



Department of Geology and Geological Engineering

2023 Alumni Newsletter



Faculty and staff in Geology and Geological Engineering/Museum of Geology – 2023
Back row (l to r): Edward Duke, Trevor Waldien, Kurt Katzenstein, Roger Nielsen, Kevin Ward,
Zhi Ye, and Tim Masterlark
Front row (l to r): Sarah Keenan, Cleo Heenan, Gokce Ustunisik, Christopher Pellowski, Colin
Paterson, and Robert Hall
Absent: Liangping Li, Nathaniel Fox, Kayleigh Johnson, Victoria Karnes, Darrin Pagnac, Larry
Stetler, Nuri Uzunlar, Samantha Wright, Arden Davis, Jim Fox, James Martin, Perry Rahn, Bill
Roggenthen, and Foster Sawyer



1999 Italy field trip group photo at the summit of Mt. Vesuvius.

- Back row (l to r): Larry Stetler, Kyle Smith, unknown, Albrecht Schwalm, Chuck Van Hoovlen, John Weeldryer, Ed Friend, Joel Bielstein, Steve Weisenburger
- Middle row (l to r): Maribeth Price, Jamie Mathison, Bill Roggenthen, Eileen Roggenthen, Sherdan Hansen,
- Front row (l to r): Jenny (Mathison) Kozak, Rita Krebs, Michael Roggenthen, Brianna (Griffith) Widdick, Jen Waggner

From the newsletter coordinator – Christopher Pellowski

Greetings alumni and friends! Please enjoy reading the 2023 edition of the alumni newsletter.

This newsletter is also accessible on the department's alumni newsletter webpage:

<https://www.sdsmt.edu/Academics/Departments/Geology-and-Geological-Engineering/Activities-and-Organizations/Alumni-Newsletters/>

Status of the Department (from the newsletter coordinator)

Alumni and friends, we hope you are doing well and have had a great year.

As you may be aware, Dr. Laurie Anderson's transition from the Geology and Geological Engineering Department Head to the Interim Vice President for Research took place on Thursday, June 22nd of this year.

Dr. Lance Roberts, Provost and Vice President for Academic Affairs, provided the following update regarding the future of the GGE Department leadership on November 20th of this year:

“Effective in FY25, Dr. Robert Hall will serve as the permanent Department Head for both the Department of Mining Engineering and Management and the Department of Geology and Geological Engineering. The departments will remain independent, along with the respective academic programs under each department. The departments have a long history of working together in teaching, research, and service and I anticipate that further collaborations will develop in all areas of our mission as a higher education institution.”

Thank you for your continued support and best wishes in the new year.

GGE Updates (from the Newsletter coordinator)

The Nucor Mineral Industries Building will be located on the south side of the quadrangle, and we anticipate substantial completion by late October next year with a planned ribbon cutting in December and the first classes to be held in Spring 2025.

We have a new addition to the faculty this year. Dr. Zhi Ye has joined us as the new assistant professor in Geological Engineering. Dr. Ye earned his Ph.D. from the University of Oklahoma.

It was announced on September 26th that the Accreditation Commission of ABET granted accreditation to 12 science and engineering programs including the GEOE BS program that was again granted accreditation under the Engineering Accreditation Commission and the GEOL BS program was granted accreditation under the Applied and Natural Science Accreditation Commission which makes it the second program in the United States and the fifth in the world to become ABET accredited. Thank you everyone for helping us reach our goal.

In fall 2023, there are 84 GEOL and 23 GEOE undergraduate majors and 28 graduate students enrolled across the three graduate programs with career placement remaining strong. In 2022-2023, we graduated 25 undergraduate and 9 graduate students.



Views of the Nucor Mineral Industries Building taken on December 15th.

2023 GGE Department news:

February:

Dr. Laurie Anderson named AAAS Fellow

<https://www.sdsmt.edu/News/Anderson-Named-AAAS-Fellow/>

<https://www.kotatv.com/2023/02/17/school-mines-professor-now-part-prestigious-scientific-society/>

March:

Dr. Laurie Anderson – First woman working at a state university was named AAAS fellow

<https://listen.sdpb.org/science/2023-03-05/first-woman-working-at-a-state-university-was-named-aaas-fellow>

May:

Ms. Kayleigh Johnson – Museum of Geology at South Dakota Mines celebrates 100 years

<https://www.sdsmt.edu/News/Museum-100th/>

https://rapidcityjournal.com/news/museum-of-geology-at-south-dakota-mines-celebrates-100-years/article_049ef360-f8d5-11ed-8d5c-2b5f63b3dad9.html

<https://www.blackhillsfox.com/2023/05/23/museum-geology-south-dakota-mines-celebrates-historic-100-year-milestone/>

2023 Nucor Mineral Industries Building topping off ceremony - Mines mineral building reaches major milestone

<https://www.flickr.com/photos/sdsmt/albums/72177720308388059/>

https://rapidcityjournal.com/news/mines-mineral-building-reaches-major-milestone/article_806799ec-f5b6-11ed-92ab-33e67a837264.html

<https://www.blackhillsfox.com/2023/05/19/schools-mines-closer-opening-new-mineral-industries-building/>

Drs. Laurie Anderson and Sarah Keenan – Innovations: The animals who once ruled the world

<https://listen.sdpb.org/podcast/in-the-moment/2023-05-19/innovations-studying-what-came-before-humans>

June:

Dr. Laurie Anderson – Making History *in* The Hardrock (Spring/Summer 2023)

https://issuu.com/gotomines/docs/hardrock_winter-spring_2023_230502_comp

Dr. Laurie Anderson named Interim Vice President for Research at South Dakota Mines
<https://www.sdsmt.edu/News/Anderson-Interim-VP-for-Research/>

https://rapidcityjournal.com/news/local/communities/rapid_city/laurie-anderson-to-serve-as-interim-vice-president-for-research-at-south-dakota-mines/article_d622268a-19de-11ee-8e60-e76ea05bcb59.html

July:

Geology alumni and friends triple giving day goal *in* The Arch (2023)
https://issuu.com/3ppubs/docs/the_arch_2023?ff

August:

Dr. Gokce Ustunisik – South Dakota Mines researchers use lab experiments to show volcanic activity on Mars

<https://www.sdsmt.edu/Research/Research@Mines/Volcanic-Activity-on-Mars/>

<https://listen.sdpb.org/science/2023-08-31/south-dakota-mines-researcher-studies-volcanic-remnants-on-mars>

<https://www.kotatv.com/2023/09/05/south-dakota-mines-experiment-replicates-martian-conditions-unearting-critical-minerals-groundbreaking-experiment/>

https://www.newscenter1.tv/news/south-dakota-mines-scientists-bring-mars-to-earth-just-the-minerals-though/article_91fdfe84-486e-11ee-a790-2baef197af5d.html

Drs. Sarah Keenan and Scott Beeler – South Dakota Mines expands water testing capability thanks to NSF grant

<https://www.sdsmt.edu/News/New-Dionex-ICS-6000/>

September:

Ms. Julie Carver (GeolE 86) and Mr. William (Bill) Eldridge (GeolE 15/GGE 16) – Mines honors graduates at Hardrocker Heritage Gala

<https://cara.sdsmt.edu/awards/alumni-awards>

<https://cara.sdsmt.edu/alumni/distinguished-alumni-award-recipient>

<https://cara.sdsmt.edu/outstanding-recent-graduate-awardees>

<https://www.flickr.com/photos/sdsmt/albums/72177720311403904/with/53205700191>

Drs. Gokce Ustunisik and Roger Nielsen – Mines researchers receive NSF funding to harness big data of geologic processes

<https://www.sdsmt.edu/News/Big-Data-of-Geology/>

<https://listen.sdpb.org/science/2023-10-07/using-big-data-to-explore-earths-innerworkings>.

Ms. Kayleigh Johnson – Museum of Geology invites public to Rock & Fossil ID Day
<https://www.sdsmt.edu/News/Fall-2023-Rock-and-Fossil-ID-Day/>

https://rapidcityjournal.com/news/local/museum-of-geology-to-host-rock-and-fossil-id-day/article_f00527bc-595a-11ee-8caa-3f55aa7f03eb.html

https://www.newscenter1.tv/lifestyle/museum-geology-rock-fossil-id-day-sd-mines/article_af75d498-5b1d-11ee-b2b7-efb2ec847452.html

GGE Department faculty and staff – South Dakota Mines receives prestigious ABET accreditation for 12 programs

<https://www.sdsmt.edu/News/ABET-Accreditation/>

Dr. Sarah Keenan – SD Mines has the only paleontology master’s program in the nation

https://www.newscenter1.tv/news/sd-mines-has-only-paleontology-masters-program-in-the-nation/article_4b1c83d2-50f2-11ee-864c-cfadc1f06904.html

October:

Ms. Kayleigh Johnson – Celebrate National Fossil Day at the Museum of Geology

<https://www.sdsmt.edu/News/2023-National-Fossil-Day/>

Ms. Kayleigh Johnson – Museum of Geology at South Dakota Mines hosts Night at the Museum

<https://www.sdsmt.edu/News/2023-Night-at-the-Museum/>

https://rapidcityjournal.com/news/local/south-dakota-mines-to-host-night-at-the-museum-halloween-celebration-oct-21/article_7755da02-6dd0-11ee-8c24-b305928e88e1.html

https://www.newscenter1.tv/things_to_do/spend-a-night-at-the-museum-at-the-museum-of-geology-at-south-dakota-mines/article_2a1c88e8-6ec6-11ee-b169-37b6b9200c80.html#1

November:

Dr. Trevor Waldien – Adventures in mapping: Summer geologic research in the remote Alaskan wilderness

<https://www.sdsmt.edu/News/Fall-2023-STEAM-Cafe/>

Drs. Sarah Keenan and Scott Beeler – Researchers explore underground water chemistry at SURF to open doors in the search for extremophile

<https://www.sdsmt.edu/News/Researchers-explore-underground-water-chemistry-at-SURF-to-open-doors-in-the-search-for-extremophile/>

https://rapidcityjournal.com/news/local/researchers-explore-underground-water-chemistry-at-surf-to-open-doors-in-the-search-for-extremophiles/article_3f6c4a9e-8ed8-11ee-88a1-b313f5a730a1.html

<https://www.blackhillsfox.com/2023/12/01/surf-south-dakota-mines-team-up-microbe-research/>

<https://sanfordlab.org/article/researchers-explore-underground-water-chemistry-surf-open-doors-search-extremophiles>

December:

Drs. Sarah Keenan and Scott Beeler – Researchers study unique water chemistry at SURF
<https://listen.sdpb.org/science/2023-12-11/researchers-study-unique-water-chemistry-at-surf>

GGE Department Field Trips during 2023!

GGE was overwhelmed by the support our friends and alumni provided during the 2023 [Raising for Rockers](#) campaign. Through your generous donations, \$14,641.97 was raised to support department field trips! This blew the doors off our campaign goal of raising \$5,000. We even had the largest number of donors of any unit on campus! Clearly, you agree with us that these trips are an important part of the GGE experience and are worth supporting. We cannot thank you enough for your generous gifts, and we look forward to making this the focus of our Raising for Rockers campaign again in 2024.

There were two great field trips offered by GGE During 2023. In the Spring of 2023, Dr. Kevin Ward led a trip to observe Tertiary igneous rocks exposed in the northern Black Hills and Devil's Tower. As part of this day trip, we visited Bear Butte, Devil's Tower, and the summit of Terry Peak. Roughly 20 participants took part in this trip!



Over Labor Day, Dr. Sarah Keenan led a group of about 20 on a field trip to Badlands National Park to explore Eocene through Oligocene sediments deposited in western South Dakota. The trip included an overview of the White River Group at the Windows and Doors overlook, a stop at the Ben Reiffel Visitors Center to view fossils on display and observe active fossil preparation in the fossil prep lab, the Yellow Mounds overlook, and our final stop, at Bloom Basin outside of the park where we observed deposits from an ancient carbonate lake that is one of the field areas for a soon-to-start NSF grant secured by faculty in GGE. The students helped to discover fossil bones preserved within the algal-dominated ancient lake!



As a result of your generous donations, we are planning a more ambitious field trip over Spring break in March of 2024 when we plan to visit Death Valley, Owens Valley, and Long Valley in California. We plan to spend four nights camping in and exploring Death Valley, two nights exploring Owens and Long Valleys, and one night camping at the Red Rock Canyon National Conservation Area near Las Vegas. We plan to see many of the same sights that were visited during a similar trip led by Drs. Katzenstein and Sawyer in 2010 (photos below). Many of the donors from this year's Raising for Rockers event were on that 2010 trip!



Once again, thank you for your generous contribution to support GGE field trips. As I am sure you will agree, the impact these trips have on our students is immeasurable.



Badlands National Park, South Dakota - Large Letter Scenes
 Vintage Postcard (c. 1956)
 Image # 41398

8 65311 53021 5

PLACE
 STAMP
 HERE

Thank you!
 Ed Duke

Thank you!
 Eric Haglund

Thank you!
 Cole

Thank you!
 Logan Ekstrom

Thank you for the great trip!
 Ryan M.

Thank you!
 Chase Bradley

Thank you!
 Columbus

Thank you!
 Thomas Bourfant

Thank you guys!
 -max Jan

Thank you!
 -LARRY STELLER

Thank you!
 -Deacon Dumberry

Thank you!
 -John Gallucci

Thank you!
 -the chantics - Joseph P.

Thank you!
 -Jacob S.

Thank you!
 Set A Billygo

Thank you!
 Scott Beeler

Get well soon w/ snat leg!

Thank you!
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Get well soon w/ snat leg!

A Badlands NP postcard signed by all the field trip participants saying thanks for your generous donations!

Christopher Pellowski

We continue to operate the field camps from the SD Mines campus. During the two five-week sessions, we had 28 students (8 SD Mines) from 5 universities in session 1, and 19 students (3 SD Mines) from 15 universities in session 2. The weather this year was cool and wet with weekly adjustments being made to each of the project areas. There was no shortage of mosquitoes, snakes, or ticks and most everyone became quite adept at flicking ticks after each field day. I continue to work on identifying/visiting additional field areas for future mapping projects to be incorporated when the new field station is constructed.

I taught GEOL 351 Earth Resources and the Environment in the spring semester with 30 students enrolled showing an increased interest in critical minerals. I also taught GEOL 464 Senior Research I this fall with 12 students enrolled and will be overseeing GEOL 465 Senior Research II this spring. This year I am serving on five department committees and will be teaching Geol 451/L Economic Geology/Lab during the Spring 2024 semester with nine students already signed up.



Session 1, 2023 group photo with Grubby.



Session 2, 2023 group photo with Grubby.



Just remember, it's all about being comfortable when working in the field!

Be sure to visit and like us on Facebook and follow our posts.



<https://www.facebook.com/SDSMTGeologyGeologicalEngineering>

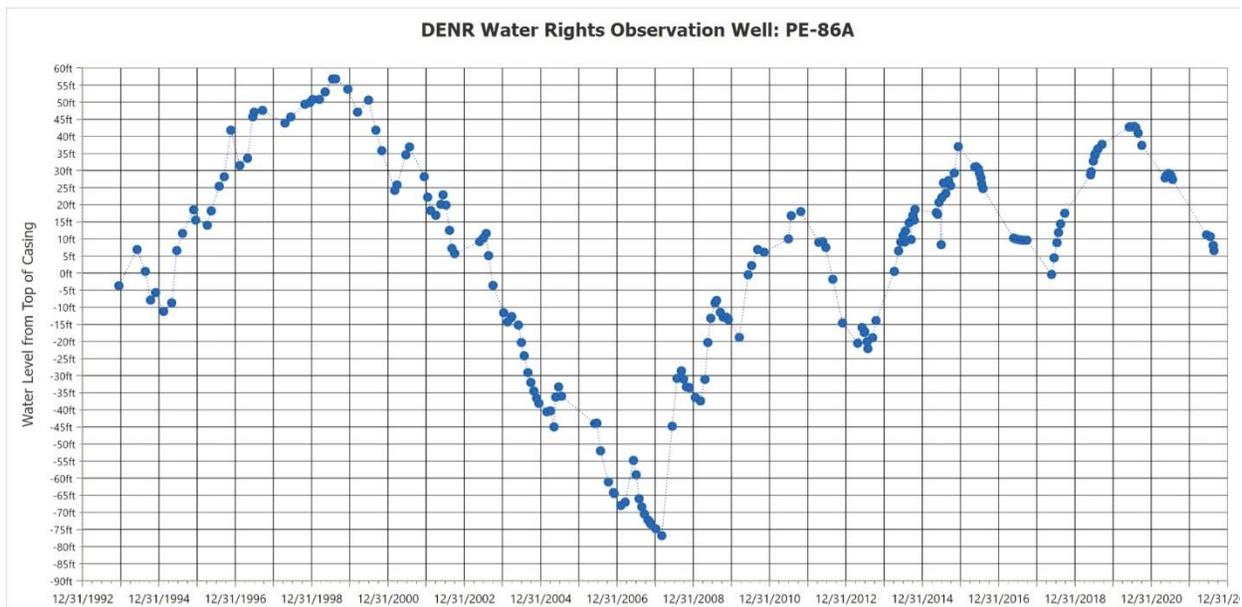
From our Emeritus Professors:

Arden D. Davis, Professor Emeritus of Geological Engineering

In previous newsletters, I've mentioned a water project that involves a proposed pipeline from the Missouri River to the Black Hills area. Local and regional interest is growing, and meetings have been held in various towns in western South Dakota. Kurt Katzenstein, Mark Anderson, Scott Kenner, and I did some of the early work, along with the late Alvis Lisenbee. Cheryl Chapman, a civil engineering graduate and professional engineer, recently was involved in the formation of the Western Dakota Regional Water System, to help the project move forward. Below is a link to their web site.

<https://wdrws.org/meet-the-board/>

At last spring's 2023 meeting of the Western South Dakota Hydrology Conference in Rapid City, Mark Anderson and I presented a paper about our region's growing dependence on the Madison aquifer, and potential limits to its production, especially during extended periods of below-average precipitation (not necessarily severe droughts). Below is a graph that Mark put together to show a head decline of about 134 feet in a Madison aquifer observation well during the period from 1999 to 2007. Precipitation records show that this wasn't an unusually dry period or a severe drought. Instead, several years in a row with below-average precipitation and decreased recharge caused the decline in head. This well is near Reptile Gardens, not far from Rapid City. Other Madison wells on the eastern side of the Black Hills showed declines from 50 to 80 feet during the same period.



Potentiometric head in a Madison observation well near Reptile Gardens, 1992 to 2022.

Mark also noted that we need to consider the quality of the Missouri River water and potential water-quality changes during its transport over such a long distance to the Black Hills. We also could look at alternatives such as conservation and re-use of water, rather than using treated drinking water for washing cars or growing grass on lawns. Large infrastructure projects such as the proposed pipeline could have a development timeline of decades. The construction costs would likely be more than \$2 billion dollars for the project, aside from operating costs, so it would require federal and state assistance. In addition to its technical and economic aspects, the project ultimately would involve legal aspects such as water rights and tribal concerns, along with sharing of water, needs of upstream and downstream states for river transportation and other resources, and political considerations.

From mid-May to early June, Mark Anderson and I taught our environmental / groundwater field camp course through the Black Hills Natural Sciences Field Station. Mark has retired as director of the Rapid City office of the U.S. Geological Survey, which is now called the Dakota Water Science Center. However, he continues to be involved part-time with national and international water problems. He also is an adjunct professor at the School of Mines and is on our professional advisory board. This year, our field camp had students from the University of Alaska at Anchorage, Binghamton University, Central Michigan University, Kansas State University, Minot State University, Missouri University of Science and Technology, the University of North Dakota, and the University of Pittsburgh.

During the past year I've continued to work with CalxAqua, a company that several faculty members at the School of Mines formed as a commercial entity for removal of arsenic, heavy metals, and other contaminants from water. We've recently looked at a project that involved seepage from the Rapid City landfill, and we've continued our contacts with a gold mine. Some of the other owners of CalxAqua include Dr. David Dixon (Chemical Engineering), Dr. Cathleen Webb (formerly in the Chemistry Department, now Department Head and Associate Dean at Western Kentucky University), and Dr. Jenifer Sorensen (Minnesota Department of Natural Resources).

After retirement, I'm continuing to share an office with Perry Rahn in MI 327B. Perry comes in about one day each week. He looks healthy and strong, and I think he's enjoying his time at his log house and property west of Hill City.

My wife and I again spent about 2 ½ months in Minnesota during the summer. It was unusually dry there. When we arrived in June, the lawns were brownish yellow, and our neighbors told us it hadn't rained during late April and May. The drought continued through the coming months. I only mowed the lawns twice during the summer, and some parts not at all because the grass was so dry that it crackled underfoot. There wasn't any asparagus to pick, but my wife watered the garden often, and we were able to eat green beans, zucchini, sweet corn, lettuce, tomatoes, cucumbers, and other vegetables, as well as a few apples from the orchard.

The weather seemed unusual last summer. Typically, it's moist and humid in Minnesota, and we often would need to mow the lawns about twice a week. In Rapid City, the lawns often are dormant and might not need to be mowed all summer. Last summer, it was the reverse:

when my wife and I drove back from Minnesota to Rapid City, the landscape seemed to get greener in western South Dakota as we approached the Black Hills.

As a final note, please encourage any potential students to consider enrolling in the geological engineering program. Our student numbers have decreased recently, but scholarships are available. During the past year, as always, it was enjoyable to be in contact with alumni. Please stop by to visit if you're in the area.



Cascade Falls in the southern Black Hills.

Colin Paterson

Becci and I spent the first 4 months of 2023 in Te Anau – she had just obtained her permanent residence for New Zealand, enabling her to vote, take advantage of health care, and travel to NZ without the need for a visa. We spent most of our time playing lawn bowls, cycling on trails, and hiking. We returned to Rapid City in April and spent more time in my office, continuing to work on a Homestake paper and clearing out excess rocks and documents prior to our move to the new building in late 2024. After several years of increasing debilitating back pain and many attempts at chiropractic solutions, I finally had back surgery in September – this was instantly successful with no longer any pain. I am back to walking, and after a few more months of rehab will be able to resume normal activities.

Dr Kelli McCormick (MEM) and I have continued to advise the Society of Economic Geologists student chapter. They continue to conduct monthly meetings, mostly presented by current students reporting on summer internships in the mining industry, but also a presentation by John Norby (my first MS student at SD Mines in the 1980s) who is currently consulting for Dakota Gold in the northern Black Hills. The upsurge in exploration activity in the Black Hills for gold and lithium is providing students and graduates with increased job opportunities. Another highlight was the August trip by 4 SEG students to the SEG Annual Conference in London, U.K. This was a great experience for them, and their first overseas adventure. They were fortunate to receive significant sponsorship from Newmont Corporation and Dakota Gold (special thanks to Steve O'Rourke (GeoE 83), and for that we are extremely grateful. The next SEG conference is in Windhoek, Namibia in September 2024, and Becci and I are planning to attend this one. I am looking forward to visiting colleagues with whom I worked in Namibia (2000-06) and South Africa (1978-81), as well as introducing Becci to the southern African wildlife and geology.

From the Faculty:

Victoria Karnes

Hello all, and Happy Holidays!

This year has been full of ups and downs. Zach and I have settled in quite nicely and have enjoyed exploring the Black Hills on the rare occasion we both have a day off, spending many hours hiking out at Custer State Park. We also got a chance to travel to Maryland to visit our close friends this year, where we enjoyed sightseeing, eating lots of great seafood, and spending time with our chosen family. We also had a more than usual amount of time spent with our families in Iowa and Arkansas. My brother got married to his lovely wife in a beautiful ceremony this past June, and they are now living happily in Wayne, Nebraska, where he works his dream job as a Varsity Athletic Director at Wayne State College, and she is working on her graduate degree in Educational Administration. I am sad to report, however, that we also had four family deaths this year, three occurring around major holidays in 2022 and 2023. While it is hard to find a silver lining in the grief, we have cherished every second we spent with them and have loved being near those who needed us even when it was hard.

In regard to Mines, I have continued to teach all GIS classes, but have also taken over GEOE/MEM 201L (otherwise known as Surveying). While challenging, learning surveying equipment practices and rewriting lessons and projects has been an absolutely blast. We have also ordered drones for the department to use in both Surveying and Remote Sensing, which is super exciting! I look forward to teaching it in the coming semesters and seeing how far we can take this class! I have also continued teaching and working on expanding the GIS Workshops for the community, which I enjoy teaching in the winter and summer. I have also implemented an online version of the Workshops to allow more interested parties outside of the state to attend, which we are testing out this December.

While teaching here at Mines, I have also become the Advisor for the Hardrockin' Drama Department! The Director (Matt Leonard), our wonderful officers, and I have spent countless hours preparing and presenting the clubs' works to the University and the community and have enjoyed every second of it. Our next show, *Pride and Prejudice*, will be debuting in Spring 2024, and is sure to be a hit! If you find yourself in town, we would love to see you there!

Wishing you all the most wonderful and fun-filled holiday season!

Kurt Katzenstein

Greetings! I hope you had a wonderful 2023! The Katzenstein family had another busy year filled with family events and weekend trips to athletic competitions all over the region. Brianne (13) earned her second varsity letter in soccer as a 8th grader, and Hannah (12) played on the JV team as a 7th grader. All three (including Leslie - 9) are very active with their club soccer team as well. As other soccer parents can attest, the soccer season never ends... In addition to soccer, Brianne and Hannah played middle school basketball, with Bri also playing freshman ball for the high school after the end of the middle school season.

Our family took a large road trip this summer to the desert southwest to explore some of the amazing natural wonders in southwestern Utah. All of my wife's family (26 of us!) stayed together in a house we rented in Brian Head, UT (at 10,400 feet!) and we were able to explore Bryce Canyon, Zion National Park, Cedar Breaks National Monument, Kodachrome Basin State Park, Goblin Valley State Park, Escalante National Monument, Moab, and many other awesome places (I even convinced my kids to go see A Midsummer Night's Dream at a world class Shakespeare festival in Cedar City). Five of us also scored a lottery permit to climb Angel's Landing at Zion!

Unfortunately, the extremely wet winter in the western U.S. thwarted our planned backpacking trip in the Sierras. By the time our scheduled trip had arrived, the area we had planned to visit was still snow covered and I didn't want the experience to be a negative one for my kids, so we decided to postpone until this coming summer.





I continue to work hard to recruit students to GGE through numerous outreach and recruiting events. As you may know, the enrollments in the geological engineering program are on a downward trend. If you know of any high school students who might be a good fit for our GEOE program, let me know and I'd be happy to talk with them!

My term as the Faculty Senate Chair for South Dakota Mines continues. With this position comes a plethora of responsibilities, but it is a fun challenge, and it is enjoyable to work with colleagues at our great institution to solve problems that crop up.

I also continue to serve as the ABET Commissioner for Geological Engineering. This past accreditation cycle, I served as a Team Chair and Co-Team Chair on two visits. As usual, the visits were very enjoyable, and it is always interesting to learn about how other programs and institution's function.

Unfortunately, one of my research projects was postponed. I am working with a company in Nevada to fund a study to evaluate historic mine-subsidence at a site producing a critical mineral (can't say much more than that at this point). We hope that the funding will only be postponed until January 2024. We'll see. This postponement had an unfortunate impact on the two of my graduate students who I was planning to fund from the project. One, who already has multiple job offers, decided to graduate under our newly established non-thesis M.S. program, and the other has had to change his thesis topic but has found a great project through an internship he had over the summer at RESPEC. Another one of my graduate students, Edward Anokye, finished his M.S. thesis this December. Edward was evaluating subsidence resulting from coalbed methane production in the San Juan Basin of New Mexico and Colorado. I am also in the process of finishing up a study evaluating groundwater-induced subsidence near Salt Lake City. If you keep up with SD news, the Missouri River pipeline project that was evaluated in our funded project a few years ago is still making good progress towards becoming a reality. The process has now moved on to the preliminary design stage overseen by the [Western Dakota Regional Water System](#), and is often discussed in local news and politics and appears to have a good chance of moving forward.

As mentioned in another section of this newsletter, Drs. Ward, Keenan and I are organizing a spring break trip to Death Valley, Owens Valley, and Long Valley. So far, our group is 20-strong, and we are excited for the trip. A trip of this size would not be possible without the generous donations of our friends and alumni during the 2023 Raising for Rockers event. Your support is much appreciated, and it will play a huge role in helping our students make some incredible memories as we explore some of the geologic wonders of that region.

I hope that you and your family are well and that you have a very enjoyable 2024. Best wishes!

Liangping Li

Alumni and friends, Happy New Year and Merry Christmas!

In 2023, I continued my instruction of the Groundwater course (GEOE/CEE 475/575L) for both undergraduate and graduate students, along with the Groundwater Modeling course (GEOE 766/L) specifically designed for graduate students during the fall semester. Additionally, I also taught a course for geological engineering major in the fall: GEOE 456/556/L, Statistical Methods for Geology and Geological Engineering. It's glad to see that this newly developed course is now required for Geology major as well. This course placed a strong emphasis on data analytics within the context of earth sciences, incorporating practical programming skills like Python in the lab exercises.

I also conducted research for projects funded from NSF and USGS 104b. For the enhanced geothermal recovery project funded by the NSF, we developed an optimization method based on genetic algorithm for calibrating fracture models and it was published with my former PhD student Dr. Redoloza in the journal of Advances in Water Resources. We also proposed to use machine learning for modeling complex reservoirs, which was published with my former student Dr. Redoloza in the journal of Hydrogeology. For the USGS 104b grant, we conducted sensitivity analysis for well placements for the split creek rock aquifer.

I published three papers in 2023:

1. Redoloza, F*., Li, L., & Davis, A. (2023). Stochastic inversion of discrete fracture networks using genetic algorithms. *Advances in Water Resources*, 104477. (Impact factor: 5.4)
2. Redoloza, F*., Li, L., & Davis, A. (2023). Progressive Growing Generative Adversarial Networks Using Conditioning Ratio for Facies Modeling in Complex Aquifers. *Hydrogeology*, (impact factor: 3.2)
3. Feng, W., Wang, S., Hu, C., & Li, L. (2023). Landform sedimentary contributed to groundwater nitrate vulnerability in multi-alluvial fan aquifer systems in a watershed. *Environmental Earth Sciences*, 82(13), 1-16. (Impact factor: 3.1)

Three proposals were funded in 2023:

1. NSF Geothermal INTERN
2. South Dakota School of Mines' Internship Program at the Bureau of Land Management - Montana/Dakotas (2023-2028)
3. Environment Monitoring and Water-Quality Sampling at the Abandoned Belle Eldridge Mine Site (2023 -2028)



Collaborating with DANR, EPA, and BLM on water sampling activities at the Belle Eldridge Abandoned Mine site.



Participated in the Spearfish Canyon 15K, achieving a new personal record with a time of 59:05 min (pace: 6:43/mi)

Tim Masterlark

2023 was a great year with a pivot to new research and leadership possibilities. I was elected for a second term to lead the SDBOR Natural Sciences Discipline Council. The Council solves particularly difficult STEM curriculum challenges that touch multiple South Dakota universities. Last summer, I agreed to lead the GGE Geology BS Program as we evolve to serve student career trajectories and ensure sustainability for our ABET accreditation. Andrew Guilford (MS student, GGE) joined my research team this Fall. Andrew is using Machine Learning and satellite radar data to investigate the integrity of underground storage caverns in salt domes. These caverns play a critical role in storing hydrogen and conventional energy resources. I built a new partnership with WSP USA and RESPEC to connect Mines students with the underground storage industry. This partnership paid membership fees for Mines to join the Solution Mining Research Institute (SMRI) and provided scholarships to Andrew and Rohit Madavi (MS student, MEM) to attend the SMRI 2023 Fall Meeting in San Antonio, TX. I look forward to positive results from a proposal I submitted to the Naval Surface Warfare Center. This investigation will use Machine Learning and satellite radar data to detect underground facilities for global locations. Results will provide unconventional tools for targeting and mitigating the proliferation of Weapons of Mass Destruction. I continue to serve as an Advisor to the US State Department's Bureau of Diplomatic Security. This service provides me with unique global perspectives on Critical Minerals, Energy Transition, and Great Competition challenges. On the home front, I remain on the path toward a life of discipline, personal responsibility, and mental toughness. Feel free to stop by my garage at 5:05AM and join me for a nasty beatdown to test your grit. Evenings are OK too if you want to catch the second half of a two-a-day. I have an extensive catalog of ugly challenges to choose from, set to my approved selection of hits from the 80's. Or, try a Sandbag Saturday for an immersive experience of suck that can span several hours. What am I training for? Everything. Because life doesn't happen in a safe space.



(Top) My invited lecture at SMRI. (Left) Graduation Day: ABET's Institute for the Development of Excellence in Assessment Leadership. (Right) Core samples from salt domes. Experiments on cores provide elastic and creep properties for finite element models of stress and deformation.



(Left) I hate the erg machine. And that's exactly why I do it. (Center) Deck of Pain. Ace=1 Burpee, 2=2 Burpees, ... King=13 Burpees. The whole deck=340 Burpees and takes about an hour. (Right) A ruck to Harney Watch Tower on Christmas Eve. Cold. Quiet. Solitude. Perfect.

Gokce Ustunisik

Alumni and friends,

Season's warmest greetings! Here we are again finalizing another year - 2023 and I write this letter in the plane back from American Geophysical Union Fall Conference in San Francisco. 2023 was a busy and very much rewarding year for me and my graduate students. My research program was supported by 5 continuing NSF grants. Besides my active grants, I submitted 4 new research proposals to NASA-Solar System Workings and several programs under NSF. My most recent 2 awards that was co-PI ed by Roger Nielsen (<https://www.sdsmt.edu/Research/Research@Mines/Plate-Tectonics-Climate-Change-Study/> and <https://www.sdsmt.edu/News/Big-Data-of-Geology/>) funded a new PhD student (Olivia Daynes), a MS student (Madison Betts), and an undergraduate student (Andrew Price). As a part of my "Curator of Minerals" role at the Museum of Geology (MoG); Laurie Anderson, I, and Nate Fox received a new award from Institute of Museum, and Library Services (IMLS) to digitally catalog and rehouse specimens from MoG mineralogy and petrology collections that document the mineral diversity of the Black Hills and include ores of many strategic minerals. Besides graduate and undergraduate student support, our goal is to provide public access to the collection through an online collections database that will include photography and 3D scans of curated minerals for the benefit of faculty, students, staff, and visiting researchers of mineralogical sciences.

On the teaching side, I continued teaching department 2 required Earth Material courses "Mineralogy and Crystallography" in the Fall and "Igneous and Metamorphic Petrology" in the Spring in addition to my 2 graduate courses "Volcanology" and "Planetary Geology" both of

which attract a broader range of graduate students in our department. Teaching both Earth Materials courses provides me the opportunity to work with students for a full year and get to learn their strengths and weaknesses. Due to this advantage, student grades and performance almost always improve in Petrology compared to Mineralogy. Students truly enjoy the incorporation of microscopic observations into hand specimens. Their struggle in applying phase equilibria and thermodynamics into igneous and metamorphic rocks diminishes as they observe the connection between textures and the chemistry of rocks. They appreciate how basic concepts of chemistry become more tangible and applicable to geology.

Once again, I am quite proud of the progress put forward by my graduate students. Olivia received couple scholarships and both Olivia and Madison presented their projects with multiple abstracts at Goldschmidt Conference in Lyon, France during July and at AGU Fall Meeting past week in San Francisco, CA. Also, thanks to my research group and collaborators in various projects, 2023 was a productive year for publications and presenting. Between previous and current students, our group's work was presented at a wide variety of conferences with 14 abstracts in addition 2 journal articles (Cung et al., 2023 <https://doi.org/10.1029/2023GC010876>; Rogaski et al., 2023 <https://doi.org/10.1111/maps.14000>; <https://www.sdsmt.edu/News/Volcanic-Activity-on-Mars/>), and 1 book chapter. Book chapter focuses on microbially accelerated carbon mineralization experiments to reduce CO₂ emissions from atmosphere and finding innovative ways to sequester safely in underground reservoirs. Alex Rogaski's experiments on simulating surface alteration on Mars received a fair amount of public attention. I joined as a guest for "In the Moment" program by Ellen Koester at SD Public Broadcasting studio (<https://listen.sdpb.org/science/2023-08-31/south-dakota-mines-researcher-studies-volcanic-remnants-on-mars>) and our planetary research is covered by KOTA TV (<https://www.kotatv.com/2023/09/05/south-dakota-mines-experiment-replicates-martian-conditions-unearthing-critical-minerals-groundbreaking-experiment/>).

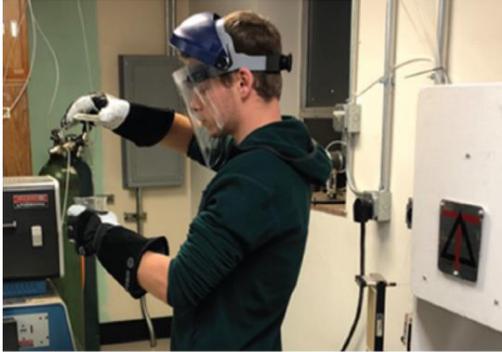
Besides, research and teaching, I continued being involved in several department, university, and professional committees. I still believe that I had the highest impact as securing funding as Curator of Minerals at MoG; chairing Peer-Review of Teaching of various courses; serving as faculty representative at University Research Committee; helping to graduate school and leading GGE department's graduate student recruitment and outreach efforts under the SD Mines R2 status initiative; leading IEDA traceDs and Library of Experimental Relationships (LEPR) in guiding FAIR data principles ([EarthChem- Experimental Petrology](#)); serving at NSF panels and reviewing proposals for various solicitations under NSF and NASA; and my outreach efforts in STEM Tribal College Committee.

We are very much looking forward to moving our new MI building and new leadership in the department. Best wishes to you and yours for a happy and healthy holiday season and lots of hopes for 2024!

Press Release/Ustunisk

<https://www.sdsmt.edu/News/Volcanic-Activity-on-Mars/>

Alexander Rogaski (MS, 2019) Use Lab Experiments to Show Volcanic Activity on Mars



Press Release/Ustunisk & Nielsen

<https://www.sdsmt.edu/News/Big-Data-of-Geology/>

Ustunisk and Nielsen receives a new NSF Funding to Harness Big Data of Geologic



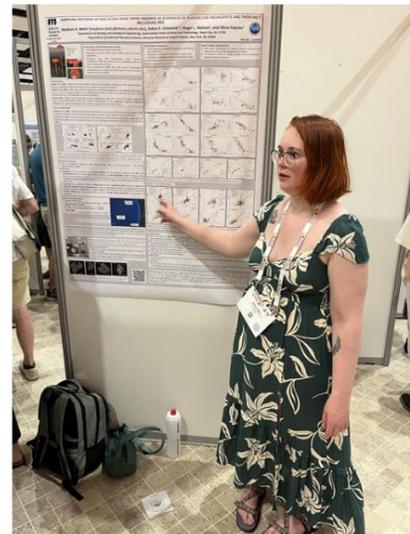
Madison Betts (MS), Lauren Stern (MS) and Olivia Daynes (PhD) are presenting at 2023 AGU Fall Conference in San Francisco, CA.



Olivia Daynes (PhD) conducting Raman Spectroscopy Analysis on Melt Inclusions at Woods Hole Oceanographic Institute (WHOI)



Madison Betts (MS) is presenting at 2023 Goldschmidt Conference in Lyon, France.



From Black Hills Natural Sciences Field Station (BHNSFS) and Nuri Uzunlar:

The BHNSFS is the world's largest field school offering summer and winter camps in earth science and related engineering fields including geology, geological engineering, environmental geology, volcanology, petroleum and geomorphology on six continents. In 2023, 185 students from across the USA mapped geological environments ranging from volcanoes to fault zones in Hawaii, Turkey, France, Spain, Morocco, Iceland, and the Black Hills of South Dakota. We are getting ready for the winter camps in Hawaii, New Zealand and Death Valley. All three camps will start after Christmas.



In addition to traveling from camp to camp I attended GSA in Pittsburg and AGU in San Francisco where the field station and the department had an exhibit.

Nemo Field Station:

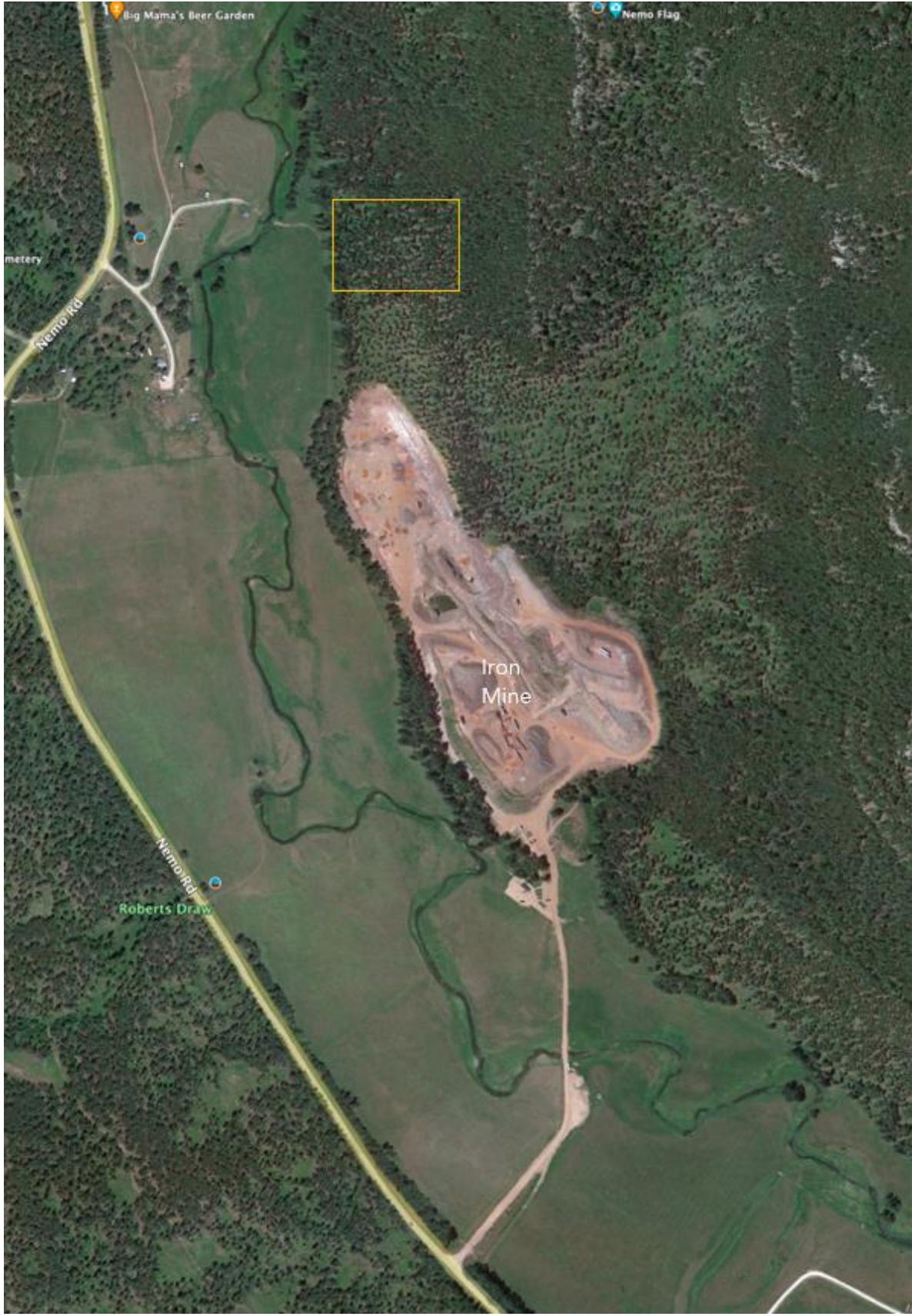
Location: Near Lien iron mine, Nemo, South Dakota.

Land has been donated by Pete Lien and Sons and is located at the northern edge of the mine.

Building size and description: Plans include a lodge style A-frame building with dormitory space for 50-60 people (students and faculty) for field camps and other educational activities. Large lecture/dining hall, offices and living space for caretaker.

For additional information about upcoming field station activities please visit:

<http://geologyfieldcamp.sdsmt.edu>, call me at (605) 394-2494 or write to nuri.uzunlar@sdsmt.edu



Kevin Ward

Hello everyone and welcome to a new year. 2023 was full of exciting events and 2024 looks to be promising as well. This year, I thought I would highlight some of the field trips that I was fortunate enough to be a part of in 2023 and a big one coming up in 2024. In April, more than 20 students and faculty enjoyed great weather and some nice hikes with the field trip theme focusing on recent magmatism of the northern Black Hills. We started the day with a hike around Bear Butte. We then dove to Devils Tower National Monument and had lunch at the visitor center before hiking around the tower. The trip concluded with a visit to the Terry Peak Fire Lookout and a short lecture to tie all of the geology we experienced during the day into a regional geological story. In June, I led another geology summer youth camp with 22 high school students from around the country. This is always an exciting summer camp as I really get to see students experience the geologic wonders



that are showcased in the Black Hills; many for the first time. The camp is scheduled to run again in June of 2024 and if you know someone who might like to participate, direct them to the following resource:

<https://www.sdsmt.edu/Academics/Events-and-Outreach/Summer-Camps/Camp--Overnight-Geology-Rocks!/>. In the near future, many exciting things are on the horizon. Every day, the Nucor Mineral Industries Building is getting closer to completion and not far behind with be the new field camp station near Nemo, SD.

In September, a few of the faculty were able to visit the site and hike to the top of the ridge. This is going to be an amazing site when the facility is completed and housing field camp students. I helped teach the Black Hills field camps this year and I can really see the advantage of having a permanent field station in the Black Hills on the students learning experience.

Finally, for some big news on the horizon in 2024. Along with Dr. Katzenstein, we are planning a spring break field trip

traveling to southern California in March. During the week-long trip, we will be visiting many geologic sites in Death Valley National Park, Owen's Valley, and Long Valley. We will be driving out there so we are hoping for



good weather along our route but are going to have an adventure that the students will never forget either way. I would like to take this short opportunity to thank everyone who donated to our Raising for Rockers event. Money raised from that event has helped support some of these trips and without such generous contributions, our field trip to Southern California would not be possible. "And now you know...the rest of the story."

Zhi Ye

Dear Alumni,

Warm greetings to all of you! I am honored to be the newest faculty member of the Department of Geology and Geological Engineering, focusing on geomechanics and rock mechanics. The opportunity to join this vibrant community of skilled geoscientists and geoengineers is truly exciting.

My journey in this field began with a Ph.D. in Petroleum & Geological Engineering from the University of Oklahoma. Before joining South Dakota Mines, I explored various research dimensions, initially as a Centennial Postdoctoral Research Fellow at the University of Alaska Fairbanks, followed by a role as a Research Scientist at the University of Oklahoma. My research expertise lies in geomechanics and rock mechanics, primarily targeting subsurface science and engineering challenges. This includes a broad spectrum of fundamental and practical applications, including fault mechanics, induced seismicity, geothermal energy, oil and gas, and carbon storage. My goal is to integrate multidisciplinary knowledge of geomechanics, geophysics, and engineering rock mechanics to explore the coupled THMC (thermo-hydro-mechanical-chemical) processes of rocks and rock fractures, as well as their associated seismic response when subjected to fluid injection within the Earth's upper crust. This research is not just a pursuit of academic interest; it is a step towards optimizing geo-energy and storage solutions responsibly and sustainably.

Since joining GGE, the support from the entire faculty and staff has been incredible, helping me steer my teaching and research in the right direction. This fall, my focus was on delivering the geomechanics course, laying the groundwork for my research program, and exploring collaborative research opportunities. I have embarked on the grant-writing journey, submitting two proposals to the DOE and NSF, and experiencing both setbacks and progress. With the addition of a few new equipment, either donated by DOE national labs or acquired through my startup funding, our petrophysics and rock mechanics labs are now more suitable for advanced subsurface geomechanics research. It has been inspiring to collaborate with two undergraduate students, contributing to our lab's experimental research endeavors. Looking ahead, I am actively seeking motivated graduate students to join us 2024 Fall.

The GGE department's rich legacy in Geoscience and Geoengineering education and research is an aspect I hold in high regard and deeply appreciate. The prospect of collaborating with our

talented students, dedicated faculty, and supportive staff energizes me. I am eager to make a meaningful contribution and look forward to a productive and rewarding 2024.

Outside of work, my family and I have been highly impressed by the numerous outdoor activities around Rapid City. We have thoroughly enjoyed the amazing hiking trails here; in fact, I have hiked more in the past several months than I did in the previous thirty years combined. We have also started skiing and hope the Terry Peak will treat us well in the coming days.

Lastly, as we approach the holiday season, I extend my warmest wishes to you and your loved ones for a joyful time and a New Year filled with prosperity and happiness!



We quickly began enjoying our new life in Rapid City, visiting places like the Needles (left) and the Storybook Islands (right) with my six-year-old daughter, Michelle.



Drs. Ustunisik and Ward working in the department booth at the fall AGU meeting in San Francisco, CA.