

**IOWA**



# DEPARTMENT OF EARTH & ENVIRONMENTAL SCIENCES

**FALL 2022 NEWSLETTER**

# MESSAGE FROM DEO DAVID PEATE



*"I am grateful to all alumni  
and friends for your  
continued support for the  
Department of Earth &  
Environmental Science..."*

A few weeks ago, I had an opportunity to chat with Lynette Marshall, the president and chief executive officer of the University of Iowa Center for Advancement. As soon as she heard what department I was from, she congratulated us on how well we engage with our alumni. This is a testament to the selfless work done by the Earth & Environmental Sciences Department Alumni Advisory Board (EESB). It is great to see recognition for these efforts from the highest levels of the University administration. I would like to thank all the board members, past and present, for the work you do on behalf of the department. Over Homecoming, we had a productive EESB meeting and welcomed three new board members (Luan Heywood, Brian Hartmann, Tim Stroope). This was followed by an excellent, but rather frightening, talk on contaminants in Iowa waters by Dana Kolpin, the 2022 EESB Distinguished Alumni awardee. On the Saturday morning, we all had an opportunity to go to the Ashton Prairie Living Laboratory site (highlighted in the Fall 2021 newsletter) in west Iowa City with a group of Environmental Science undergraduates who enthusiastically explained the diverse range of research projects that they have been working on, primarily supervised by Ben Swanson and Kate Tierney.

The excellence of the University of Iowa "field camp" courses in Montana has been recognized by GSA, and I congratulate the faculty instructors (Emily Finzel, Jane Gilotti, Bill McClelland, Jeff Dorale) for receiving the 2022 GSA-ExxonMobil Field Camp Excellence Award, which is based on safety awareness, diversity, and technical excellence.

The College of Liberal Arts and Sciences (CLAS) sees the broad area of Environment as a potential growth area, both in terms of increasing student enrollments and external research funding, and has established a committee to review ways in which we can better coordinate teaching and research activities. To this end, we are also in discussions with the Department of Geography & Sustainability Sciences to develop a vision that we can take to CLAS and better position ourselves to build strength in both environmental science and policy areas.

Finally, I would like to thank Amy & Joe Sullivan for organizing a great alumni event at their home over the summer. I thoroughly enjoyed meeting some of our Colorado-based alumni and seeing the geology and wildlife of Roxborough Park. I am grateful to all alumni and friends for your continued support for the Department of Earth & Environmental Sciences, and please do stop by the department whenever you are visiting Iowa City.

Sol (Martian day) 395 taken by the Perseverance rover when roving to the delta in Jezero crater



# Welcome to the newest member of the **EES faculty**: Valerie Payre

In my research I focus on assessing the evolution and processes of planetary surfaces and interiors, combining various disciplines that are usually not intimately linked including igneous and sedimentary petrology. My primary research focus is Mars, but I am highly interested in other rocky planets including Venus.

Analyses of martian meteorites and Mars igneous rocks from rovers and orbiters demonstrated the diversity of Mars' magmatism, raising questions about the composition of the crust and the magmatic processes that could produce such diverse magmas. The recent discovery of >4.0 Gyr old intermediate and felsic rocks and clasts from the Curiosity rover and within a martian meteorite called Black Beauty suggest that early on, after the formation of Mars, evolved magmatism was occurring, potentially suggesting the presence of an ancient evolved crust on Mars. The presence of a homogeneous basaltic crust as envisioned up to the last decade is now questioned by chemical, geophysical, and seismic data that support the presence of evolved rocks underneath the basaltic surface characterized by orbiters. The discovery of ancient feldspar-rich terrains (> 60% of feldspar) by the Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) spectrometer onboard the Mars Reconnaissance Orbiter might be additional evidence of an old evolved crust covered by subsequent basaltic lava flows.



Combining remote sensing (visible/near-infrared and thermal infrared spectroscopy), experimental petrology, lab measurements (microscope fourier transform infrared spectrometer, visible near infrared spectroscopy, X-ray diffractometer, microprobe, etc...), modeling, and various analytical instruments onboard the Martian rovers, Curiosity and Perseverance (ChemCam and SuperCam laser induced breakdown spectroscopy, alpha-particle X-ray spectrometer, CheMin, PIXL), my research aims to explore the complex processes that resulted in Mars as we know it today, with scattered ancient evolved terrains covered by weathered basaltic rocks.

I teach the Mineralogy class with the primary goals being to provide students with the knowledge to differentiate and identify minerals, understand the mineral structure, and constrain the formation and occurrences of various minerals. Next Spring, I will teach a Planetary Geology class to introduce planets and the geology scientists have been exploring since the development of telescopes and the launch of spacecrafts and rovers.

# GREAT STORIES START *here*

This year we welcomed eight new graduate students to the department from different parts of the country and the world. Read their stories here.



## **Shubhamita Das**

I am Shubhamita Das from India. My undergraduate degree was awarded by Durgapur Government College (Kazi Nazrul University), and my MS degree was granted by the Indian Institute of Engineering Science and Technology (IIST). I participated in three separate groundwater publications throughout my MS degree. In the fall of 2022, I began pursuing my PhD under the guidance of Dr. Jessica Meyer on an NSF-funded EPSCOR project titled "Critical Resource Availability for the Future of the Renewable Energy Industry: Critical Minerals and Ground Water Resources in Iowa and Kansas." Following my PhD, I intend to pursue a postdoctoral degree.



## **Brandon Botha**

I am Brandon Botha and I completed my undergraduate degree at Purdue University. There I worked on developing a regional proxy to evaluate the mean annual precipitation in the southwestern United States during the Pliocene-Pleistocene transition. I am now pursuing an MS under Dr. Emily Finzel. My research at Iowa is about testing for natural and induced bias in sedimentary systems and how it translates into provenance studies. After Iowa, I am interested in either pursuing a PhD or working in industry for a few years. Eventually I would love to become a professor or work for the USGS.



## **Nate Kilburg**

I am a first-year MS student working with Dr. David Peate. My research project is focused on doing geochemical analyses and precise dating of the Matlock Well Cores (volcanics) located in northwest Iowa. I received my undergraduate degree from Iowa State University in 2016. After I graduated, I worked for a few organizations that mostly focused on environmental conservation. I chose to come to Iowa not only because my sister and mother did their graduate studies here, but I also felt confident that my interests aligned with my current research. I am currently figuring out my future career goals, but I am leaning towards pursuing my PhD after finishing here.



(Upper left) John Nguyen, (upper center) Sophie Pierce, (upper right) Samson Bruxvoort, (bottom left) Sebastien Mure-Ravaud

## John Nguyen

My name is John Nguyen and I have a BS in Geology from the University of Oklahoma. While there, I worked under Dr. Stephen Westrop identifying trilobites from the genus *Peltura* and identifying a new species, *P. hutchinsoni*. Here at Iowa, I am working with Dr. Christopher Brochu on a currently undecided project but that will focus on paleontological systematic analysis of crocodyliforms. I chose to come to the University of Iowa because of its well-regarded vertebrate paleontology program. I plan to finish my MS here and the continue into a PhD program and research in the field.

## Sophie Pierce

My bachelor's degree in Environmental Science is from the University of Iowa. During undergrad I began working in hydrology at the USGS where I stayed until 2019, specializing in field data collection, equipment maintenance, and data management and QA/QC. Since 2019, I've been working as a hydrogeologist at the Iowa Geological Survey working on a variety of research projects in the areas of groundwater and surface water interactions and groundwater quality and quantity. I chose to come to UI for the exciting research and teaching opportunities available and the interdisciplinary collaboration within the department and university at-large. While my current research project is yet to be determined, I am looking forward to working with my advisor, Dr. Jessica Meyer. My goal post-grad is to further my career as a research scientist working in the public sector for an academic institution or for state, federal or local government.

## Samson Bruxvoort

I received a B.S. in Geoscience at the University Iowa in Spring 2022 and now am pursuing a MS in Geoscience. I chose to come to Iowa because my parents and two of my uncles got their degrees from Iowa so being a Hawkeye runs in the family. In my time as an undergrad, I spent a year working part time at the Iowa Geologic Survey's Oakdale campus helping digitally archive rock cores and strip logs for research specialist, Rick Langel. I am currently working with Dr. Bill McClelland on a project in Northern Alaska. My project will be creating a geologic map of an area of the Brooks Range. I will visit the Brooks Range with other students for three weeks in the summer to traverse an area of the Brooks Range creating a geologic map. I will focus my thesis on this map I create. When I graduate, I want to work in the private sector for an engineering company as a geologist within a team of engineers, or as an economic geologist working with mineral deposits for industrial use.

## Sebastien Mure-Ravaud

I received my associate's degree in Biology from Eastern Iowa Community College, and my bachelor's degree in Geology from Western Illinois University. I am currently working with Dr. Jonathan Adrain. I chose the University of Iowa because one of my professors at Western did his undergraduate and graduate degrees here. My current career goal is to do museum collections management.



## Dioysios Stamatis

I received my BSc in Geology from the university of Patras in 2019. During my final year I worked on one of the best varved records found in Greece from a coastal lake, assisting a research team in the sampling, sedimentological and geochemical analysis of the core as part of a team of undergraduates. My exposure to this type of research led to me wanting to pursue a career in paleoclimatology and geochronology. Following my graduation, I enrolled in the MS program at the department of Geology of the University of Patras, where I graduated in 2021. For my master's thesis, I worked on a lacustrine record of a drained lake from Northern Peloponnese, Greece. After my graduation, I worked for a brief period as a geotechnical engineer gaining valuable experience. While my research project at Iowa hasn't been determined yet, I am planning to study past climate patterns through stable isotope signals from speleothem fluid inclusions under the supervision of Dr. Jeffrey Dorale. I aim to expand my knowledge in the realm of paleoclimatology, and am excited for the journey ahead.

# EES Alumni Gathering Roxborough Park, Colorado

By Amy Sullivan

Alumni gathered at Amy and Joe Sullivan's home outside Roxborough State Park on June 4th. After getting reacquainted, we reviewed base maps of the local geology focusing on the Fountain Formation. The Fountain Formation consists of Pennsylvanian proximal alluvial fans and fluvial deposit, 12,000' thick. This is the same formation that makes Red Rocks Park, Garden of the Gods and the Boulder Flatirons. Representatives from the Center for Excellence and David Peate attended!! The group went out to hike along the Fountain Formation. Afterward we shared more departmental stories and had plenty to eat and drink. It was a pleasure hosting EES alumni and Joe and I hope to do this again in June 2023.

In attendance were Travis Osen-Foss and Ellen Larsen (Center for Advancement), Jim Eagan, Elizabeth and John Healy, Joe Sullivan, David Peate, Louisa and Robert Matthias, Amy Sullivan, Tim Stroope (joined later).



# 2021-2022 EES Fulbrighters

By Jane Gilotti



The Fulbright Program is the United States government's flagship international educational and cultural exchange program. Active in 160 countries, the Fulbright mission is to forge lasting connections, counter misunderstandings, and help people and nations work together toward common goals. During the 2021-2022 academic, three EES women at different stages of their careers were granted Fulbright awards.

Megan Lenss (2021 B.S. Geoscience) spent her Fulbright in Tromsø, Norway hosted by the Norwegian Polar Institute. She worked with Drs. Sebastian Moreau and Karli Campbell on a project entitled "The role of sea ice in triggering phytoplankton blooms in the King Haakon VII Sea, Antarctica." Although her cruise to the waters off Antarctica was cancelled, Megan was able to participate in two trips to the Barents Sea. She is currently a M.S. student in biological oceanography at the University of Tromsø.

Megan Koch (2019 B.S., 2021 M.S. Geoscience) did field work in Svalbard prior to starting her Fulbright at the AGH University of Science and Technology in Kraków, Poland. Megan's host was Dr. Karolina Kościńska, a former postdoc with EES Professors Jane Gilotti and Bill McClelland and now an Assistant Professor. Megan is working on the "Kinematics and timing of strike-slip motion in SW Svalbard, Norway." Megan just started a Ph.D. program in petrology at Syracuse University.



Prof. Jane Gilotti held a Fulbright U.S. Scholar award to visit the Dept. of Mineralogy, Petrography and Geochemistry at AGH-UST in Kraków, Poland. She worked with Dr. Kościńska on a project "Using age proxies to determine the size of the ultrahigh-pressure terrane in NE Greenland," as well as writing manuscripts from the NSF sponsored Ellesmere Island project in arctic Canada from Karolina's post doc days. The Fulbright awards are a testament to Gilotti's commitment to mentor the next generation of Arctic geoscientists.

# EES:1170 National Parks Field Trip

Colorado National Monument, Capitol Reef National Park,  
Grand Staircase Escalante, and Dinosaur National Monument



(top) Students working at the Strike Valley Overlook, Capitol Reef National Park. (left) Mary Waite propped up in Cohab Canyon, Capitol Reef National Park. (above top) Anna McNally, Sadie Richter, Schaffer Finney, and Esther Buergo in Capitol Reef National Park. (above bottom) Sharing a meal at Doctor Creek in Fishlake, CO.





(top) Sadie Richter, Emma Schopen, and Lauren Hoaefs at Panorama Point, Capitol Reef National Park. (left middle) Ian Ray appreciating a *Diplodocus* vertebrae on the Rabbit Valley Trail Through Time. (left bottom) The group poses at Panorama Point, Capitol Reef National Park. (above) Megan Kroeger taking notes on the Wingate Sandstone in Colorado National Monument.

# EES:3001 **Third Year Field Trip**

## Badlands National Park, South Dakota



(left top) Ciara Gallen, Sydney Rayburn, and Claire Bruce at Yellow Mounds. (left middle) Sam Hudziak and Ian Ray enjoying the view at Yellow Mounds. (left bottom) Dr. Kate Tierney leading a discussion at Sage Creek. (above right) Emma Holesinger waiting her turn to climb up the wooden steps on the Notch Trail.



(top) The friendly neighborhood buffalo, affectionately named Bob, patrolling the Sage Creek Campground. (above left) A group photo at the Sage Creek Basin Overlook. (above right) Dr. Ben Swanson leading a discussion about the Badlands Formation at the Sage Creek Basin Overlook. (left) Dr. Kate Tierney talking with (starting at the bottom left and going clockwise) Sadie Richter, Megan Kroeger, Samantha Eberly, and Ian Ray.

# EES:4001 **Fourth Year Field Trip**



**Big Bend National Park, Carlsbad Caverns National Park,  
Guadalupe Mountains National Park**



(left top) Group photo taken at Carlsbad Caverns National Park Visitor Center: (back row) Dr. Kate Tierney, Talia Hill, Jenna Lane, Emma Schopen, Megan Kroeger, Anna McNally, Schafer Finney, (front row) Ian Ray, Manny Zertuche, Henry Frederick, Sadie Richter. (left middle) At the mouth of the caverns (left to right) Henry Frederick, Ian Ray, Manny Zertuche, Talia Hill, Emma Schopen, Jenna Lane, Megan Kroeger, Sam Hudziak, and Anna McNally. (left bottom) Group photo along the Tuff Canyon Trail, Big Bend National Park. (above) (left to right) Emma Schopen, Jenna Lane, Megan Kroeger, Schafer Finney, and Anna McNally taking a break along the Permian Reef Trail in Guadalupe National Park.



(above) Sadie Richter taking in the gorgeous outcrops along the Santa Elana Canyon Trail in Big Bend National Park. (right top) Ian Ray making friends with a Lubber Grasshopper. (right middle) Ian Ray, Manny Zertuche, and Talia Hill at the Mule's Ears in Big Bend National Park. (right bottom) The group at Lost Mines Chisos at Big Bend National Park: (front row) Dr. Kate Tierney, Sadie Richter, Jenna Lane, Megan Kroeger, Emma Schopen, (back row) Schafer Finney, Ian Ray, Anna McNally, Henry Frederick, and Manny Zertuche.

# Field Methods and Field Analysis

Field Methods and Field Analysis are beginner and advanced, respectively, three-week courses that run simultaneously and provides a total of 6 weeks of field camp instruction for our majors. Field Methods spends the entire three weeks in Dillon, MT, whereas Field Analysis spends 2 weeks in Dillon and 1 week in the thrust belt south of Glacier National Park as a capstone experience.



(left top) Field Methods class taking a lunch break at Kelley Reservoir. (right top) Manny Murillo, Faith Skinner, and Sydney Rayburn and (left bottom) a student in Field Methods working on field notes in the Sandy Hollow mapping area. (above) The Field Camp Excellence Award presented by GSA and Exxonmobil to the University of Iowa Field Camp.



(top) Field Analysis class at Wagner basin: (left to right) TA Shay Ridl, Leon Spataru, Gabe Finn, Zach Vig, Talia Hill, Kris Symanski, Hanna Konavaluk, Samson Bruxvoort, Jack Halbur, Conner Hansen. (above left) Jack Halbur and Conner Hansen and (above right) Field Analysis students in Wagner basin. (right) Samson Bruxvoort and Hanna Konavaluk surveying the landscape.



# Planetary Geologic Mapping Workshop : Zach Vig



Hello EES newsletter readers! My name is Zach Vig, and I am a senior this year, finishing up my B.S. in Geoscience through the EES department as well as a B.S. in Physics from the department of physics and astronomy. Over this past summer, I had the wonderful opportunity of participating in the first ever Planetary Geologic Mapping Workshop (PGMW) at Northern Arizona University in Flagstaff, AZ, put on by NASA's Topical Workshops and Symposiums program.

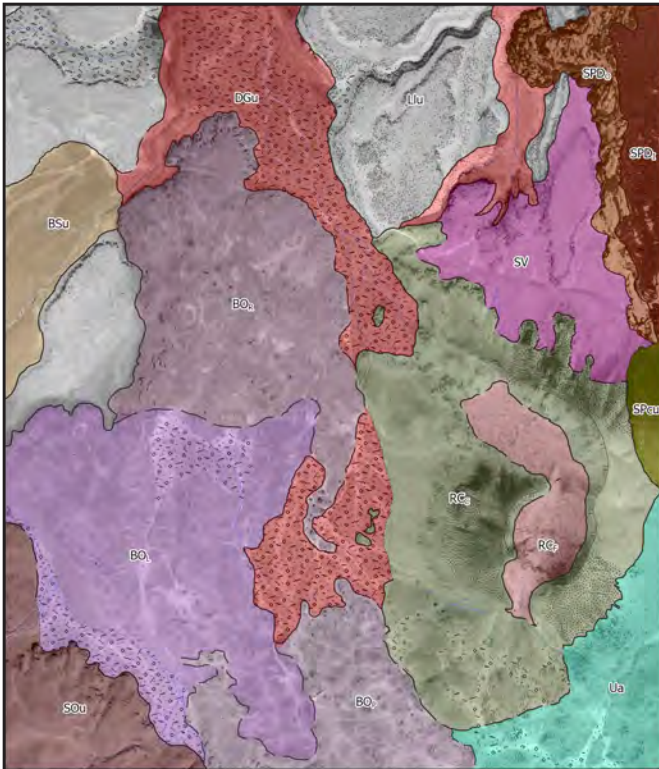
This opportunity was perfect for me because space has interested me for as long as I can remember. It is not the sprawling constellations or the mysterious black holes that steal my attention from day to day, however. What is so cool and exciting about space is the existence of other worlds that parallel our own. Lucky enough for me, I discovered the perfect way to study these distant worlds using the expertise that I have gained at the University of Iowa in the EES department — planetary geology.

During the PGMW, I was able to gain unique experience in remote mapping of planetary surfaces by making a map of a small area in the San Francisco Volcanic Field called SP Crater (what the “SP” stands for is left as an exercise for the reader). Numerous different lava flows intersect and overlap in this area making uncovering the geologic history intricate and difficult. The youngest and most prominent crater and associated flow (SP Crater) stands out from the surrounding landscape and is pictured behind the workshop participants above.



The final map on the next page is actually a product of two separate attempts to map the area, with one utilizing purely remote sensing and imaging datasets and the other using a dataset that we collected during a (very rainy) day in the field. By mapping using this unique method, I was able to better recognize and understand the biases and assumptions that go into making geologic maps of planetary bodies that are hundreds of millions of kilometers away from us. After all, on Earth, calling a rock a sandstone is an observation, but on the surface of planetary bodies, calling a





0 0.25 0.5 1 1.5 2 Kilometers  
 Geologic Map of the SP Crater Region  
 of the San Francisco Volcanic Field

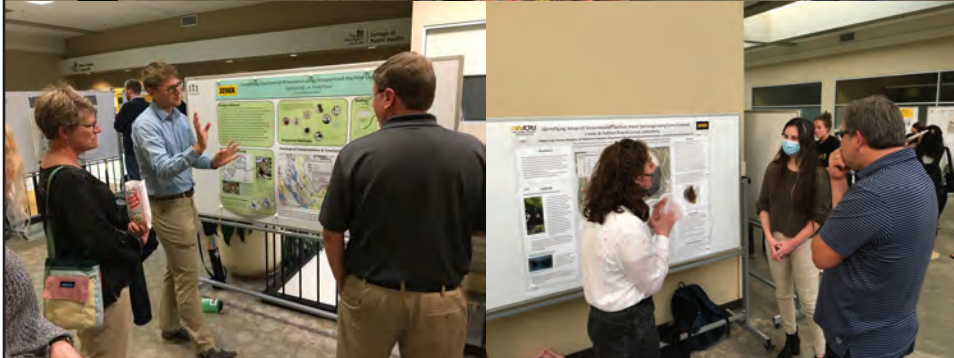
rock a sandstone is inherently an interpretation.

With this workshop being open to a diverse pool of candidates from all over the country, I was quite thankful for my background in field geology. Many of the other participants had only very minimal field geology experience, and I believe that this showed up in the way these people mapped rocks using non-field-based methods.

After I graduate, I would love to pursue a PhD in the field of planetary geophysics, and this workshop taught me that having a solid background and understanding of Earth-based geology will be invaluable for my future work in this field.

I cannot thank the department enough for connecting me to this opportunity to further develop my research interests and for giving me the geologic foundation that I needed for this workshop and will need as I venture out further into the world of planetary geology and academia in general.

# FURF: Fall Undergraduate Research Festival



The Iowa Center for Research by Undergraduate's Fall Research Festival is held in recognition of undergraduate researchers' contributions to scholarly and creative work. EES students presenting at FURF this semester were (clockwise from top left): Sydney Rayburn, Ethan Bley, Bob Pentuic, Kobie, Long, and Zach Vig.

# Earth & Environmental Sciences Alumni Board News Briefs

by Lee Phillips, EESB Chair

Dear Fellow Alumni,

It is my great pleasure to serve as Chair of the Earth and Environmental Sciences Alumni Advisory Board. We strive to help the department that we dearly love to continue to have an amazing impact on student learning through efforts that promote excellent teaching, community outreach, and world-class research. As students of the department, whatever its name at the time, we learned so much about our surrounding through highly engaged lectures, labs, and field trips/courses. Many of us have continued to work in the discipline, while others have parlayed our abilities to think critically, solve complicated problems, work well in teams, and communicate effectively to happiness in other career and/or life situations. I know that I am forever grateful to be able to understand my surroundings and how our planet works.



The relationships we developed as students with other students, faculty, and staff are strong and remain important, to me for one. We know that relationships are incredibly valuable and I'd like to encourage you to consider reconnecting with each other to leverage the best support of friends and colleagues. A few years ago, the Board established a **Mentor Network** that is open to current students and alumni, alike. Please let us know if you're interested in serving as a mentor or want to connect with one.

Most of us cherish the time we got to explore the world outside the confines of Trowbridge Hall. I certainly reflect on the many fieldtrips regularly because, ... that's where a lot of the learning happened. Decreases in the financial support for field-based experiences prompted us to focus efforts on helping the Department raise money that would subsidize the expenses students incur to learn in this most meaningful way. During **One Day for Iowa** last spring, we (all of us) were able to raise a little more than \$12,000 that was used to support field-based learning. We're going to focus on this important mission again next spring, and I encourage you to mark your calendar for **March 29, 2023**. Gifts of ANY size make a huge difference.

I could go on, but know you have other articles in this newsletter that you'd like to read. So, let me close with a big thanks to you all, as well as the Alumni Board Members.

We could use your help and here are some ways:

- ✓ Volunteer to be a mentor
- ✓ Become an Alumni Advisory Board Member; we could benefit from your talents
- ✓ Nominate your favorite colleague to be recognized as an Iowa Geode Star and/or the EES Distinguished Alumnus Awardee

Go Hawkeyes!

Lee Phillips, Ph.D. 2004  
Chair – EES Alumni Advisory Board





One Day for Iowa is the University of Iowa's 24-hour online giving day. In 2023, it will be on March 29! You can make a difference in many ways by supporting the Department of Earth & Environmental Sciences. This year the primary focus will be the Earth and Environmental Sciences Field Course Support Fund, which provides support for students costs related to attending field course experiences. We hope you will join us and make One Day for Iowa a great success. If you don't want to wait, make a gift on the department website today!



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## AAPG Fall Field Trip



### By Shay Ridl

The American Association of Petroleum Geologists (AAPG) student chapter held its annual field trip in the Laramie Mountains of Wyoming. This year the group was greeted with cool and windy weather while the undergraduates, M.S. and PhD students explored the world class outcrops of the Laramie anorthosite complex, upper Paleozoic–Mesozoic sedimentary basin fill, and Precambrian basement. The first day of the field trip focused on compositional variations across the Laramie Anorthosite Complex, field relationships with the associated volcanism, and discussed the ongoing exploration and potential of the complex for critical mineral resources. The group was joined by EES Alumni Patty Webber, now at the Wyoming Geologic Survey, on a transect across the

Laramie Basin. The group studied the type locality and relationships of “Laramide” basement cored uplifts and documented the field relationships of the primary petroleum horizons in the region. The field trip ended in the stunning landscape of the Snowy Range with the students examining some of the oldest known exposure of Paleoproterozoic stromatolites and the Medicine Peak Quartzite that are exposed near Lake Marie (photo: (first row left to right) Dr. Jane Gilotti, Patty Webber, Rachel Smith, Brandon Botha, Max Collins, (second row left to right) Alec Lockett, Samson Bruxvoort, Nate Kilburg, Shay Ridl, Ethan Smyke, and Sam Hudziak).



Department of Earth & Environmental Sciences  
The University of Iowa  
115 TROWBRIDGE HALL  
IOWA CITY, IA 52242

EARTH & ENVIRONMENTAL SCIENCES

SPRING 2022

*Anything you would like to see in the newsletter? Please send an email with any suggestions or requests to [geology@uiowa.edu](mailto:geology@uiowa.edu)!*