

MACALESTER GEOLOGY

FALL 2024 NEWSLETTER



GREETINGS FROM THE CHAIR!

Alan Chapman

The Geology Department is excited to be embarking on a new adventure, in the form of the 2024-2025 academic year! It's been a while since our last newsletter (2021!), so let me share with you what we've been up to!

"First" off, I have to begin with how excited we were – back in 2022 - to hire Dr. Emily First as an Assistant Professor and our new mineralogy/petrology expert. We are obviously still very excited to have Emily as a friend and colleague in the Geology Department. Emily specializes in experimental petrology – literally making her own rocks! – to better understand igneous processes that occur in the wild. Emily's work is not constrained by this planet, however, and often finds herself looking at lunar samples and considering how basaltic planets outside of this solar system might appear in telescopes – far out! Emily brought a couple of additional gifts when she moved to St. Paul – her husband and fellow volcanologist Benoît Welsch and their son Gabe. Ben does fascinating work on how, and over what timescales, crystals (primarily olivine and clinopyroxene) grow along ridges, volcanic arcs, hotspots, and on other planets! Ben was recently appointed as a Visiting Faculty member and will put his teaching hat on for the first time this fall. I'll hit pause there and allow Emily and Ben to tell you more about themselves on one of the following pages.



The last academic year wrapped up with our six seniors (Eunice Choi, Caitlin Compton, Mikayla Giehler, Sarah Henderson, Maggie Morgan, and Holiday O'Bryan) presenting their fascinating Senior Thesis/Capstone research and graduating. At the same time, our Department Coordinator Kristine Spangard retired (many thanks for your nearly 18 years of service) and Rennie DiCarlo completed her stint as our inaugural Post-Baccalaureate worker!

The latter position was made possible, in perpetuity, by a generous endowment by Dr. Rolland Oberg ('60). The main goal of this position is to offer a bridge connecting a recent alum's Macalester career with their post-graduate work. During her time as our first Oberg Postbac, Rennie assisted with teaching lab sections, coordinated field trip logistics, offered one-on-one tutoring of students, organizing our collections, facilitating faculty research, and working on her own professional development. We continue to imagine what is possible with this fantastic new resource and look forward to many years of partnership with future workers.



Over the summer, we welcomed Kate Anders as our new Department Coordinator and Riley Waters as our new Oberg Postbac. After a busy August, Kate is fully up to speed and is already deftly and skillfully completing the variety of tasks needed in her role. We are very excited to continue working with her. Similarly, Riley is off to the races in her Postbac role, assisting with field trip logistics, organizing “crash courses” in various topics, getting trained in on department facilities, organizing department collections, and looking into potential graduate schools.

I'll allow Ray, Kristi, Emily, Ben, Kelly, and Jeff to tell you their own stories, but in short the summer of 2024 was full of personal and professional adventure for us all. For myself, this involved supervising four research students on projects ranging from determining the timing of underthrusting of subduction-related rocks in northern California to clarifying the mechanisms of Devonian mountain building in the Arctic (Svalbard). Funding for these projects came from the National Science Foundation as well as Webers and Oberg endowed funds. Running-related adventures included setting a personal best at Grandma’s Marathon this June, running the length of Isle Royale (though I failed to set the fastest known time – maybe next time), and will soon tackle the Hennepin Hundred. When I’m not geologizing or running you can find me hanging out with my wife Kelly and middle schoolers Gabriel and Jake.

This academic year begins with Emily teaching her first FYC, “Dynamic Earth and Global Change,” as well as “Mineralogy.” Kelly is teaching a large-enrollment version of Dynamic plus Geomorphology before she begins a well-earned sabbatical this spring. Jeff will once again teach the lab sections of Dynamic, with assistance from Riley. Ben will teach his first class at Macalester, “Analytical Methods,” this fall – a new upper-level course offering! Ray and Kristi are co-teaching another new offering, “Origins and Extinctions: Rocks & Life in Deep Time.” To round out our fall offerings, I'll teach my upper-level elective “Tectonics” course.

Please read on for the latest news from my friends and colleagues!

Happy trails,
Alan



Dave Bailey is a shared talent for the sciences in Olin-Rice. He invents, builds, and improves on all manner of things in the Ken Moffett Machine Shop. This fall Tectonics students got a chance to see his latest creation in action. A new wax tank modeling tool uses a paddle to push through wax, producing simulated faults, convergent and divergent plate boundaries, and even the neat transform faults pictured above.



Student's in Emily's Mineralogy course got a special treat on their October 2024 fieldtrip to Minnesota's north shore. Epic aurora borealis stole the show from their cabins at Spirit Mountain above Duluth.

Hello from Emily First

Hi y'all! Since arriving at Macalester, I've been slowly setting up my research lab and diving into all sorts of interesting courses: Mineralogy, Petrology, a new course I designed called Volcanoes, and this semester I'm trying my hand at a First-Year version of our intro course Dynamic Earth and Global Change. This year I'm advising three thesis projects, on spinel lherzolites from Earth's mantle (Gustavo Marchant Allende '25), colorful anorthosites from Duluth, MN (Matthew Flowers '25), and volcanic tephra from Heimaey, Iceland (Alex Parr '25).

When not dashing around to finish lecture slides, put together labs, or design projects, I work on research related to my favorite topics: volcanoes and space! I've recently had a paper accepted in Nature Astronomy, in which co-authors and I analyzed basaltic rocks from Earth and modeled how they might appear to the James Webb Space Telescope if they were observed on an exoplanet surface. My current work involves analyzing thin sections of lunar volcanic material that was collected by Apollo 17 astronauts in 1972. Ben Welsch (husband and colleague!), Mac student Gustavo Marchant Allende, Jen Mitchell (UMN), and I have been looking at the detailed shapes and chemical compositions of crystals in these samples to learn more about what was going on in magma beneath the Moon's surface about 3.5 billion years ago.



Emily holding a chunk of the Moon (a lunar meteorite, not an Apollo sample), during a break in one of her analytical sessions at the University of MN over the summer.



Students in Emily and Jeff's First-Year Course setting up tents at Bear Head Lake State Park during their class field trip in October

My lab is coming along slowly, but I'm incredibly happy with the equipment I've gotten so far. My research microscope has dreamy optics and powerful software that make thin section observations a true joy. Thanks to a grant I received from the Heising-Simons Foundation, I've also purchased a heating stage, which will allow Ben and I to watch crystals grow from magma in real time, under the microscope.

I'm excited to continue into this next year at Macalester in a department that I LOVE and feel so grateful to be a part of. It is inspiring to see how my colleagues support our students, excel in their respective fields, and always make time to chat about a teaching conundrum or go for a quick walk to get coffee. The pretty rocks and minerals I get to admire each day are the cherry on top!



*Glacier National
Park, Montana*

News from Kelly MacGregor

This past summer was a busy one! In June and July I led six students on a Keck Geology Research Experience for Undergraduates, a five-week long program designed to provide a glimpse into how research works. We spent several weeks collecting lake sediment cores in Glacier National Park, Montana, and then two weeks at the Continental Scientific Drilling laboratory at the University of Minnesota. The project concluded with a presentation of our findings at the national Geological Society of America meeting at the end of September in Anaheim, California. Woo hoo!

I was lucky to be a faculty leader on a Macalester Alumni trip to Scotland in August, and got to see some amazing landscapes - lots of ancient volcanoes with castles adorning their peaks, and glaciated landforms (drumlins! glacially-carved lochs!) everywhere. A huge thank you to the group of alumni that got to hear more about geology than they probably wanted to.....we were also able to watch the Macalester Pipe Band compete in the World Pipe Band Championships in Glasgow at the end of the tour, and catch glimpses of our new mascot (the Highland Cow) in real life!

I still enjoy reading novels, hanging out in my garden (working to transform my yard from turf grass to a bee-friendly landscape), and getting in some exercise (I did a fun 10-mile race in the spring). Both of my kids graduated this spring; one from college (a geology major at Colorado College) and the other from high school - my son just started at Macalester this fall! I miss so many of you and would love to hear how you are doing!



In April 2024, Emily and Jeff took students from the Petrology & Geochemistry class on a fieldtrip to Quarry Park and a Martin Marietta Aggregate Quarry near St Cloud, MN. They had the pleasure of sharing the adventures with, and learning from, Terry Boerboom, a retired MN Geo Survey scientist.

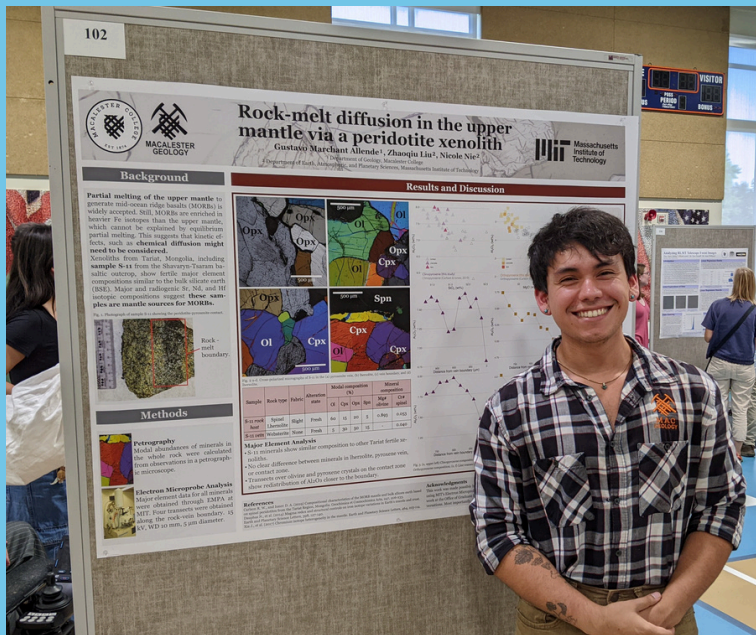
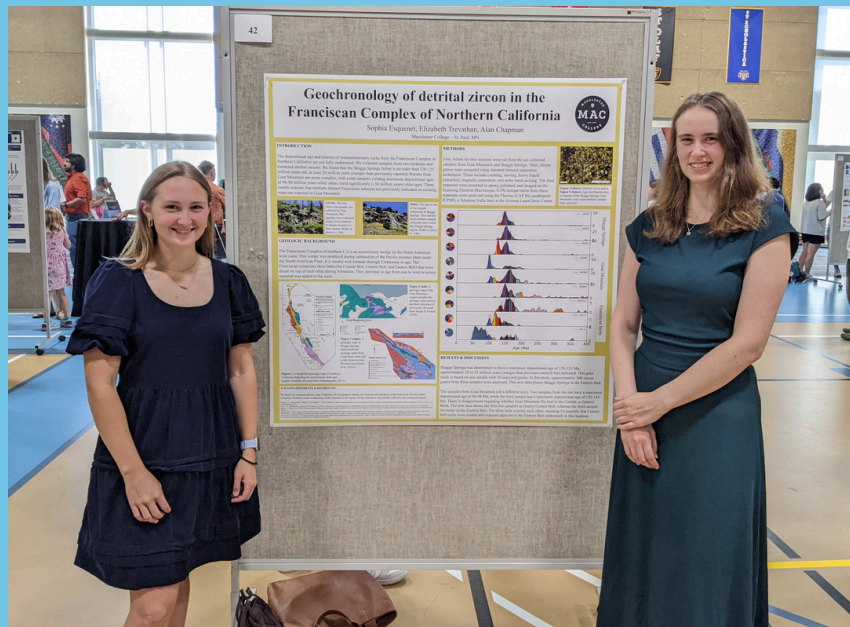
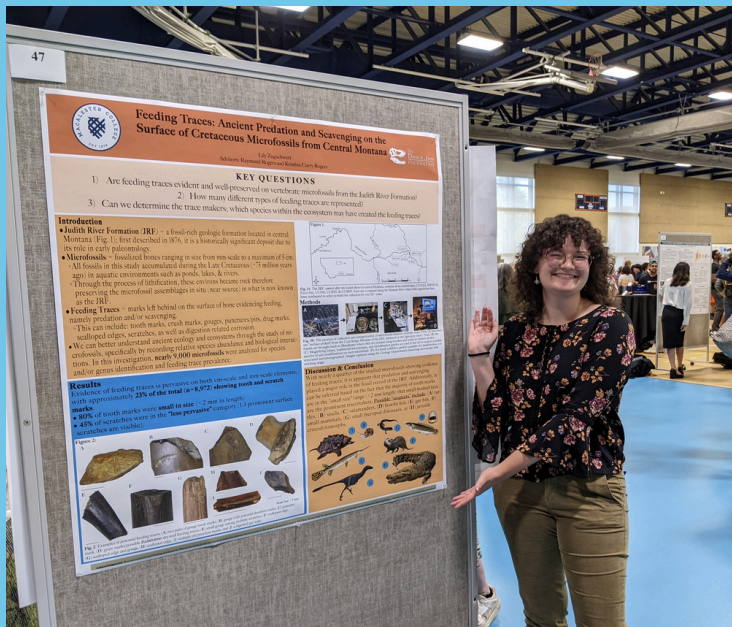


Note from Benoit Welsch

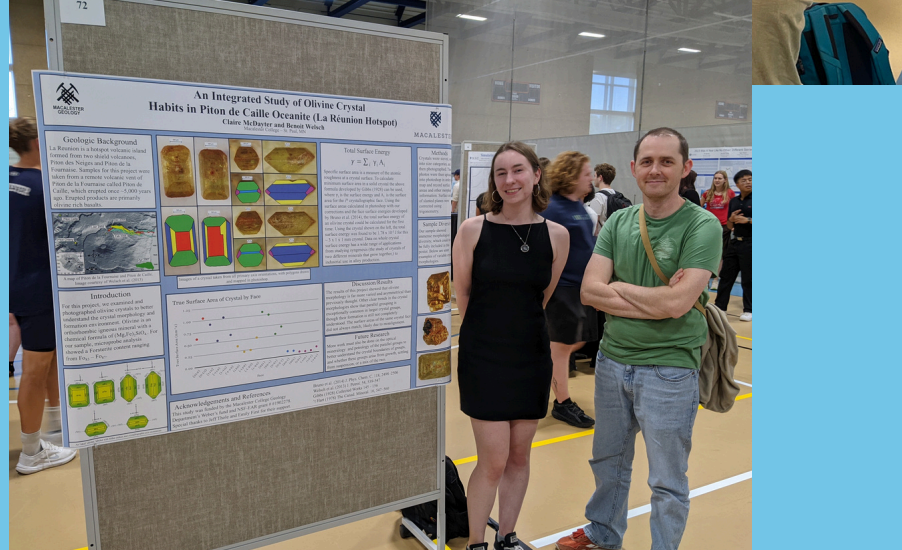
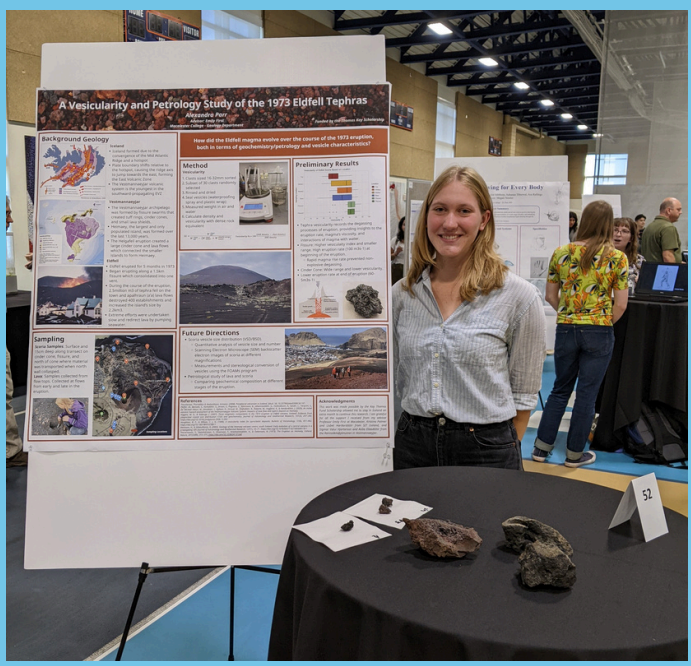
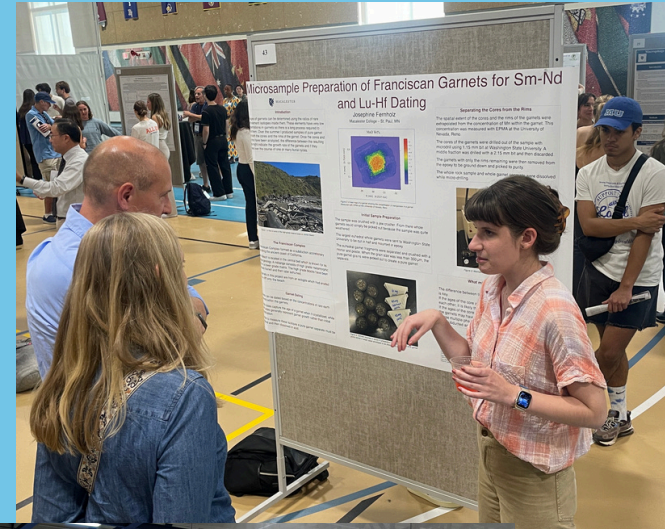
It has been already almost 2 years that Emily and I have been at Mac now, adapting to the Minnesotan world, grinding through classes and research. And it just feels like home. It has been really a privilege to get to know everyone a bit every day, and have our little family warmly welcomed by the whole department. As we got settled, I was able to finally publish a long-awaited article on olivine growth rates in *Journal of Petrology*, and present these results at the annual Geological Society of America (GSA) meeting of 2023.

And perhaps a once in a lifetime thing, Emily and I had the opportunity to be guest editors, together, of the special issue on olivine in the magazine *Elements*, writing / co-writing 3 of the 6 chapters published in this issue. Since then, I've been working on new original research, writing a proposal, and participating in one of the Mineralogy class field trips on the North Shore. No time for a break.

This past summer I started to work with senior Claire McDayter on a research project that is now growing into a senior thesis. Claire has been charged to unearth samples from my PhD and bring new life into them. She has already done an amazing job collecting data and making new observations. She hasn't disproved all my theories yet, but she's getting there... And this fall, I've been upgraded to Visiting Assistant Professor to offer some new upper level class options, including Analytical Methods Geol 394 this fall, and possibly Crystallization Processes in spring 2025. Fall is on us, winter is coming, it is for me the best time of the year!



(clockwise from lower left) Students Alex Parr, Gustavo Merchant Allende, Lily Zugschwert, Elizabeth Trevathan, Sophia Esquet, Josephine Fernholz, and Claire McDayter (pictured with Ben Welsch) shared their research with visitors for Mac Fest in September 2024.



Updates from Kristi Curry Rogers

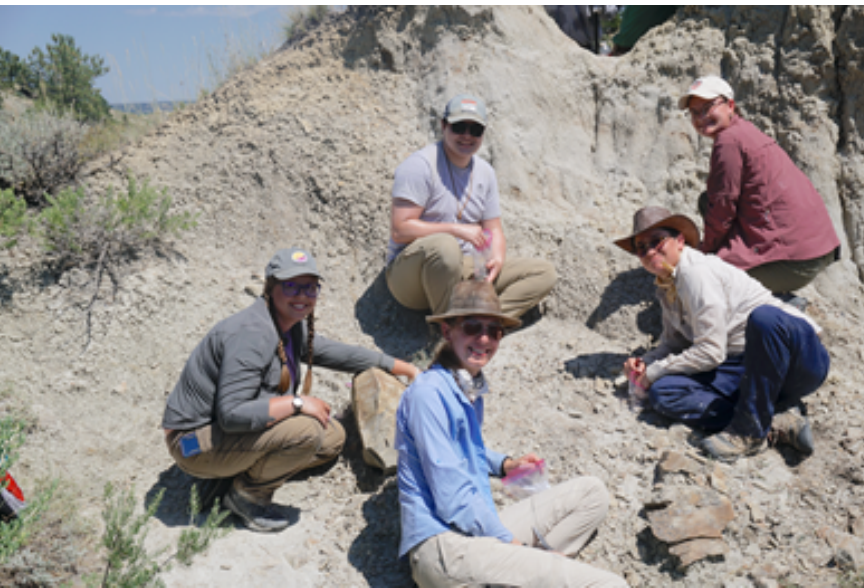
Hi Everyone! I had a great summer doing research on Cretaceous vertebrates all over the western US, with the help of both Macalester alums and current students. Summer kicked off with a lengthy visit to the Denver Museum of Nature and Science, where I worked on studying variation in postcranial elements of titanosaurs from Madagascar. It was especially fun because I got to intersect with the “Macalester Mafia” at DMNS -Sierra Swenson '17 was instrumental in helping me make progress in my collections based research, and it was so fun to connect with Julia Ricks '22, who's been working at the DMNS in education for the last couple years. We missed Brooke Noonan '23, but heard amazing things about how great she is doing with preparation, CT scanning, and segmenting!

From there, I headed to Central Montana with Ray, back to our old stomping grounds in the Upper Missouri River Breaks National Monument. Instead of working down in the valleys, this summer we spent most of our time “up top” in the shales, where we explored a new site that yielded a plesiosaur. Two current students, Lily Zugschwert and Marisa “Zuul” Luft ('25), and of course...Jeff all joined in on the fun. Too bad the new Mac Mascot is a Highland Cow - turns out we could have had a real-life Loch Ness Monster! While we were in Montana we connected with crews and colleagues from the University of Georgia, Penn State, the Bureau of Land Management, the Museum of the Rockies, the Science Museum of Minnesota, Colorado College, Brigham Young University, and the University of Washington.

Summer was also full of fun - Ray and I worked on our ongoing construction project out near the Rocky Mountain front in August Montana (we're building a shipping container cabin). We got tons of fly-fishing in (I finally have the cast down and can actually catch fish), a couple fun rodeos, and we were lucky to end the summer with back to back concerts in Missoula MT (Pearl Jam and Tyler Childers) (shout out to alum Adam Johnson '97, who we randomly ran into on Higgins Ave!).

Now that we are back in the swing of things, those of you who took the Ray/Kristi team-taught “Episodes in the History of Life” class way back in spring of 2008 will be interested to learn that we are trying another team-taught course. This time around it's called “Origins/Extinctions.” So far we haven't killed each other (even though all the folks who were around back in 2008 are placing bets about whether or not our marriage will survive!). This class is proving to be super-fun, especially because so many of our fantastic paleo-focused alums are zooming in to share their work with our students. Thanks Rachel, Brady, and Josh!

Finally, during this year's annual meeting of the Society of Vertebrate Paleontology conference (happening in Minneapolis at the end of October), I'll be assuming the role of Vice President! I was elected in August, and will start my 6-year term (two years as VP, 2 as president, and 2 years as past president) in the coming weeks. Wish me luck!



*Collecting
microfossils in
Montana (left)
and dino bones
at the Denver
Museum of
Nature and
Science (right)*



Brief from Ray Rogers

It has been a busy few years since the last newsletter...where to begin? I will start with some memories from a much needed (and appreciated) sabbatical during the 2022-2023 school year. Kristi and I had many wonderful experiences during our joint sabbatical, including (1) attending the 6th International Palaeontological Congress in Khon Kaen, Thailand, (2) conducting fieldwork in the Triassic of Argentina with friends and colleagues at the Universidad Nacional de San Juan (it was wonderful to get back to the Valle de la Luna and the Ischigualasto Formation), (3) attending the International Association of Sedimentologists meeting in Dubrovnik, Croatia, and (4) exploring the Grand Canyon (and general Flagstaff region) with Lucy, who is now a senior geology major at Colorado College.

This past year (2023-2024) I shifted back to my usual routine, and I taught Paleobiology (go Rockford!), a first-year version of History and Evolution of Earth (6 new majors), Sedimentology and Stratigraphy (some of you must remember those relaxing point counts during MSP), and the standard version of History and Evolution of Earth (we had some truly awesome time scale metaphors this time around!). It was great to be back in the classroom, and it has been wonderful working alongside my new colleagues Emily and Ben.

Things have also been exciting on the research front. The “Campanian Campaign” (a multi-institution project aimed at getting new high-precision U-Pb ages for the dinosaur-bearing rocks of Campanian age in the Western Interior) finally came to fruition. Three new articles packed with new ages and interpretations of the Two Medicine and Judith River Formations (one in Scientific Reports, two in GSA Bulletin – check out the Judith on the cover!) were published in 2023 and 2024 (several of you likely did your theses on these units). Currently, I am working with senior Lily Zugschwert on modifications on tiny bones from the Judith River Formation (Kristi and I recently published an



*Ray and Lucy in the Grand Canyon,
March 2023*



*Ray's History and Evolution of Earth class
investigating an outcrop near Winona, MN
April 2024*

article in Scientific American that focuses on these tiny bones) and wrapping up a book on the “Dinosaurs of Montana” with Jack Horner. This past summer (2024) Kristi and I continued our work in the Upper Missouri Breaks with two students, and we discovered and began excavating a large plesiosaur from the Bearpaw Formation (we found the mascot that should have been...).

And finally, Kristi and I are currently co-teaching for the first time in 16 years (some of you might remember “Episodes in the History of Life” from 2008). We are teaching a course entitled “Origins and Extinctions: Rocks and Life in Deep Time.” We are loving it (and sharing it), and I look forward to doing it again in a year or two.

Enough for now – take care and keep in touch!



(above) Emerald Thole showing off pollen pics at Dunn Bros., St Paul, MN and (left) Jeff standing in the Arctic Ocean

Hi from Jeff Thole

Greetings from St. Paul after our record-setting warm September. We are just starting to have a few crisp mornings and the frost has just returned with yet another warmup expected soon. The fun for me continues into my 28th year and it has been a real joy to welcome our new colleagues Emily, Ben, Kate and Riley. The "buckets" once needed to put out the department fires are now, thankfully, much smaller.

Life in the classroom, lab and field continue with great students and interesting projects for both student/faculty research and personal interest. On the personal interest side, my daughter (Emerald) and I were fortunate to display a collection of pollen images at our local Dunn Bros. coffee shop across from campus (currently still on display). The pollen was collected in our yard years ago and we acquired the SEM images during the summer of 2023. That summer also included a fabulous birding trip to Alaska. My friend Todd (pilot for Air Arctic) and I drove from Fairbanks to Dead Horse in June. I saw nearly 90 species on this trip and 34 were "lififers" for me.

I hope to see some of you at the upcoming SVP meeting in Minneapolis and I also hope to make it to GSA next year in San Antonio. Stay in touch and swing by if you happen to make it to the Twin Cities.



The Judith River Formation scored the cover of GSA Bulletin thanks to the photo-wizardry of Jeff Thole!

What is a geology department newsletter without puns...



We received this message and photo (above) from MaTina Clark, Assistant Registrar at Wartburg College in Iowa shortly after the GeoClub hosted a weekend camping trip:

Good afternoon,

I am the assistant Scoutmaster for Troop 1026 in Allison and Greene, Iowa. This past Saturday, we were camping at Tosanak in Marble Rock, Iowa, and a group of your geology majors camped near us. As we were talking, I mentioned the geology merit badge and how neat it would be for the students to teach that information to our Scouts. A few minutes later, two of the students approached me with an outline of information to complete the merit badge. Three of your students then presented the information to our Scouts.

I am sorry that I do not remember their names (photo included), but I wanted to let you know how awesome they were! Their knowledge and passion for their subject was contagious! I hope you will share our sincere appreciation for their kindness and help in completing the geology merit badge!

Sincerely, MaTina Clark

Note from Karl Wirth

It's hard to believe I'm entering the final year of my four-year phased retirement, and while my schedule hasn't slowed much, I'm curious to see what this next chapter will bring. As Co-Director of the Keck Geology Consortium, most of my professional attention has been focused on our exciting Research Experiences for Undergraduates (REU) program. This year, we worked with 39 students across five projects, including one in Belize that I co-directed with Lisa Greer (Washington and Lee University). Ava ver Ploeg (Macalester '27) joined the Belize project and impressed us with her diving skills and scientific insights as we studied the health of endangered corals. We just returned from Anaheim California where she presented the results of our research on sea-surface temperatures during the 2023 heating event. This work built on recent studies in northern Belize that resulted in a co-authored paper in PLoS ONE and the publication of underwater photographs in an article in BioGraphic during 2023.

Alongside my work with Keck REU, I've continued reflecting on teaching and learning and I often miss having opportunities to work with students in the classroom, laboratory, and in the field. I'm particularly excited about AI's potential to enhance metacognition and self-directed learning, offering new pathways for students to take ownership of their educational journey. These interests culminated in a keynote presentation at a conference on self-directed learning in South Africa in late 2023 followed by workshops at several universities. As part of my work with the Keck REU, I have also been co-developing a handbook that introduces students to the "hidden curriculum" of undergraduate research.

Outside of work, I've been spending more time enjoying two of my passions—scuba diving and birdwatching—near our new home in Cozumel. I recently earned a Level 3 Fish ID Surveyor certification for the Caribbean region, and I've been conducting regular surveys for Reef.org, contributing to vital citizen-science data on global change. I've also begun studying local birdlife, including a project on an unreported foraging behavior among Great-tailed Grackles and another tracking the growth of a Northern Potoo nestling using photogrammetry. As I enter the final year of phased retirement, I'm eager to see how these projects continue to develop and look forward to discovering new ways to balance my passions for both research and personal exploration.

Karl exploring a reef with students in Northern Belize





Welcoming our new Postbaccalaureate Department Assistant!

Riley Waters is the new Postbaccalaureate Department Assistant! They are back at Macalester after graduating in May of 2022 with a chemistry major and geology and biology minors. After graduating Riley completed a fellowship at Eagle Bluff Environmental Learning Center, teaching outdoor school and taking graduate classes on pedagogy and the natural history of the Driftless region. Riley moved back to Minneapolis August of 2023 and worked for a soil drilling company over the fall and winter and the Gulliver Group at St. Anthony Falls Lab over the 2024 summer. They organize and prepare class and research materials, run instrumentation housed in the Keck Laboratory, assisting in lab instruction, and maintaining the field work gear room. Riley is looking to improve their technical skills and go to graduate school for hydrology and pollution dynamics.

Ray's History and Evolution of Earth fieldtrip in April (above). Riley showing off a turkey vulture at Eagle Bluff (below) and Setting up water level sensors in a rain garden in Minneapolis (lower left)



SPECIAL THANKS

Generous gifts over the past year from alums and department friends help make it possible for us to take good care of our students, especially in relation to support for collaborative summer research and field camp opportunities. We thank Rollie Oberg ('60), Mary Anderson, John and Jennifer Maloney ('92), Lili Sandler and Zeb Page ('99), John and Carol Larson ('68), Dr. Yoshisuke Kumano ('78), Katja McKiernan ('18), Jessie Shields ('15), Josephine Fernholz ('25), and the Medtronic Foundation for recent gifts and continued support of the geology program.