personally. My goal is to carry most of the workload so my fellow instructors can focus their attention on teaching their sections and other responsibilities.

Year four has brought about yet another job title for me – Lab Manager. The new title was deemed a better description for my role and has better alignment with the other science lab manager positions at the college. However, the job description remains the same, so I only had to change my nametag. I still hold the title of Black Hills Program Manager as well.

On campus, our Geology Museum is significantly shaping up, mainly through the efforts of Maureen Keil, who is a Master Naturalist with the University of Illinois Extension Department. In addition to the exhibits that Steve Moshier updated last year, Maureen created a bird exhibit that incorporates the taxidermy bird collection from the Biology Department. Several of our majors participate in the birding club on campus (the ThunderBirds), and this exhibit made them very happy. Maureen also took over many of our Perry Mastodon and museum tours for school groups. We are very thankful for her time and energy.

Other museum exhibits planned are adding a second bird exhibit featuring water birds, moving some of our fossil collection into the museum, and adding an Energy display case. The goal is to create a self-guided tour for guests. If you're visiting campus, come see these new cases in Lower Meyer!

We anticipate a robust Black Hills Summer 2024, with most of our courses close to capacity. It is a Geology Field Camp Summer, our third Sustainability Summer, and filled Biology Classes Summer! We are very excited about our incoming new coworker and look forward to welcoming him to the Station.

Because I am a typical Wheaton Type A planner, I'm already looking ahead to our next Student-Alumni Field Trip in Spring 2025. Thanks to the generosity of the Richard House Endowment, we have the funds to get creative with our potential destination and daydream with the students of where they would like to go. If you have any suggestions of where to go on future trips or are interested in joining us on this adventure, please feel free to reach out at geology@wheaton.edu.



Prof Katy and Dr. M at Devil's Lake State Park in Baraboo, WI – female geologists at work!



Maureen Keil (Nursing, '88) has been a HUGE help in the Geology Museum, leading school tours, and designing new exhibits. Here is the mostly completed taxidermy bird exhibit!

GRADUATING SENIORS 2023-2024

Environmental Science

- Fiona Balfe
- Mary Bonnell – Recipient of the John Muir Outstanding Environmental Science Senior Award
- Chloe Davis
- Esther Lam
- Emma Riley
- Megan Smoot
- Coby Young

Geology

- Ethan Paul – Recipient of the Gerald Haddock Outstanding Geology Senior Award



Congratulations to our 2024 Seniors! L to R: Ethan Paul (GEO), Dr. Kathryn Maneiro, Mary Bonnell (ES), Chloe Davis (ES), Emma Riley (ES), Megan Smoot (ES), Coby Young (ES), Esther Lam (ES), Fiona Balfe (ES), Dr. Chris Keil.

Publications

Wheaton people in bold

Gochenour, J.A., S.L. Bilek, H.B. Woo, **A.J. Luhmann**, R. Grapenthin, and J.B. Martin. 2024. Ambient seismic noise tomography within the Floridian Aquifer System, Santa Fe River-Sink Rise, Florida, U.S. *Journal of Geophysical Research: Solid Earth* 129 (5), e2023JB027644, <https://doi.org/10.1029/2023JB027644>.

Wu, Z., J.D. Simmons, S. Otu, A. Rinehart, **A. Luhmann**, J. Heath, P. Mozley, and B.S. Majumdar. 2023. Control of cement timing, mineralogy, and texture on hydro-chemo-mechanical coupling from CO₂ injection into sandstone: A synthesis. *Energies* 16 (24), 7949, <https://doi.org/10.3390/en16247949>.

Otu, S., A.J. Rinehart, **A.J. Luhmann**, J. Simmons, and P. Mozley. 2023. Effects of CO₂ on creep deformation in sandstones at carbon sequestration reservoir conditions: An experimental study. *International Journal of Greenhouse Gas Control* 129, 103970, <https://doi.org/10.1016/j.ijggc.2023.103970>.

Simmons, J.D., S. Wang, **A.J. Luhmann**, A.J. Rinehart, J.E. Heath, and B.S. Majumdar. 2023. Paragenetic controls on CO₂-fluid-rock interaction and weakening in a macroporous-dominated sandstone. *Applied Geochemistry* 156, 105744, <https://doi.org/10.1016/j.apgeochem.2023.105744>.

Woo, H.B., S.L. Bilek, J.A. Gochenour, R. Grapenthin, **A.J. Luhmann**, and J.B. Martin. 2023. Processing ambient noise data using phase cross-correlation and application toward understanding spatiotemporal environmental effects. *Journal of Geophysical Research: Earth Surface* 128 (7), e2023JF007091, <https://doi.org/10.1029/2023JF007091>.

Kavousi, A., T. Reimann, T. Wöhling, S. Birk, **A.J. Luhmann**, J. Kordilla, T. Noffz, M. Sauter, and R. Liedl. 2023. Joint inversion of groundwater flow, heat, and solute state variables: A multipurpose approach for characterization and forecast of karst systems. *Hydrogeology Journal*, <https://doi.org/10.1007/s10040-023-02631-8>.

Bilek, S.L., **A.J. Luhmann**, R. Grapenthin, H.B. Woo, and J.A. Gochenour. 2023. Capturing seismic signals from karst aquifer injection experiments and a natural recharge event. *Journal of Geophysical Research-Solid Earth* 128 (4), e2022JB025635, <https://doi.org/10.1029/2022JB025635>.

Maneiro, K.A. 2023. Teaching students how to “survive” in an introductory geology and environmental science course, In the Trenches: The News Magazine of the National Association of Geoscience Teachers (cover article), v. 13, no. 3.

Abstracts

Wheaton people in bold

Gochenour, J., C. Zeiler, S. Bilek, and **A. Luhmann**. 2024. Ambient seismic noise tomography of heterogeneous geological formations. Abstract presented at the 2024 Seismological Society of America Annual Meeting, Anchorage, AK, 29 Apr. – 3 May.

Lam, E.N., M.W. Noble, A.J. Luhmann, H.B. Woo, J.A. Gochenour, S.L. Bilek, R. Grapenthin, J.B. Martin, M.K. Flint, and M.D. Covington. 2023. Comparison of electrical conductivity and temperature datasets along a karst sink-rise flow system to infer flow dynamics. *Geological Society of America Abstracts with Programs*, Vol. 55, No. 6, Paper No. 178-7, doi: 10.1130/abs/2023AM-395595.

Luhmann, A.J., Z. Wu, J.D. Simmons, S. Otu, J.E. Heath, and A.J. Rinehart. 2023. The control of the diagenetic sequence and burial history on chemomechanical responses during CO₂ injection into sandstone. *Geological Society of America Abstracts with Programs*, Vol. 55, No. 6, Paper No. 66-10, doi: 10.1130/abs/2023AM-395329.

Maneiro, K.A. and E.F. Baxter. 2023. Detrital garnet geochronology: Challenges and opportunities. *Geological Society of America Abstracts with Programs*, Vol. 55, No. 6, Paper No. 263-1, doi: 10.1130/abs/2023AM-395746. (invited talk)

Noble, M.W., E.N. Lam, A.J. Luhmann, J.A. Gochenour, H.B. Woo, S.L. Bilek, R. Grapenthin, J.B. Martin, M.K. Flint, and M.D. Covington. 2023. Inferring hydrologic architecture from the propagation of water level signals at a karst sink-rise flow system. *Geological Society of America Abstracts with Programs*, Vol. 55, No. 6, Paper No. 178-6, doi: 10.1130/abs/2023AM-395502.



We welcomed back the Distinguished Johns Lecture Series to campus in Sept. 2023. This year's distinguished lecturer, Dr. Vince Cronin, spoke on how engineering geology can help with climate change.

WHEATON GEOSCIENTISTS ROCK AT RAMBOLL!

SARAH OSTERTAG ('17)



Sarah Ostertag (GEO '17)

As a rising senior during field camp at the Black Hills in 2016, I distinctly remember sitting on the deck with Dave ('82) and Lisa Heidlauf discussing career opportunities during one of our group dinners. Having visited several different Wheaton courses over the years, and partly through my exposure as a repeat-TA for Lisa, Dave asked me if I would ever consider a career in environmental consulting. At the time, I think I said something naive and flippant along the lines of “absolutely not.” Fast forward a year or so, I was on the tail-end of a research internship with the USGS hunting for jobs, and “Ramboll” kept coming up in my search. I sent a blast email to the Wheaton professors asking if they could connect me with the alumni that had spoken about this company; little did I recall that it was Dave! My embarrassment aside, Dave was so gracious to continue fostering my interest in environmental consulting, and ultimately, I started a position with Ramboll in December 2017.

Prior to and during my years at Ramboll, Dave successfully facilitated similar connections for several other Wheaton geology and environmental science department alumni: George “Kit” Carson ('12), Michael Davis ('12), Ian Gottschalk ('15), Sammy Mallow ('16), Sara Hahne ('17), and Andrew Margason ('20), to name a few. Our Wheaton-contingent at Ramboll currently all serve under the Environment and Health (E&H) business unit, and many of us assist with the Site Solutions and Due Diligence practice areas, performing qualitative and quantitative environmental site assessments, remediation projects, and data management tasks in various stages and regions.

Personally, my Ramboll trajectory has been slightly unusual but extremely fulfilling. Over the last 6+ years at Ramboll, I've worked in large part as a field geologist, but have also had the opportunity to gain my commercial drone pilot license and work with our Due Diligence, Litigation Support, and now Galago (High-resolution remote sensing for land restoration and biodiversity management) practices within E&H.

Working at Ramboll has given me the opportunity to bolster my skillset and gain exposure to many different applications of earth and environmental science, and Ramboll's generous support also funded the majority of my graduate studies in Earth Systems Science, which I recently completed at George Mason University in December 2023. As of February 2024, I am now a member of the Galago team in E&H serving as a geospatial analyst and drone pilot, and this new digital transformation team relies on remote sensing data along with AI mapping and data management methods to create innovative and sustainable solutions for our clients' environmental monitoring needs. It is very exciting to support a team that provides cutting-edge geospatial services for sustainability and biodiversity applications, which I like to think of as “high-tech” site solutions, building on my existing skillset.

Aside from the immense personal and professional growth I've experienced at Ramboll since my time at Wheaton, it has been a joy to collaborate with fellow members of the Wheaton contingent over the years: Sammy Mallow and I are both drone pilots and completed site surveys together in Minnesota and North Carolina; Sara Hahne and I frequently share tips and tricks with each other for various field work tasks; Andrew Margason and I automated daily and weekly PDF reports in PowerBI for an air quality monitoring project; and Kit Carson and I discuss digitalization approaches for some of Dave Heidlauf's and his projects out west, to name a few.

Overall, Ramboll has been a wonderful workplace full of a plethora of learning and collaboration opportunities with fellow Wheaton grads. Feel free to reach out to me or any other Ramboll Wheaties if you have any questions about Ramboll or environmental consulting in general.

Who doesn't love operating a weedwhacker?

Mary Bonnell (ES '24)

I had the pleasure and privilege to work as HoneyRock's Forestry and Land Management Intern this past summer (2023). Wheaton College, through HoneyRock, owns and actively manages almost 1,000 acres of land in the north woods of Wisconsin. As the fearsome director of the facilities crew, Scott Eppler heads up the management of HoneyRock's forested expanse. Scott was also my mentor as I worked closely alongside him and fell into the groove of the day-to-day upkeep and maintenance of this land on and off the main campus.

At the time of my internship, a section of forest along the trail to the well-known Black Bear campsite was undergoing a timber harvest. HoneyRock strives to manage their land with sustainability and stewardship, which is at the forefront of their care—this is shown in the ways they carefully design their timber harvesting plans over long periods of time. Plans include the intentionality of leaving large amounts of biomass and most of the bigger, more productive trees in the system to avoid the exploitation of the woods for monetary gain.

On one of my days as an intern, we joined the loggers (members of a family-owned logging company) who were working on this particular harvest at a mid-day cookout in the middle of the forest—the piercing smell of freshly cut pine mixing with the irresistible aroma of burgers sizzling on cookstoves hooked up to truck batteries.

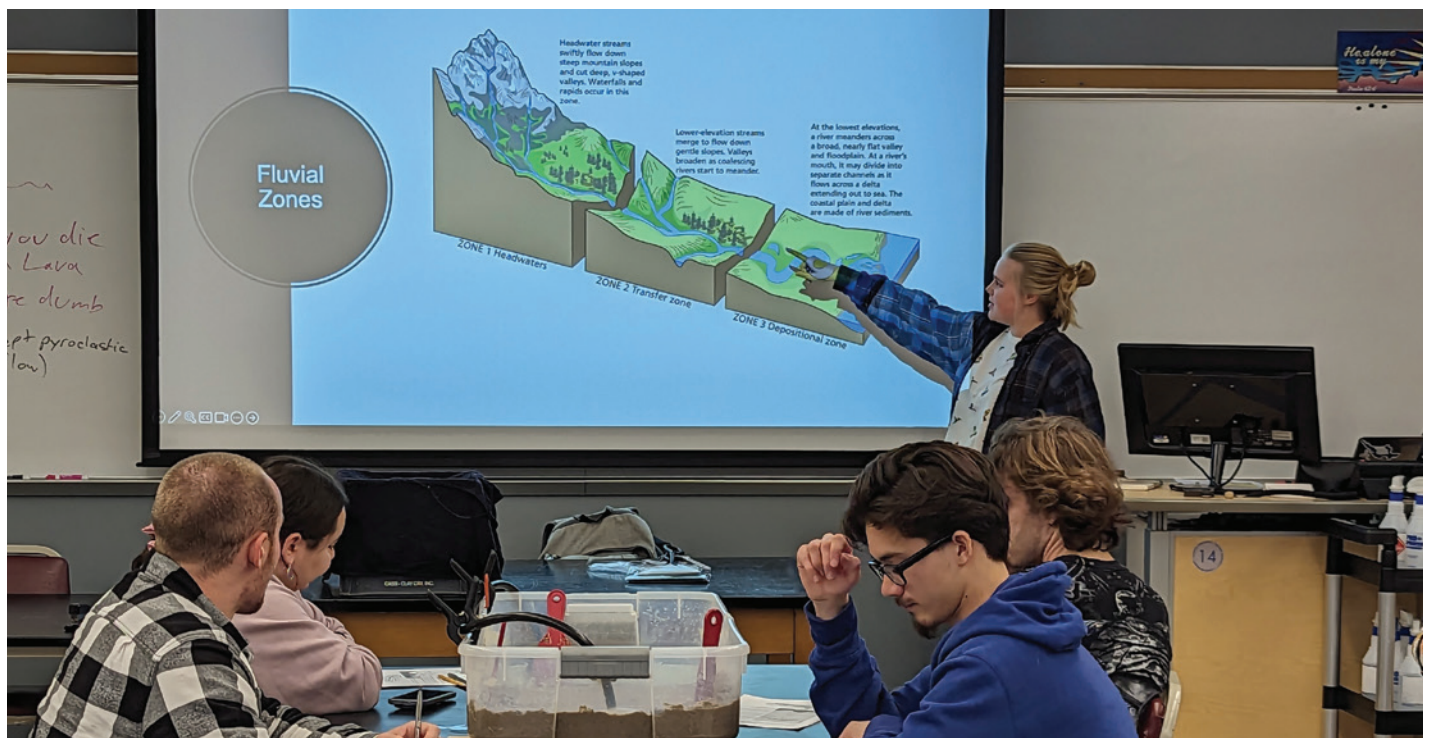
If I learned anything from my experience at HoneyRock, it was how much behind-the-scenes work and planning happens for a seemingly untouched forest, especially one that hundreds of campers and other campus visitors

make their way through over the course of the year. Many of my days were spent on a UTV, navigating through trail systems not only to clear paths from fallen trees with my newly acquired chainsaw safety certification, but also to identify potentially hazardous trees and update faded trail markers with a dash of spray paint.

When I wasn't traversing the larger expanse of HR's land, I was on the main campus as a grounds crew member. We completed many projects large and small—from mowing the front lawn to providing landscaping complete with a split-rail fence to the brand new riflery range.

I was also thankful for the opportunity to be assigned two to four high school students for a few weeks at a time to pour into as we worked alongside one another. It was an enriching experience for both the high-schoolers and myself, as I had to learn how to include less equipped (and maybe less motivated) individuals in the tasks we were assigned. I learned that even if it takes longer and the job may be one degree less perfect than originally planned, grander things could be accomplished over time, and smiles would be bigger at the end of the day because who *doesn't* love operating a weedwhacker?!

As I reach the end of my senior year here in the department of Earth and Environmental Science, I'm grateful not only for the technical skills I've learned in our rigorous program, but also for the important lessons in teamwork and leadership that I've gained that will benefit me in any job that comes my way. (Please send jobs my way!)



We love when TA's step up to teach a lab! Here is Mary Bonnell (ES '24) teaching Intro students about stream channel development.

Study abroad—the natural way

Emma Riley (ES '24)

During the fall semester of 2022, I participated in a study abroad program in Thailand through the International Sustainable Development Studies Institute (ISDSI). The Sustainable Development Studies program I participated in lasted four months and was based in the beautiful city of Chiang Mai, where the ISDSI campus is located. Classes were split into four blocks, and each block lasted four weeks.

The first block class was called “Historical and Political Contexts of Thailand.” In the morning, my classmates and I had three hours of Thai language class on campus and then three hours of Historical and Political Contexts class in the afternoon. Six hours of class a day was tiring, but it was broken up by lots of fun and interesting field trips. Some of my favorites included a Thai cooking class, a visit to an elephant sanctuary, and a Q and A session with a Buddhist monk! During the first block, I learned a ton about Thai history, culture, traditions, and how they came to be.

The second class block and first field course was called “Sustainable Food Systems.” We did homestays in a village called Don Jiang that was known for its organic farming co-op. My classmates and I helped our host parents tend and harvest their home gardens and went with them to an organic farmer’s market to help them sell their produce! During this field block, we also learned about organic pesticides, herbicides, soil health, and cash crops such as coffee, cannabis, and cocoa.

My third class block and second field course was on oceans, reefs, and mangroves in the Andaman Sea. My class flew from northern Chiang Mai to the Andaman Sea off the Malay peninsula of Thailand. We started the field block doing homestays in a Muslim fishing village called Motanoi. We learned all about subsistence fishing, boat building, and the health of ocean, coral reef, and mangrove ecosystems. We also got the chance to snorkel in pristine coral reefs not far from the village!

For the second half of this field block, we went ocean kayaking and camping from island to island in the Adang Archipelago. We had a really special chance to talk to members of a local people group called the Urak Lawoi, who were historically a nomadic people who sailed freely from island to island. Unfortunately, they have faced persecution and have been forced to give up their nomadic lifestyle for the most part. It was really powerful to hear their stories and get the chance to see what their lifestyle was once like through ocean kayaking. It was physically and mentally challenging but incredibly rewarding.



Emma Riley (ES '24) holding sea stars in the Andaman Sea.

Our final class focused on forests in Thailand. We traveled northwest to the Mae Hong Son province and spent our last few weeks in Thailand backpacking from village to village. We conducted homestays along the way and learned about tons of interesting things from the biodiversity of rainforests to rotational agriculture and polyculture to traditional textile weaving and blacksmithing. We stayed at a total of six villages, each varying in distance from the city, religion, and primary occupation. We had the chance at each village to ask the village elders questions about anything we were curious about and participate in traditional music and dance.

I really appreciated my time being a student through ISDSI. The program offered me and my classmates unforgettable experiences and rich perspectives on Thai culture and communities that I couldn't have gotten any other way!

A summer of pseudotachylyte microanalysis and exploration

Samuel Dunbar (GEO '25)

When I first applied to Arctic REU (Research Experiences for Undergraduates) Greenland, I thought, like the name suggests, that I was going to Greenland to perform field geology in the Ikertôq Shear Zone on pseudotachylytes (friction melt rocks formed by earthquakes). Due to a lack of funding, however, the REU would instead have a smaller cohort working domestically. Instead of Greenland, our REU traveled through West Virginia, Virginia, Colorado, and Montana, with a one day stop at Yellowstone. Throughout my research experience, I was advised by Dr. Joseph Allen from Concord University and Dr. Colin Shaw from Montana State University (MSU). I am deeply indebted to my advisers and to the others who made this REU possible.

Our first two weeks were spent in Athens, West Virginia living and working out of Concord University's campus. Every day we drove to Virginia Tech's NanoEarth facility to use their machines. I was introduced to many expensive and complicated microanalysis machines that broadened my horizons of geological investigation. The cohort were all taught how to use the SEM (scanning electron microscope) and began searching through thin sections of pseudotachylyte collected a previous year. We performed EDS (energy dispersive x-ray spectroscopy) on thin sections to get preliminary data on elemental composition and minerals present.

During the second week in the Virginias, we worked with an electron microprobe. Dr. Steven Kuehn from Concord University taught us how to use the machine and perform EPMA (electron probe microanalysis) to analyze trace elements in the samples. Our time in the Virginias was not all work, however. On weekends we went hiking in nearby state parks and at New River Gorge with a couple geology stops as well. Almost every dinner we ate came from Moe's Restaurant & Café, so if you're ever in Athens, West Virginia, try it out. During this time, we also celebrated July Fourth with Dr. Allen and his family.

After performing microanalysis for so long, our brains needed a macro break, so we flew to Colorado to begin field work in the Homestake Shear Zone. We would spend a day at an outcrop mapping pseudotachylytes so we knew how to identify them in the field. We were also given time to explore, taught how to use a Brunton, and taught how to take detailed field notes. Leadville took my breath away quite literally (from the altitude) and figuratively with its beautiful views and amazing geology. After Leadville, we drove to Montana to finish up our program.

The last three weeks of our program we stayed at Montana State University, continued our research, and enjoyed their delicious dining hall. I decided to study the mineralogy of amygdules in the pseudotachylytes as my individual project. MSU's nanotechnology facility (MONT) was outfitted with an SEM capable of doing EBSD (electron backscatter diffraction) which enabled us to study the mineralogy and crystallography of the amygdules. I analyzed my data, compiled it in a poster and a presentation, and then delivered both during the NNCI (National Nanotechnology Coordinated Infrastructure) Convocation at MSU.

My research experience last summer enabled me to grow in new ways I didn't think were possible. I learned how to collaboratively work with non-Christians, how to perform research by myself, and how to present that research to others in an engaging manner. It also initiated a deeper interest in structural geology and research, gave me necessary field experience, and made me some new friends. Despite not going to Greenland as I had hoped, traveling the United States and performing microanalysis was still an amazing and fruitful experience that I would happily repeat.



Arctic REU 2023 cohort happily standing with a piece of pseudotachylyte. From left to right: Caroline Kenney (William and Mary University), Paola Berrios (James Madison University), Samuel Dunbar (Wheaton College), Alana Green (James Madison University).

WELCOME, DR. BOLTON HOWES!

We are excited to welcome Dr. Bolton Howes to the Wheaton College Department of Earth and Environmental Science as Field Station Director and Assistant Professor of Geology! Dr. Howes has a PhD in Geosciences from Princeton University, an MS in Geology from the University of Georgia, and a BA in Geology from Macalester College.

Dr. Howes is a sedimentary geologist, with abundant field experience in North American and international locales. His dissertation research focused on ooids and how these grains are important indicators of ancient seawater chemistry and for paleoenvironmental interpretation. He just completed a one-year postdoctoral research position at the University of Miami exploring natural hazard risks using paleoclimatology and remote sensing, and he is just beginning as an NSF Postdoctoral Fellow at the University of Washington, where he will be exploring PETM fluvial records to understand the impact of climate change on fluvial migration in modern environments and the rock record.

Dr. Howes will officially begin working at Wheaton in August 2025.



Dr. Bolton Howes will be joining the department as Field Station Director and Assistant Professor of Geology!

GIVING TO THE DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCE

Anyone wishing to give to the ongoing work of the Department is invited to consider donating to any of the listed funds. Please clearly indicate the fund or funds for which your gift is designated. Many employers match gifts. We thank you for your consideration.

1. Boardman Black Hills

Scholarship - An endowed fund providing scholarships for geology majors attending our field course in the Black Hills.

2. Geology Major Scholarship

- An endowed fund providing financial aid for geology majors.

3. Jeffrey Greenberg and James Clark Endowed Research Fund

- Promoting faculty-student research, such as expenses primarily related to collaborative geoscience research, or interdisciplinary research, for undergraduate geology or environmental science majors, including conference costs for students who have been selected to represent Wheaton College at professional conferences to present their findings.

4. Dr. Stephen O. Moshier Endowment Fund

- Provides funds to promote the visibility of the geology program on campus and support alumni engagement with students. A generous donor has already committed \$50K with the hope of it being matched to celebrate the retirement of Dr. Stephen Moshier.

5. Department Equipment and Lab Renovation Funds

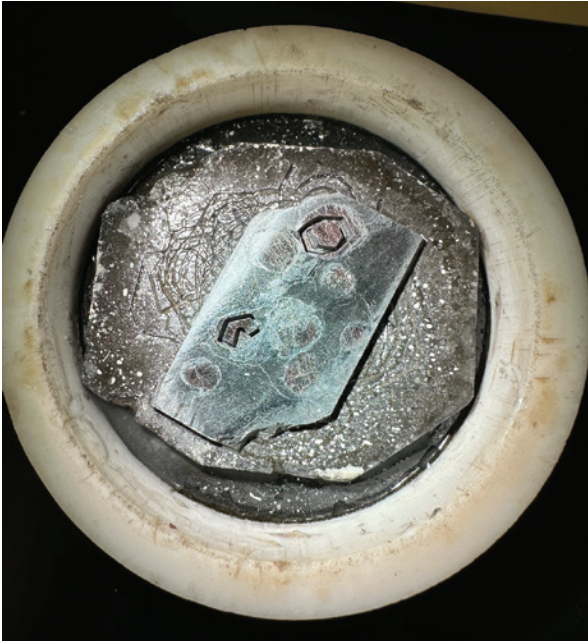
- Funds used to purchase, update, and maintain research equipment in the department. There is also a need for start-up funds to support new faculty members and lab space renovations.



So excited about structural geology!



Dr. Luhmann and the Geomorphology class enjoying the sunset at Lake Michigan.



Drilling what might be one of the oldest garnets in the world!



The Geo Gals at Prof Katy's house for a movie night.



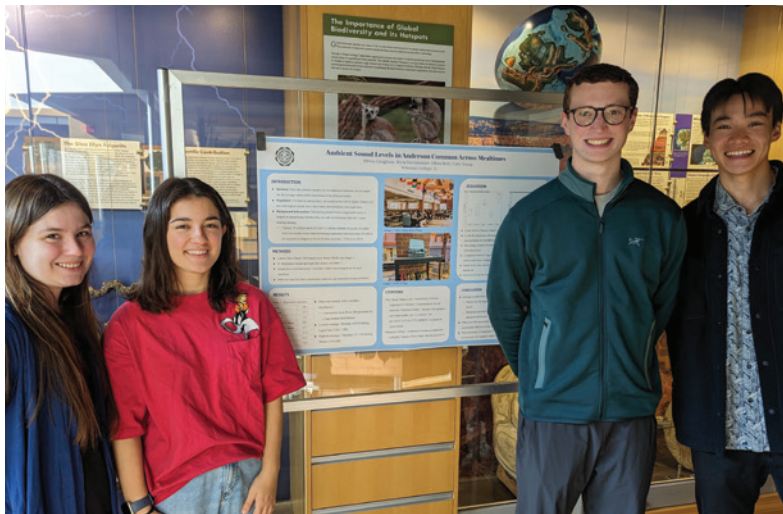
Prof Katy leading an intro field trip at Matthiessen State Park.



Dr. Maneiro with her cheering squad after receiving her well-deserved Junior Faculty Achievement Award at Wheaton's Honors Convocation Chapel.



There has been a lot of restoration work done on Perry's tusks this year, including reassembling some pieces recently found in the back of the Dirty Lab.



(L to R) Myra Davidsmeier (ES '25), Olivia Creighton (ES and COMP SCI '26), Ethan Roth (ES and BUS/ECON '25), and Coby Young (ES '24) showing off their poster from the Quantitative Methods for Environmental Analysis and Problem Solving class.



Igneous and Metamorphic Petrology students having fun at Elephant Rock State Park in Missouri.



Dr. Luhmann and Meg Noble (GEO '25) on a field trip while attending the Arkansas Field Workshop of the Carbonate Critical Zone Research Coordination Network.



We enjoyed the early morning view of the Pittsburgh skyline from Mount Washington on the last day of the 2023 GSA annual meeting.



Black Hills Homecoming breakfast – (L to R) Judith Riley ('92), Christopher Williams ('93), Chad Smith ('93), Kyle Arney ('93), and Doc Mo.



Dr. Maneiro helping Matthew Stoner (GEO '26) and Kathryn Skinner (GEO & BIO '25) with their Brunton compasses.



Emma Riley (ES '24) sharing at Donut Time about her semester at the International Sustainable Development Studies Institute.



With students leading the charge, this is our 3rd year with a department IM soccer team.



Ruth Rendall (ES '25) and Carson Frear (GEO '26) helping lead an elementary school tour of the museum.