UBC SEG AUSTRALIA TRIP

MAY 2023

THE UNIVERSITY OF BRITISH COLUMBIA

Itinerary May 2023

6th - James Cook University tour
7th - Billabong Sanctuary
8th - Pajingo Mine tour
9th - Ravenswood Mine tour
10th - Australian Age of Dinosaurs Museum tour
11th - Ernest Henry Mine
12th - Cannington Mine
13th - Day off in Cloncurry
14th - Mary Kathleen Mine
15th - Day off in Mount Isa
16th - EGRU Mineral Systems of the Mt Isa Inlier Workshop Day 1
17th - EGRU Mineral Systems of the Mt Isa Inlier Workshop Day 2
18th - EGRU Mineral Systems of the Mt Isa Inlier Workshop Day 3 Fieldtrip

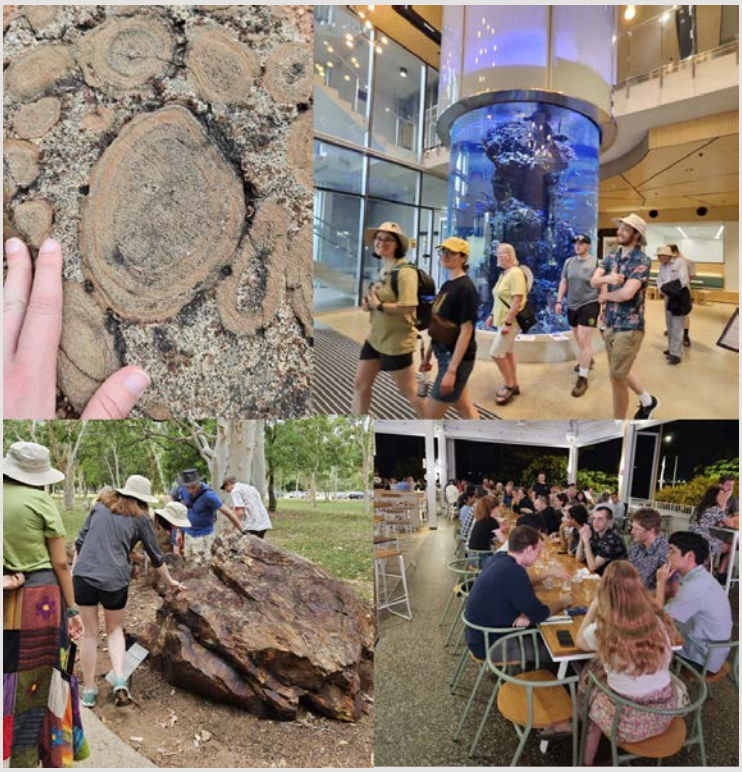
Trip Attendees

- Catriona Breasley
- Mary Macquistan
- Ben Eaton
- Filippo Maria Vescovi
- Ian Goan
- Rachel Webb
- Helen Kopystecki
- Sasha Ubhi
- James Blewman
- Charlie Barrett
- Linda Dandy
- David Nickerson

Thank you to our sponsors!

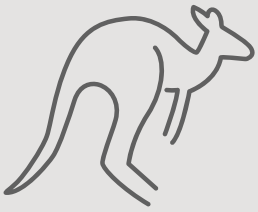
UBC SEG would also like to thank the MDRU finance team for logistical support.

JAMES COOK UNIVERSITY
6TH MAY

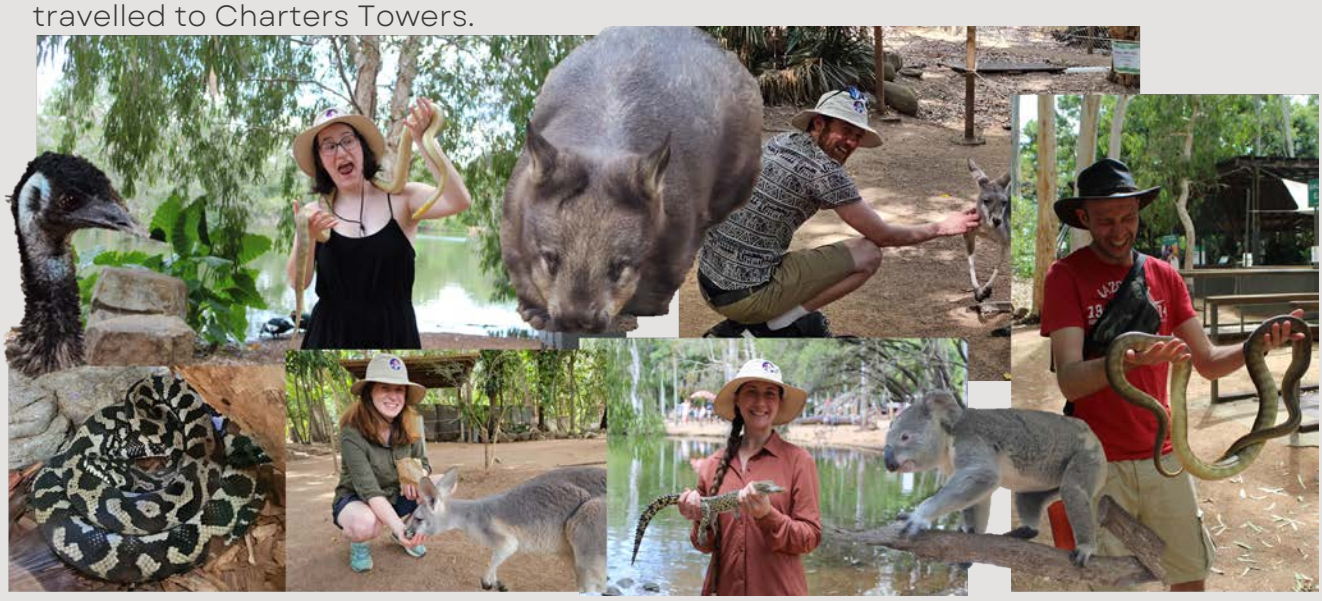


For the first official day of the trip, most students went out for an Aussie pie for breakfast. The group packed up and headed to James Cook University for a tour of the campus lead by graduate students Alanis and Grace. We visited the Earth Sciences building and spent time in the “rock garden” discussing examples of various ores and host rocks from mine sites across Queensland. Following the tour, the group made a quick trip up to Castle Hill to get a view of Townsville from above. Finally, the day ended with an EGRU sponsored dinner with the grad students from JCU.

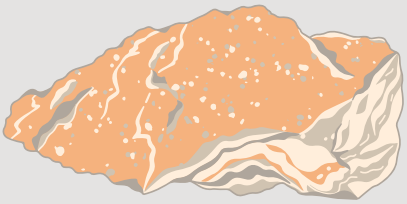
BILLABONG SANCTUARY
7TH MAY



On the 7th of May the group headed to Billabong Sanctuary to see some of the local wildlife of Australia. Highlights included getting to hold a snake, watching the crocodile show, and getting to feed kangaroos by hand. Following this visit we travelled to Charters Towers.



PAJINGO MINE 8TH MAY



EPITHERMAL AU-AG

Our first mine visit was to Pajingo. Several samples of the country rock, ore, and low-sulfidation epithermal textures were examined during the initial presentation to give us context of the rock types at this deposit. Metallurgists and exploration, resource, and logging geologists were all present to answer our questions. We were lucky to see the "discovery outcrop" where exposed epithermal textures were visible at the surface. This was an area that was deemed uneconomic after being explored several years ago. After this, we saw some characteristic drill core of the deposit in the core shack. A classic Australian BBQ meal was generously provided and we were able to chat with multiple company employees over lunch. After the mine tour, we travelled back to Charters Towers to watch a film on the history of Charters Towers gold in an open air amphitheatre.

RAVENSWOOD MINE 9TH MAY

VEIN HOSTED AU-AG

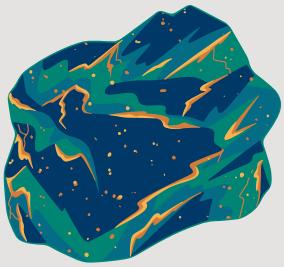
On May 9th, the group visited the Ravenswood Gold mine, the largest gold mine in Queensland, Australia. The visit began with a presentation, discussing regional geology, mineralization, data analysis and exploration. Following this, we made our way to the core shack, where core with vein hosted gold was presented. The Ravenswood team took us to "the White Blow" an outcrop made entirely of quartz.

Next, we were taken to a lookout point, from which we could look into an active pit. The geologists pointed out major visible structures and ongoing operations. To conclude the tour, we visited another lookout into a different open pit operation on site, which has been filled with rainwater. For lunch, we went to an old haunted hotel where we enjoyed hearing ghost stories from the owner.

AGE OF THE DINOSAURS
10TH MAY

We ate lunch with a spectacular view of the surrounding desert at the Cretaceous Cafe and browsed the gift shop before our tour. We began with a tour of their lab where they work to uncover and preserve fossils found in the region. Afterwards we entered the Collection Room and were shown a video explaining the history of the fossil discoveries in the region, and a presentation of their most famous fossil specimens. Finally we visited the March of the Titanosaurs exhibition featuring a recently discovered 54-meter-long sauropod track site and walked through dinosaur canyon. Concluding our visit to the Australian Age of Dinosaurs we drove back to Winton and checked out the main street, which featured many opal shops selling locally mined opal. The group visited one of these shops, and the owners were kind enough to speak to us about their opals and the local opal mining in the area. Most of our group members purchased rock samples containing opal from the shop's excess bins. We enjoyed drinks and dinner including spring rolls of kangaroo meat from our hotel restaurant. Finally, since Winton is classified as an International Dark Sky Sanctuary, we went outside for some stargazing and observed the beauty of the milky way.

IOCG
CU-AU



ERNEST HENRY MINE 11TH MAY

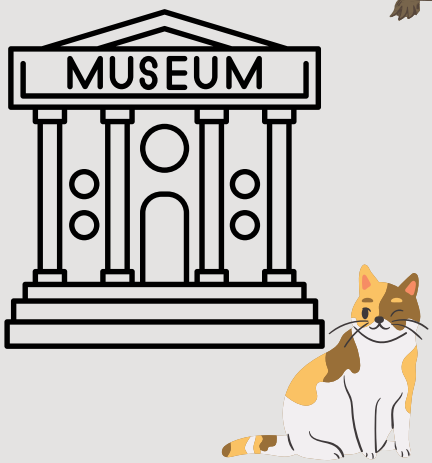
The team gave us a short presentation on the local geology, the ore body, indicators for gold within the ore, and about the structural controls within the deposit. After this presentation we were on the core, looking at some of the best intercepts from the deposit. A breccia matrix of magnetite and chalcopyrite hosts all economic mineralization at Ernest Henry and in sections is massive with very few clasts. They showed us different ore classifications called the “Spotted Dog” and “SGBX”. The Spotted Dog has a high carbonate content and indicates higher than average gold to copper ratios while SGBX is nearly massive magnetite and chalcopyrite with very high copper grades. After the core viewing we were shown a drone video of the open pit which highlighted the progressive sagging and slumping of the pit wall due to the underground block caving below the pit.

CANNINGTON MINE 12TH MAY

BROKEN HILL STYLE
PB-ZN-AG

The mine visit started with a technical presentation which overviewed the regional and local geology, as well as information about the basic operations of the mine. Then we viewed the most recent mine core and were able to see the sphalerite and galena, which hosts the Zn and Pb. Lastly, the South32 team drove us out to see the drill rig ran by the exploration team. The drillers demonstrated how they operated the rig, which included automated components. For some, this was the first time being at a drill rig, which was a great opportunity. South32 generously gave us gift bags and provided lunch.

DAY OFF IN CLONCURRY
13TH MAY



URANIUM DEPOSIT

MARY KATHLEEN MINE
14TH MAY

After checking out of the motel in Cloncurry the group spent the day driving to Mount Isa taking multiple stops to see the scenery in the area. We stopped at multiple memorials as well as a small lake, but the main event of the day was visiting the closed Mary Kathleen uranium mine. We passed through the fully destroyed old townsite with only foundations remaining before driving the van as far up the road as we could towards the open cut.

A short but very hot hike took us up to the edge of the pit. The geology on the hike was different from anything we had seen so far on the trip. Highly foliated gneissic rocks dominated showing no primary igneous or sedimentary textures. Veins were highly deformed when seen showing isoclinal folding. The pit itself was as beautiful . Highly acidic bright blue water (caused by copper staining) filled the bottom of the pit creating a stark contrast with the surrounding rocks. Minor sulfides and copper carbonates as well as fluorite were visible in some rocks, but no uranium mineralization was visible apart from a yellow stain on the far pit wall. We returned to the van and made it to Mount Isa where we BBQed and celebrated Ben's birthday.

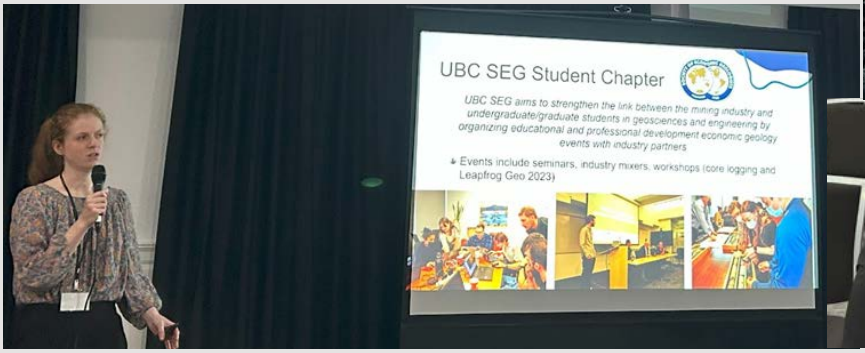
DAY OFF MT ISA 15TH MAY

After an early breakfast at our motel, we made our way over to the Outback at Isa center, which included multiple museums. At the center, we started with the Hard Times Underground Mine tour, which included an aboveground showing of their mineral collection, mine vehicles and mine equipment by a retired miner.

In the underground mine, we had a tour of the area, rode in a trolley, tried a drill and learned about the history of the museum itself. Following this, we visited the Riversleigh Fossil center, which presented a range of Cenozoic fossils from the Australian Riversleigh locality. We finished the day with a delicious BBQ dinner.

EGRU WORKSHOP DAY 1 16TH MAY

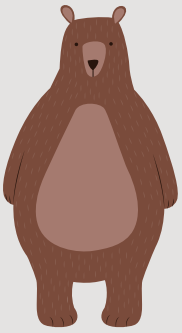
On May 16th, the group attended the first day of the EGRU Mineral Systems of the Mt Isa Inlier Workshop. The morning began with presentations which focused on topics such as geochemistry and lab techniques which are useful for understanding mineral deposit systems in the region. During this time, Catriona and Mary from our group presented a synopsis of our trip and briefly spoke on their individual research.

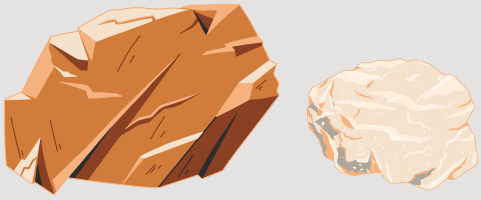


EGRU WORKSHOP DAY 2
17TH MAY

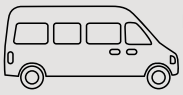
The group had a team breakfast before departing for the second day of regional, mine, and exploration presentations at the Mt. Isa workshop and afternoon tours of drill core from surrounding mines in the Mt. Isa Inlier. Highlights of the presentations were overviews of the Rocklands and Mt Colin copper deposits by Bruce Godsmark and Tom Manoy, a review of the exploration efforts by Carnaby Resources at the Greater Duchess Project, and a presentation on the structural controls and plumbing effects of shear zones for the formation of IOCG deposits in the Mt. Isa inlier. Ioan Sanislav presented an overview of the stratigraphy of the Mt. Isa Inlier that would be toured on the field trip on Wednesday.

After lunch, the workshop headed to the core viewing session at the John Campbell Mines Drill Core Facility. The core viewing session had core from George Fisher, Cannington, Dugald River, Maronan mines providing an excellent hands-on opportunity to see the geology and mineralization of the mines that the workshop presentations covered. The mine geologists from each mine gave the students a rundown of their core and explained the mine geology, structural controls, mineralization, and alteration displayed in each hole. The second day of the workshop ended with an evening social at the Mt. Isa Hotel where the students, industry participants, and the attendees of the workshop had snacks and drinks, discussing the presentations and core they had seen, the differences and opportunities of working in Canada and Australia, and debating which were worse – snakes or bears!





EGRU FIELDTRIP DAY 3

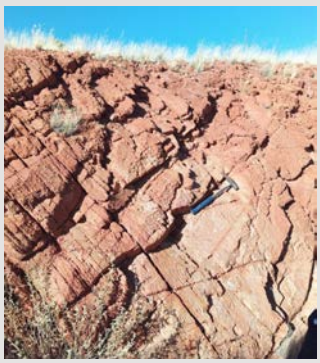


18TH MAY

Four outcrops were visited over the course of the field trip. The first stop showed the northernmost outcropping portion of the oldest metamorphic rocks of the regional sequence. This unit is the quartz-feldspathic Sulieman Gneiss, time equivalent to the Kalkadoon-Leichhardt belt at about 1862 Ma (intrusion time). Metamorphic grade increases from West to East. Two younger intrusions are present in the area (Sybella event). The second stop was the Bottletree formation outcrop. This formation represents either the base of the Haslingden Group (>1815 Ma), which uncomfortably overlies the Kalkadoon-Leichhardt units, or one of the oldest units in the Inlier, as it seems to be intruded by 1860 Ma granodiorite. Lithologies involved are mainly metasedimentary rocks, amphibolite, and metavolcanics, with some folded quartz veins.

The third stop was located on the West side of the Wonomo Fault. The Timothy Creek Sandstone (1792 Ma depositional age) is considered coeval to the Lena Quartzite occurring in the Mount Isa succession, while the metabasalts are related to the Eastern Creek Volcanics, which are considered the metal source for the Mount Isa mineralization. The quarzitic unit represents the top part of the Haslingden Group.The last stop allowed us to examine the contacts between the Mount Isa Group rocks (Moondarra Siltstone, Warrina Park Quartzite) and Jayah Creek Metabasalt and Eastern Creek Volcanics respectively. Blueish quartz veins resulting from intense silica alteration were associated with it. Occurrences of manganese dendritic patinas and spectacular sub-centimetric euhedral pyrite crystals within the vein's host rock were common, and we collected a few samples.

At each stop, there was time to collect some quick measurements and discuss the geological setting of the area compared to the Northern part of the succession hosting the Mount Isa Cu and Zn-Pb-Ag deposit. Our group would like to extend a huge thank you to the Economic Geology Research Unit (EGRU) at James Cook University for hosting such a wonderful, educational workshop and fieldtrip.



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