

DALHOUSIE ADVANCE FIELD SCHOOL
SUMMARY REPORT

Submitted to:

Offshore Energy Research Association of Nova Scotia (OERA)

To fulfill the requirements of the Student Research Travel Program

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INTRODUCTION

The Earth Sciences department at Dalhousie University has run a geological mapping field course in parts of Nevada and California for the past five years. The 2016 field school that I attended ran from April 26 to May 23. This course has been designed and run by Mike Young and John Gosse who lead us as instructors for this course. The curriculum they created has evolved over the years into a fantastic way for students to take knowledge learnt in the classroom and apply it out in the field, as well as provide an opportunity to experience remote camp life. The course has been broken down into four different projects, each focusing on separate aspects of geological mapping so as to attempt to grasp the tectonic history of the region.

This course has been one of the most challenging and enjoyable that I have taken at Dalhousie. It has been a unique experience and privilege to be able to have spent a month with exceptional leaders such as Mike and John, as well as our three Teaching Assistants. A field school such as this is nothing without the twelve other keen, like minded peers that made this experience what it was. Unfortunately this experience comes with a great amount of cost that makes it inaccessible to many students. We thank OERA for being able to offset some of these costs, in order to support our students.

TRIP DETAILS

Throughout the duration of the month, students completed four different projects covering various components of geological mapping:

1. Rainbow Gardens Formation – sedimentology and stratigraphy: This project was located in the Valley of Fire state park in southeastern Nevada. While working in partners, the goal was to create a stratigraphic log of about 1 km of section. We then defended our interpretations about depositional environment and tectonic implications of the stratigraphy to our classmates.
2. Kit Fox Fan in Furnace Creek, Death Valley: again working in partners our job was to map the ages of the alluvial fan surfaces based off of desert pavement and varnish development and pedogenic carbonate. Here we had more of an introduction into using air photos and GPS's as tools to help. Numerous strike-slip and normal faults cut the fan that we determined direction and distance of offset in order to relate it to the extension occurring in the region.
3. Monarch Canyon metamorphic core complex: our third project consisted of mapping a 4 km long section of canyon by looking at mineral assemblages and metamorphic structure in order to establish the ages of three different metamorphic events that occurred in the region.
4. Poleta Folds (White Mountains, California): this last exercise was an independent project that spanned over 8 days that required students to produce a map and 3 cross sections of the Cambrian Poleta formation, which is a section of well exposed sedimentary rocks deformed by multiple folding and faulting events.

The 2km by 3km mapping area encompassed this heavily deformed formation in a landscape of deep washes and rolling hills. Both frustrating and satisfying, this project was a truly unique experience.

Besides the main projects, we had a few geotourism days during camp moves where we took the time to experience some of the spectacular geology unique to this area. Sites such as Badwater Basin sitting at 282 ft below sea level making it the lowest point in North America, climbing 14, 000 ft into the Sierra Nevada's for spectacular views, and exploring some of the longest living life forms on Earth, the bristlecone pines. We experienced enormous elevation changes, the effects of ancient volcanism in the form of collapsed craters, extensive ash deposits and hot springs. These are a few of many textbook examples of geological formations in this region.



Figure 1: The whole crew on one of our geotourism days, visiting Artist's Drive and Palette consisting of oxidized tuff (Honsberger-Grant, 2016).



Figure 2: Our first campsite in the Valley of Fire, featuring intense rust coloured eolian sand (Honsberger-Grant, 2016).

BENEFITS OF TRAVEL

This experience has given me the hands on approach to learning that I believe is the most effective way to understand a concept. By having the opportunity to be out in the field and seeing these features in front of me, all of these structural formations and process that I had difficulty grasping in the classroom, I found there were many moments where everything finally clicked and made sense. As well, having two professors with a wealth of knowledge keen to pass on, it was a great opportunity to pick their brains about anything that was not clear.

Besides the geology side of learning, camp life was a large part of field school. As a team we became experts at working together to quickly and carefully take down and set up camp, as well as work in smaller groups to make meals and clean up. Everyone fell into their own leadership role over the course of the month so that everything ran smoothly.



Figure 3: Up at 3:30am to watch the sun rise over the Sierra Nevada's (Honsberger-Grant, 2016).

OUTCOMES OF TRAVEL

Over the course of the month we completed four projects, three of which were completed with a partner and the last one independently. From these we produced a number of maps and reports with our interpretations of our mapping areas. Geological mapping is something that takes a lot of practice to tune the eye. It is one thing to memorize terms and concepts in a classroom, but something completely different to see and understand the same things in the field. I believe I have come out of this course with a greater understanding of geological concepts, processes and formations.

Living and working with 12 other peers created relationships and bonds that have been one of the most valuable things I have taken away from this course. Seeing each other at our best and our worst and living in such close quarters for such an extensive period of time has created long lasting friendships.

SIGNIFICANCE TO NOVA SCOTIA

By funding trip such as our advanced field course, this gives students an opportunity to see unique geology that is unavailable locally. Earth Science students such as ourselves are the future of Nova Scotia's energy research, therefore the more exposure we have

to geology other than what we see here in Nova Scotia, the better-rounded geologists we can be.

By connecting concepts we have learned about and seen in Nova Scotia, with similar geology in the region of our field school, this creates a stronger understanding of local systems. These students are bright and eager to start their careers in Atlantic Canada's offshore research, and by helping to fund trips such as these; OERA is giving opportunities for students to have successful futures in this field.

ACKNOWLEDGMENTS

I would like to acknowledge Mike Young and John Gosse for the extensive amount of time and dedication that they have put into making this field school run like a well oiled machine. Their knowledge and careful instruction created a fun and productive learning environment, and an overall unforgettable experience.

I would also like to thank OERA for helping to fund this field course, and helping to make this trip a possibility.