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Written by Lauren Kew

PDAC Field Trip Funding Report

Dalhousie University Advanced Field School 2023

This spring, six undergraduate students in the Dalhousie University department of Earth Sciences had the opportunity to take part in Advanced Field School (ERTH 4002). This four-week field course brought students across the Mohave desert, beginning in Utah, and spanning both Nevada and Northern California. The trip was led by Mike Young and Dr. John Gosse, both who have extensive knowledge of the area and specialties extending from stratigraphy to structural geology.



Figure 1. Our group near Red Rock, Nevada. From left to right: Brooke Reid, Tristan Leclerc, Ingrid Helmke, Cameron Green, Lloyd Olson, Lauren Kew.

The geology in this region was breathtaking, and students were able to develop their mapping and field techniques in both a professional and exciting setting. The field school was organized like many mineral exploration projects and Geological Survey of Canada field camps, with a base camp, rotating camp chores, and daily field work or traverses in small groups and semi-independently.

On April 27th, students departed from Halifax and arrived in Las Vegas. The views of the basin and range landscape from the plane brewed an initial excitement within us all. The Advanced Field School Orientation course (ERTH 4001) in the winter semester prepared us for this type of environment but seeing it in person for the first-time sparked enthusiasm. From Vegas, we stayed in St. George, Utah before setting up camp at Valley of Fire, Nevada. Valley of Fire became our first base



Figure 2. Our tents set up at our first camp in Valley of Fire, Nevada. The campsite was beautiful and camping amongst the rocks we were learning about was spectacular!



Figure 3. Student presenting his poster on the depositional history of the Aztec Sandstone formation.

camp, and we began our first project at Rainbow Gardens. This project focused on the regional stratigraphy and sedimentology with an emphasis on Miocene basins formed by a combination of tectonic and climatic processes. During this project, we began to tune our eyes to the stratigraphy of the area and see the concepts that we had learned in class come to life. We also became acquainted with the challenges and rewards associated with long field days. At the end of this project, each group submitted a stratigraphic column of the area, and we presented our findings to one another with guided tours in the field.

Project #2 began with a camp move to Beatty, Nevada. From here, we spent several days working in Monarch Canyon. Monarch Canyon is a structurally diverse region that exhibits great examples of the active tectonics and metamorphism associated with large shear and fault zones.



Figure 4. Fieldtrip to unique tuff columns in the Sierra Nevada region, California.

Working in pairs, we mapped this area based largely on mineralization from regional metamorphic processes. We also worked on our measuring (bedding and lineation) and orienteering skills in preparation for our large independent mapping project at Big Poleta.

From Nevada, we travelled to Panamint Valley, California. For our third project, we mapped an alluvial fan. This project focused on active tectonics and how they are revealed through sedimentary structures and the interactions of geomorphology on the landscape. The small-scale features that we identified at Manly Fan revealed a history of active tectonics within the valley which tell part of the story of regional basin and range tectonics. Here, students were able to identify and map faults associated with active fault zones such as the Eastern California Shear Zone (ECSZ).



Figure 5. View of a saline lake from the Big Poleta folds area.

For our final camp move, we ventured into the White Mountains in Northern California. The Ponderosa pines and rushing glacial streams of the Sierra Nevada were a treat after nearly three weeks in the desert. From our camp at Westgaard Pass, we began our final project at the Big Poleta Folds. This 10-day long project combined all the skills that we had developed throughout the trip. Big Poleta beautifully displayed the compressional tectonic processes and fold-and-thrust belts of the Sevier Orogeny and associated magmatic arcs of the Sierra Nevada Batholith. Students gained practical knowledge and hands-on-experience working in a structurally complex area. This project developed our confidence in the field, and we learned the importance of time management, problem solving, and teamwork.

On top of the large projects that I have described above, we also each presented a poster in the field on a topic of our choice. Further, sprinkled between projects were ‘field-trip days’ that provided background information on our projects and allowed us to dip our toes into some spectacular

geological areas. For instance, we visited the Big Pine Skarn, which introduced us to how the geological processes we had been learning about affect regional metallogeny.

In general, the skills that we developed during our 4-week long field school in southwestern USA far exceeded classroom-based learning. This experience familiarized us with remote camp life and promoted the practical skills that are much needed in many Canadian exploration and research fields. In a relatively short period of time, we were able to build on many of the skills that we have been developing throughout our time at university and delve into what a career in the geosciences might look like. The skill sets that we developed undoubtedly bettered our understanding of geology and exposed us to the endless opportunities available for our futures. This experience pushed us both personally and professionally, and we are so thankful to have engaged in such an expansive learning opportunity outside of the classroom.



Figure 6. Our group on our last day at Big Poleta after presenting our interpretations of a geologically complex section known as “The Scissors”.

We would like to thank PDAC for your generous contributions to our program. For many, this type of funding means the difference of attending field schools like this or not. The costs of this field school add up quickly, and it is donations like yours that make this type of learning possible. Unfortunately, our university experience and access to field-based learning over the last few years was affected by the pandemic. This field experience was especially appreciated following the changes related to online learning due to COVID-19. Thank you again. In the coming summer months, some of us will be working in remote exploration camps across North America and others will be taking part in research at Dalhousie. Nonetheless, we are all better equipped to contribute to our workplace and reach our goals as young geologists.



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