

Geology Exploration Field Trip Guide

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This field trip is designed to be an adaptable field trip to the Fredrick Albert Sutton Building, or geology building, on the University of Utah campus. It is designed to bring in 6th-12th grade science students to learn about the diversity of what a geologist studies.

Organizing the Trip:

Once a trip is set up with a teacher, an email should be sent out to about a week prior to the trip including the teacher and all the GG station volunteers. It should include:

- The data and time of the field trip.
- Dropoff location and bus parking information for the teacher.
- A request that the teachers divide their students into the same number of groups as there are stations *prior* to arrival (this makes things much easier!).
- The GG field trips leaders cell phone number, in case of last-minute coordination.
- Each of the GG station volunteers assigned roles and any needed room numbers.
 - Rooms should be booked through the department to make sure there is no overlap.
- Excitement! Anticipation!

Choosing Stations:

The number of stations depends on the trip length, number of students, and number of available GG volunteers. Often, 5 is a good number of stations for a 90-minute field trip, making them about 15 minutes each. Choosing which stations to include for a particular field trip depends on what the teacher finds most relevant to their curriculum or, if they have no preference, it can be up to the GG volunteers. The possible stations are listed below.

(1) FASB & Rock Slab Collection Tour

This activity is designed to show students the Geology & Geophysics Building, while also pointing out a handful of rock slabs where we can discuss a few different types of rock, how they form, why geologists care, and why anyone would care. The general pathway starts in the confluence looking at the fish wall, heads right into FASB and snakes through the second and third floors looking at and discussing the rock slabs along the way.

This station is not recommended if there is something else scheduled in the building at the time of the field trip. Even if not, the visiting students should be reminded to stay quiet so as not to disturb classes.

The best way to keep students engaged and interested is to ask them what each rock/rock slab looks like to them first *before* leading them into a discussion about what it actually is. Popular stops include:

- The Confluence
 - Fish wall; these are real fossils from the western interior seaway.
 - Floor; the pebbled river mimics running down the foothills and through the building and the tiles are Precambrian shale.
- Collection of sandstone features by the 2nd floor elevator.
- Columnar basalt (2nd floor)
- Mylonitized granite with garnets (2nd floor)
- Blue boudinage (2nd floor)
- Snowflake gabbro (2nd floor), good to try and compare to the basalt.
- Cephalopod limestone (3rd floor elevator)
- Eocene fish mass mortality rock (3rd floor, across from main office)
- Belemnite graveyard (3rd floor)
- Banded iron formation (3rd floor)

For more information about the building and the rock collection, see the GG webpage

(<https://earth.utah.edu/explore-the-fasb/explore-the-fasb.php>)

(2) Mineralogy Lab

This station is designed to allow students to explore macroscopic properties of minerals, aka. the characteristics that geologists use to identify minerals. It allows students to work together, make their own observations, and see how minerals come in many forms and hold clues about the conditions under which they formed.

Start with a short introduction about how we can identify minerals:

- *Optical properties:* To look at rocks under the microscope we cut them suuuuper thin, about as thin as a single strand of human hair (30 microns) and put it on a glass slide so we can see through it. We use polarizers to manipulate the direction that light travels through the minerals revealing microscopic features and optical properties.
- *Macroscopic properties:* These are looking at rocks just as you would pick them up outside in the field. Ask them what they would use to try and distinguish minerals (color, shape, hardness, luster...)

Activity Materials: galena, pyrite, hematite, ilmenite, calcite, blue calcite, grossular, pyrope, kyanite, andalusite, fluorite, halite.

For the activity, students can work together and make observations to try and pair up the minerals (some of them are trick questions!). After they pair them, you can talk about the “true” pairs and what makes them similar.

- Sulfides: pyrite (FeS) & galena (PbS)
- Oxides: hematite (Fe₂O₃) & ilmenite (FeTiO₃)
- End-members: garnet-grossular (Ca₃Al₂Si₃O₁₂) & garnet-pyrope (Mg₃Al₂Si₃O₁₂)
- Color imperfections: calcite (CaCO₃) & calcite (...but blue!)
- Polymorphs: kyanite (Al₂SiO₅) & andalusite (Al₂SiO₅); this is the tricky one since they don't look alike but are both aluminosilicates.
- Salts/Ionic compounds: halite (NaCl) & fluorite (CaF)

(3) Fossil Lab

This station explores the ways in which fossils can be preserved and how life evolved. Start with an introduction about fossil preservation.

Activity materials: 10-15 fossils ranging in age and preservation type.

For the activity, students can work together and make observations about fossilized animals to try and put them in chronological order. Once they have them mostly lined up, the station leader can begin to provide input to guide them. For younger age groups, giving them the first and last fossil is a helpful start.

(4) Hydrology

The activity utilizes the stream table. Here students can see how water changes and shapes landscapes. You can work with them to build river systems, beaches, and mountains. Then, how does changing the flow of incoming water change the river system? What does increasing the wave speed do to the beach and rivers? What does a tsunami do to the beach? This is meant to be a very hands-on station for the students visiting.

Prior to using the stream table check in with Christophe Brosson or Wil Mace (facilities managers) to make sure the stream table is ready to use and available for the trip. Leave time before the trip for them to teach the station leader how to operate the stream table, turn it on and off, and clean up.

(5) Campus Tour

This is a nice opportunity for some senior level students to explore a college campus if the weather is nice. There is often time to walk south of FASB to the Marriott Library and back around past the student union building. The station leader can talk about their college experience and let students ask questions.

(6) Special Topics

Station leaders can also bring in their own research expertise to create a new station. These stations have ranged from anthropology to rock magnetism, to seismology.

Advice for GG Station Leaders:

- Prompt students with questions as much as possible, if you have a point you want them to really get, ask them to make observations about it first, then give the answer.
- Say lots of really nice things when they make an observation, encouragement is HUGE for students. Even if they are not exactly right let them know they are making great observations, that they are being really thoughtful/insightful, that they are crushing it, etc.
- Talk about your own research and life path to science! If it feels like engagement is dwindling, ask them about how they think they interact with earth science in everyday life, and then talk about how this research is used in such a wide variety of ways
- If you are asked a question you don't know the answer to, it is totally ok to say "that's a really good question, I actually don't know", or "what do you think?" and feel free to look it up on your phone if it's convenient and talk about it with them (just don't make something up!)
- If they are talking over you/not listening well, do not be afraid to let them know this is rude and wait until they settle to continue.
- Have fun!!!!