

Geosciences Program NEWSLETTER

For alumni and friends of the Geosciences Program
Fall 2022



CMU crew at the 2022 Denver GSA meeting. Pictured left to right: Dr. Rex Cole, Cole Wood, MJ Winey, Liam Posovich, Dr. Greg Baker, Anja Riedel, Leyna Weller, and Laura Kleim. Crouching in front from left to right: Myah Baker and Faith Urbin.



CMU ATTENDS GSA IN DENVER

A total of 20 CMU Geosciences students, alumni, and faculty attended the national Geological Society of America annual meeting in Denver this past Fall (Oct. 8-12). This is the largest turnout that we've had at a professional meeting, perhaps ever!

Current students that attended included:

Daniel Arinze, Harley Bittle, Laura Kleim, Aaron Orelup, Liam Posovich, Faith Urbin, Jackson Weber, Leyna Weller, MJ Winey, Cole Wood

In addition, a large number of recent graduates also showed up at the meeting:

Caden Anderson ('22), Myah Baker ('22), Karlie Hadden ('22), Thomas Marso ('22), Anja Riedel ('22), Abby Winkler ('22, Geo minor)

The meeting provided students with opportunities to explore a wide range of Geoscience topics ranging from tectonics on other planets to geology of the Rocky Mountain region. Students were able to network with other students and faculty, check out graduate school opportunities, and think more about future career options. As one student put it "it was nice to see what is out there." Having a big student group at the meeting was fun and hopefully will lead to similar turnouts in the future.



CMU crew at the 2022 Denver GSA meeting. Back row pictured from left to right: Thomas Marso, Caden Anderson, Dr. Greg Baker, Daniel Arinze, Harley Bittle, Dr. Javier Tellez, and Cole Wood. Crouching Geo Mavs from left to right: Jackson Weber, Abby Winkler, Karlie Hadden, Myah Baker, Aaron Orelup, MJ Winey, Leyna Weller, Liam Posovich, Faith Urbin, and Laura Kleim.

Our students and faculty did their fair share of presenting at the meeting. The following is a list of the student presentations:

- Assessing azimuthal seismic first-arrival tomography to quantify geometry of multiple sets of shallow subvertical bedrock fractures for hydrogeologic studies **by Anja Riedel, supervised by Dr. Greg Baker.**
- WeCSIP: analyzing stable isotopes in precipitation to create a preliminary local meteoric water line for Grand Junction, Colorado by **Myah Baker and Abigail Winkler, supervised by Dr. Cassie Fenton.**
- Evaluation of petrophysical heterogeneity within fluvial architectural elements of the Cretaceous Burro Canyon Formation, Colorado by **Liam Posovich, supervised by Dr. Javier Tellez.**
- Fluvio-glacial terraces of the upper Green River Basin spanning the past ~2 Ma: new detrital-sandine, cosmogenic-burial, and luminescence age constraints **by Leyna Weller, supervised by Dr. Andres Aslan.**
- Late Eocene to Miocene landscape evolution of western Colorado: new age constraints using detrital sandine $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology by **Aaron Orelup, MJ Winey, and Cole Wood, supervised by Dr. Andres Aslan.**

CMU Geology faculty including **Andres Aslan, Greg Baker, Rex Cole, Cassie Fenton, Larry Jones, and Javier Tellez,** were also involved in multiple presentations at the meeting.

COORDINATOR'S CORNER – ANDRES ASLAN

Program and Faculty News

Since the last newsletter, CMU Geosciences students and faculty have been busy! Following the May graduation, we had a successful Field Camp (led by new Field Camp Director **Dr. Greg Baker**), several students and faculty conducted summer field research, and the early Fall semester was highlighted by student and faculty participation on several field trips (GJGS Chenoweth, Friends of the Pleistocene). We also had Prof. Mike Blum (U. of Kansas) present a seminar to the GJGS/CMU

Geosciences Program as well as attend a post-talk field trip with our Depositional Systems field class.

Major changes are in the works with respect to the Geosciences faculty. **Dr. Rick Livaccari** will retire at the end of the Spring 2023 semester! Rick has played a huge role in the Geosciences program for **25 years!** We'll have more on Rick's retirement in the next newsletter, but the Geosciences Program is in the early stages of looking for a new faculty member to start teaching in the Fall of 2023.

The new faculty member will need to fill some big shoes!

Dr. Mike Blum with Faith Urbin at Shale Ridge near DeBeque..



2022 Maverick Geo Graduates

The following students graduated in May/August with BS degrees in Geosciences. Congratulations to each of you!

Myah Baker	Karlie Hadden
Amanda Hicks	Kyle Karren
Thomas Marso	Kristopher Maurer
Sherri Randall	Anja Riedel
Abby Winkler (Geo Minor)	

STUDENT AWARDS

The following students received special recognition for their academic accomplishments in Spring 2022:

RMAG Neal J. Harr Award (awarded to the top senior in the program): **Sherri Randall**

William C. Hood Student Research Award: **Myah Baker**

Verner C. Johnson Geology/GIS Award: **Roan Hall**

Richard Dayvault Memorial Endowed Scholarship:
Andrew Schmidt

Forrest Nelson Fund Scholarships:
Daniel Arinze, Destiny Duarte, Brandi Maher, Aaron Orelup, Andrew Schmidt, Faith Urbin, Jackson Weber, Isabel Fehringer, William Myers, Hailey Peters, Leyna Weller, Cole Wood, Dana Berg, Liam Posovich, MJ Winey, Joey Meighan, Laura Kleim

Mark Garman Field Camp Scholarship: **Daniel Arinze**

Geosciences Tuition Scholarships: **Daniel Arinze, Destiny Duarte, Aaron Orelup, Andrew Schmidt, Faith Urbin**

Association for Women Geoscientists:
Amanda Hicks, Myah Baker

RMAG Robinson Field Camp Scholarship: **Leyna Weller**

Aaron Orelup also received a special undergraduate research grant from RMAG.



Recipients of the Forrest Nelson scholarship.
Pictured from left to right: Jackson Weber, Destiny Duarte, Brandi John, Daniel Arinze, Aaron Orelup, Leyna Weller, Dr. Greg Baker, Liam Posovich, Cole Wood, and Joey Meighan.

FACULTY SPOTLIGHT - PROFESSOR MARISA BORAAS-CONNORS

Many of you remember Marisa as a Geology student at CMU/MSU. Now she is also teaching part-time for us! Here is Marisa's faculty "spotlight." Professor Connors (also known as Marisa) started with CMU as an adjunct professor in the Fall of 2021 teaching a section of Geology of Colorado, one of the first classes she took as a student at CMU with Rex Cole! She has been excited to return to her alma mater as part-time faculty which enables her to follow her passion for teaching while working full-time as a project/lab manager for Yeh and Associates, a geotechnical/engineering firm.

Marisa had a roundabout route through her academic career. Out of high school she started at Colorado State University studying anthropology/archaeology. For various reasons she ended up dropping out and managing a local bagel shop for 10 years. As she says now, she should have known geology was her calling when her 8 am Geoscience course was the only early class she went to every day. In 2009 Professor Connors started taking classes part time at Front Range Community College and officially started at CMU (then Mesa State College) in the fall of 2010 taking classes online while still working at the bagel shop in Fort Collins. She moved to Grand Junction with her husband, who is from the area, in January of 2011 to start in-person classes.

Marisa graduated with her undergraduate degrees in chemistry and geology from CMU in 2014 where she developed interests in sedimentary systems, geochronology, petroleum geochemistry and analytical chemistry. At CMU she was involved with long-term research projects under Dr. Andres Aslan involving detrital zircon geochronology, provenance studies, and sedimentology looking at Oligocene fluvial systems in northwestern Colorado and southwestern Wyoming.

In 2014 Marisa's life came full circle as she was accepted into Colorado State University as a fall 2014 Master's student where she worked as a TA teaching mineralogy and petrology labs. Her thesis research was in Rhenium-Osmium geochronology and sedimentology of Jurassic black shales from the Agardhfjellet Formation of Svalbard where she also learned to process samples from core to running them on a mass spectrometer.

After graduating in 2017 from CSU with a Master's in Geoscience Marisa took a position as a Quality Control Manager for a ready-mix concrete supplier. She was able to use her knowledge of geology and chemistry to design and improve concrete mixes for a variety of applications across a diverse region of climates from Steamboat Springs to Moab, Utah. She obtained multiple certifications in concrete technology during this time and holds the National Ready Mix Concrete Association's Level IV Concrete Technologist which is held by only 286 people in the country.

Professor Connors started her current job in 2020 as a Lab/Project Manager for Yeh and Associates Inc. an engineering/geotechnical consulting firm. She continued to gain certifications in soils and

aggregate testing as well as asphalt. She gets to combine her management skills learned from the bagel shop with her technical and teaching skills learned through schooling. **There isn't really a typical day in this job which is part of why she enjoys it!** Marisa's duties range from training technical staff to equipment maintenance to construction materials testing/inspection to billing and admin work. She has been lucky enough to work on a variety of projects including airports, schools, national parks, and infrastructure across western Colorado and eastern Utah. She also gets to do outreach at school education events teaching middle and high schoolers about materials testing and construction.

In her spare time Marisa enjoys getting outdoors and exploring jeep trails, hiking, fishing, and camping. She also hosts a Lego Masters reality show recap podcast with her sister.

What Marisa enjoys most about teaching intro-level classes is finding ways to reach non-majors and peak their interests in geosciences and the world around them. Teaching Geology of Colorado is a great way to connect with students who are mostly from Colorado and involve them by including areas they find interesting throughout the state of Colorado.



Professor Marisa Boraas-Connors in the field.

FIELD CAMP 2022 – Greg Baker



2022 CMU Geosciences Field Camp in the Henry Mts. of Utah. Pictured left to right: Jackson Weber, Kyle Karren, Daniel Arinze, Brandi Maher, Kristopher Maurer, Dr. Verner Johnson, Dr. Greg Baker, Leyna Weller, and Hailey Peters.

Well, another successful Geology Field Camp season is in the books!! After a long successful run as the Field Camp director, **Dr. Rick Livaccari** passed the torch to **Dr. Greg Baker** for Summer 2022, and Dr. Baker participated in all six weeks of the course (Weeks 01-02 as instructor, and Weeks 03-06 as co-instructor). Like geology itself, some things changed, and some things stayed the same!

Week 01 was “skills week” where participants measured and correlated two stratigraphic sections focused on the Wanakah Fm (from Entrada Slick Rock Member up through the Morrison Tidwell Member) and also created a mini-map in Bangs Canyon to apply the important elements of geologic map making—all the while refamiliarizing themselves with all the ins-and-outs of Brunton compasses, GPS units, professional Field Books, and detailed lithologic descriptions.

Week 02, the crew stayed in the Grand Junction area, utilizing their detailed stratigraphic knowledge from Week 01 to create a geologic map of a ~2.5 mi² area west of Bangs Canyon.

The objective was to map the top of the Kayenta Fm. up through the base of the Dakota Formation. The final report incorporated several 3-point problems—based on their now-accurate formation contacts and GPS elevations—to determine hypothetical drilling depths to reach the top- and bottom-Wanakah Fm. contacts at three different locations. This exercise, therefore, simulated the usefulness of geologic mapping in hydrogeological and mining applications, where surface exposures can be used to determine formation locations at depth.

Speaking of some things remaining the same, **Week 03** was in the Henry Mountains, that old friend of many a CMU geology student! And, of course, the project was led by **Dr. Verner Johnson**—for what was rumored to be his 30th summer season!! We were down one participant—fortunately our only COVID-related issue of the summer—but had great weather to go with the awesome geology. For those of you who do not know the area, the map project encompasses only about a square mile, but has over 1000’ of vertical! Whew! So after working on sedimentary rocks that were mostly flat lying



CMU Geology Field Camp near Little Park Rd. Pictured from left to right: Kristopher Maurer, William Myers, Cole Wood, Daniel Arinze, Jackson Weber, Leyna Weller, Kyle Karren, and Hailey Peters.

and mostly unfaulted in Week 02, the crew now had to contend with highly-deformed sedimentary & igneous rocks interacting with complex topography. Once you've mapped it, you'll never forget!! The Week 03 project is the first project "away from home" so in addition to complicated geology the participants had to settle in to camp life. We had at least one professed "camping virgin" who had never spent even a single night in a tent—but everyone was a pro by the end (and we had some excellent group meals!!).

Week 04 was led by **Dr. Julia McHugh**. The project was located among the fossil sites of north Rabbit Valley, west of Fruita in the McInnis Canyons National Conservation Area. This week incorporated paleontology—re: dinosaur hunting!!—into the project. Specifically, students measured stratigraphic sections at several locations to get detailed sub-member layer thicknesses, and then incorporated those data with GPS elevations of known dinosaur-fossil exposures and their geologic maps to correlate different fossil sites and determine their relative ages. The participants final report outlined the fossil-bearing units and locations surrounding four dinosaur quarries, including the famous (or infamous!) Mygatt-Moore Quarry. Oh, and there was an excellent behind-the-scenes visit to the paleontology lab of the Museums of Western Colorado's Dinosaur Journey Museum, where a highlight was Dr. McHugh taking "bucket list" requests for specific fossils to actually touch—Allosaurus claws and C. megalodon teeth were favorites!

For another example of some things changing, **Dr. Javier Tellez** was the lead instructor for Week 05 for the first time.

Week 05 was located in Escalante Canyon, and participants not only mapped the area but they also generated high-resolution stratigraphic sections (three in all) in the Escalante and Rattlesnake Canyons. These sections were analyzed in detail for depositional environment and sequence stratigraphy, and used to build a model of the distribution of various deposits throughout the area. Oh, and each group used a scintillometer to measure radioactivity every foot up their sections. This also enhanced the pedagogy of our camp by allowing participants to understand the utility of proxy data from boreholes to delineate strata (specifically, radioactivity is well-correlated to the presence or absence of shales in the sequences).

Week 06—the final week of the course—led by **Dr. Andres Aslan** brought the group to Browns Park in Utah after touring the eastern part of Dinosaur National Monument and the Gates of Lodore, magnificently sculpted by the Green River! The trip up was not without its challenges—the Mormon crickets (*Anabrus simplex*) were out in abundance and made driving interesting (and loud!)—but everyone arrived safely for their final week. The conclusion of Field Camp moved into geomorphic realms with a project focused on gravel terraces of the Green River. Specifically, participants were required to map the locations and elevations (with GPS) of the strath terraces to unravel the uplift and erosional history of the Green River in Browns Park.

So all in all, another great Field Camp season! Special thanks to all of the CMU faculty participants—Drs. Aslan, Baker, Johnson, McHugh, and Tellez, and Brandi John (field assistant). In addition, a **HUGE** thanks goes out from the participants to all of the generous Grand Junction Geological Society individuals that donated Field-Camp scholarships to: **Daniel Arinze, Kyle Karren, Kristopher Maurer, and Cole Wood. Thank you GJGS!**



GJGS members Rex Cole, Bill Hood, Jerry Daub, Ben Haveman and GJGS Field Camp scholarship recipients Cole Wood, Kyle Karren, Kristopher Maurer, and Daniel Arinze.

GEOSCIENCES IS INTEGRATING TECHNOLOGY

With The Aim Of Increasing Student Engagement
And Improving Workforce Development – **Kerry Riley**

New field-based methods to conduct repeat surveys of evolving landscapes were integrated into GEOL 402: Applications of Geomorphology during the 2022 Fall semester. Emphasis was on structure from motion (SfM) photogrammetry with a supporting component of using the global navigation satellite system (GNSS). SfM was completed using ground-based platforms (hand-held), but can be easily adapted to uncrewed aerial systems (UAS=drones; Drone Class offered Spring 2023). Georeferencing was completed using a real time kinematic (RTK) GPS/GNSS. The new field-based methods are being piloted in GEOL 402 and will be adapted and refined for integration into Geology of Canyon Country, River Dynamics/Hydrology, Environmental Geology, and Physical Geology Lab.

Field experience and methods are integral parts of the Geosciences Program at CMU, and we have a long-standing tradition of immersing students in the breathtaking geologic landscapes that encompass Grand Junction. Research technologies in the Geosciences are growing and there are numerous benefits to integrating geodetic methods into field courses. Technology integration into field-education can increase student engagement and improve workforce development. Students travelled to field sites and learned how to plan and execute a Structure from Motion survey using RTK GPS to georeference the high-density point clouds the students created. Students planned and executed an RTK survey of fire-related debris flows in Glenwood Canyon and surveyed post-flood channel change in Ladder Canyon near Colorado National Monument. Societal challenges addressed by these method might include 1) measuring migration of a river channel near a valuable resource or infrastructure, 2) measuring movement on landslides, earthflows, or slumps, 3) measuring motion of monuments on a glacier, glacial retreat or snowpack change, 4) measuring scarp surfaces or profiles to evaluate earthquake hazards, 5) creating topographic models of a floodplain to calculate flood volume and evaluate flood hazards at various

stages, or 6) creating digital elevation models to determine slope stability following wildfire.

The next steps to fully integrate these new techniques into other Geoscience classes will be to acquire funding to purchase software for the Geosciences computer lab. Students used a 30-day free trial license of the required software during the fall semester and a similar plan is in place for the spring semester. Funding avenues are also being pursued to purchase a teaching set of rovers and a base station to conduct high-precision RTK GPS surveys to support Structure from Motion field-based classes and labs in the future.



Applied Geomorphology students Leyna Weller (left) and MJ Winey (right) survey ground control points using a rover and base station to make precise Real Time Kinematic GPS measurements in Ladder Canyon.

GJGS CHENOWETH FIELD TRIP TO THE BOOK CLIFFS

– **Andres Aslan**

In early September, ~43 GJGS members as well as CMU Geosciences students and faculty gathered for the annual Chenoweth Field Trip. This year, the trip was led primarily by **Rex Cole** and **Steve Cumella** who took us on a transect eastward across the Book Cliffs from Hunter Canyon to Plateau Valley. Discussions focused on Cretaceous strata including the Mancos Shale, Iles Formation shoreface sandstones, the Williams Fork Formation, and the enigmatic Ohio Creek interval. Overall, we had a great day in the field looking at perhaps the most iconic strata in our area, which is something that one can easily take for granted!

FRIENDS OF THE PLEISTOCENE FIELD TRIP

– Ice Ages, Yellowstone Ice Cap, and the ‘Bone of Contention’ in Grand Teton National Park – **Kerry Riley**

Four students from the Geosciences Program (**Miles Garrison, Faith Urbin, Graceanne Hanson, and Jeffrey Lenahan**) attended the 2022 Rocky Mountain Friends of the Pleistocene (FOP) field trip to Jackson Hole, WY and Grand Teton National Park in late September. The fieldtrip honored the legacy of Ken Pierce and his extensive body of research on the last two ice ages and glaciation, tectonism and faulting, slope processes, lake records, basin evolution, paleoclimate, and the environmental history of the area.

The field trip included three nights of camping, two full days of field stops, and an evening campfire celebration with Geoscience-themed songs and an award ceremony. Field trip stops were packed with multidisciplinary discussions about methods and techniques, published and hot-off-press results of optically stimulated luminescence and radiocarbon ages and terrestrial cosmogenic nuclide ^{10}Be exposure ages, and interpretations. The trip included a 6-mile hike across glacial deposits to glacial lakes with sediment core records, and to glacial deposits that are

crosscut by a fault scarp. At the campfire celebration, awards were given out to recognize volunteer efforts put forth by field trip leaders and where the ‘Bone of Contention’ was awarded to the most contentious field trip discussant!

Overall, the 2022 Rocky Mountain Friends of the Pleistocene field trip to Jackson Hole and Grand Teton National Park was a great learning opportunity for everyone that participated!

ADAM TRUMBO MEMORIAL SPRING FIELD TRIP

– April 1st, 2023

The Geosciences Program plans to hold the annual Adam Trumbo Memorial Spring Field Trip on Saturday April 1st 2023 (date is tentative). We plan to visit the Moab area. If you are interested in attending, please email aaslan@coloradomesa.edu.

MAVERICK GEOLOGY ALUMNI

Myah Baker ('22) graduated in May but hasn't left; she is now working at CMU as a Colorado Opportunity Scholarship Initiative (COSI) advisor in the Office of Student Success and Engagement. Myah is also looking into graduate school opportunities.



Alumnus Jordan Walker in his M.S. Navajo Sandstone field area in southeastern Utah.

Karlie Hadden ('22) and **Abby Winkler** ('22 Geo minor) are both enrolled in Geosciences M.S. programs at the Colorado School of Mines. Abby's advisor is alumna **Dr. Alexis Navarre-Sitchler** ('00)! Karlie and Abby attended the GSA meeting in Denver and are doing well in the early stages of their graduate studies.

Jordan Walker ('20) graduated with his M.S. in Geology from Southern Illinois University in '22 and is currently enrolled in a Geology Ph.D. program (focusing on isotope geochemistry) at Baylor University. Jordan's thesis was "Stratigraphic reevaluation of Mollies Nipple, Kane County, Utah, USA to better understand the origin of alunite and jarosite cements." Jordan's thesis was supervised by alumna **Dr. Sally Potter-McIntyre** ('06)! Jordan plans on publishing his thesis soon and will present his work at the February GJGS meeting in 2023!

Miriam Kane ('20) is currently working at Gaston Design, LLC in Fruita and is also applying to graduate schools.

Alexandra Price ('15) is currently teaching full time as a Geology instructor at a junior college in Texas and she is also an adjunct for the geology program at the University of Texas of the Permian Basin where she earned a M.S. Alexandra is also considering getting her Ph.D. from the University of Houston, and recently published a Geology course for distance learning! Alexandra also worked for Field GeoServices for two years and was involved with the training of alumna **Rachael Lohse** ('18).

Ben Haveman ('13) is in a new job working for RESPEC, a mineral resources company, exploring for rare earth elements including lithium. **Tristan Bates** ('18) essentially took over for Ben when he left Agapito and Associates, and is involved with geological engineering studies.

Caden Anderson ('22) is working for Ivanhoe Electric, along with **Jarad Lavelle** ('21), which is part of Global Mining Services, as a geologist in Eureka, UT.

Tammie Lee Crossen ('09) checked in with Verner and let us know that she is currently teaching geology at DeBeque High School. Congratulations!

Eric Farmer ('01) is similarly teaching geology courses for D51 at Grand Junction High School and his Physical and Historical Geology classes are concurrent courses with CMU so that high school students can get college-level credit while still in high school.

Lastly, **Andres and Shawn Labounty** ('00) got together this past summer for a day in the field unraveling the mysteries of the evolution of the North Fork River valley After 20+ years, Shawn is still puzzling over the valley's origins!

To all our alumni, we love to hear about your recent activities and endeavors. Please drop us a line (or visit) and let us know what you are up to!

GEOSCIENCES PROGRAM SUPPORT

We are trying something new this year. If you are interested in donating to the Geosciences Program, the CMU Foundation has established a website with a list and description of our current program funds and scholarships. No more checks in the mail!

TO DONATE, SIMPLY VISIT:

<https://www.supportingcmu.com/geosciences>



Dr. Andres Aslan and alumnus Shawn Labounty on the bank of Shawn's stomping ground – the North Fork River near Hotchkiss.