

Virtual Field Trip to the Blue Ridge Province, Central Virginia

Instructors: Steve Whitmeyer and Lynn Fichter (James Madison University)

Welcome to the Blue Ridge (virtual) field trip for the James Madison University SST: Stratigraphy, Structure, Tectonics course.

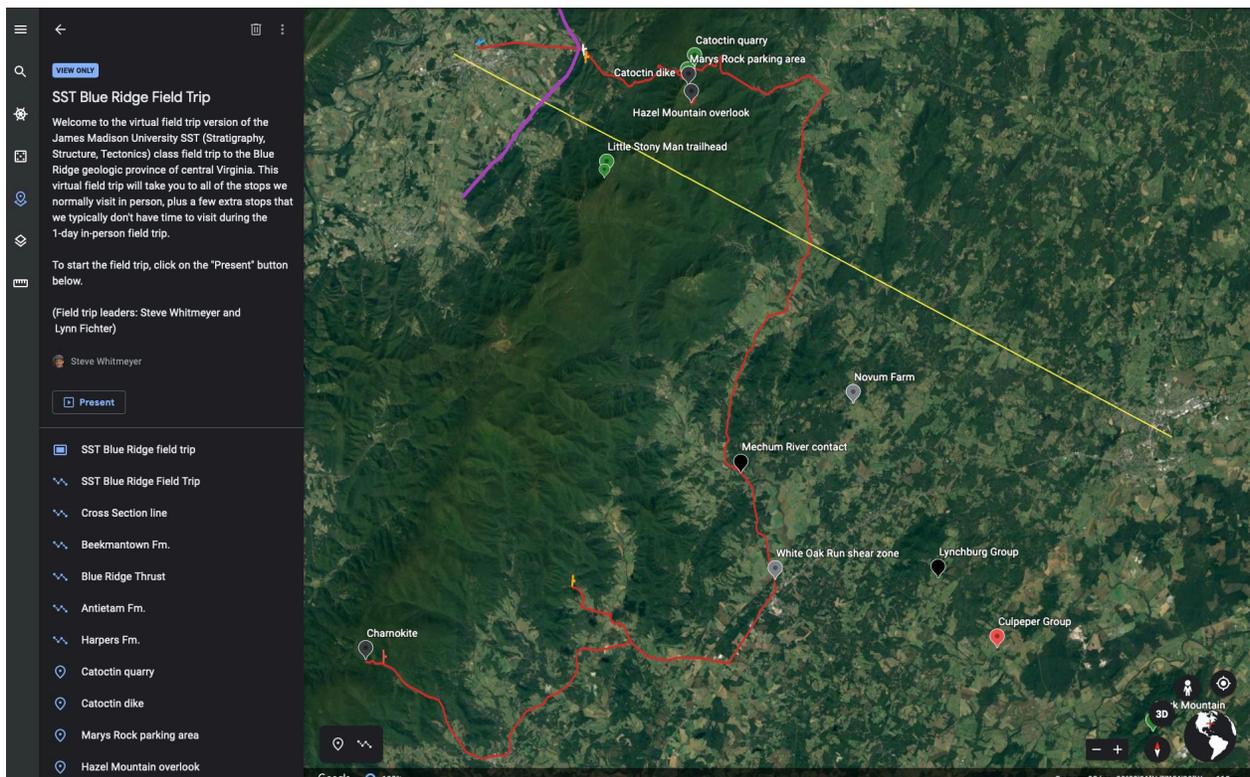
On this field trip you will visit several locations that feature a variety of geology, from Ordovician carbonate rocks to Neoproterozoic greenstones (metamorphosed basalts) to Mesoproterozoic charnokites (pyroxene-bearing granitic rocks). Each site has abundant geologic data that you will need to synthesize and integrate with data from other sites, in order to:

1. Draw a geologic cross section through the area, and
2. Write a geologic history of the region.

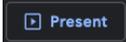
The virtual field trip is accessed by the link below, which will open in the web version of Google Earth. Note that the virtual field trip will not run correctly in the desktop version of Google Earth.

[Blue Ridge Virtual Field Trip](#)

When you click on the link, you should see an image like the one below in your web browser. The red line shows the general path of the field trip, from north to south. The field trip sites (or stops) are indicated by colored Placemarks or orientation (strike & dip) symbols. You will notice that there are some extra stops that are located away from the red line. These are alternate stops, but the information in these stops is still important for you to understand and synthesize.



You can click on any symbol/Placemark to view the information at that site; note that each site has informational text in the balloon or sidebar at the right of the screen, as well as images or videos at the top of the balloon or sidebar. Clicking on these images will enlarge them.

It is probably best to view the field trip locations in order, starting in the northeast, progressing south, and then ending in the southeast. The best way to do this is to run the field trip as a presentation; to run the presentation click on the blue “Present” button  at the left side of the screen. Prior to starting the field trip we recommend that you remove unnecessary text labels from the Google Earth ground view; you can do this by clicking on the Map Style icon at the left side of your browser window (6th icon down: ) and choosing the “Clean” map style.

You will need to take notes for each field trip site that document the stratigraphic, igneous, metamorphic, and structural features. You will use this information to determine the tectonic history of the Blue Ridge Province region over the last ~1.2 billion years. Don’t forget to consult and examine the diagrams in the Supplemental Materials packet.

Exercise Deliverables

Once you have visited all of the field trip locations (probably multiple times!) and collected detailed notes, you will need to prepare two items to turn in to your instructors: 1. A geology history of the field trip region, including details of each unit/formation; 2. A geology cross section across the field area, depicting the geology as it exists today. Instructions for preparing these deliverables are below.

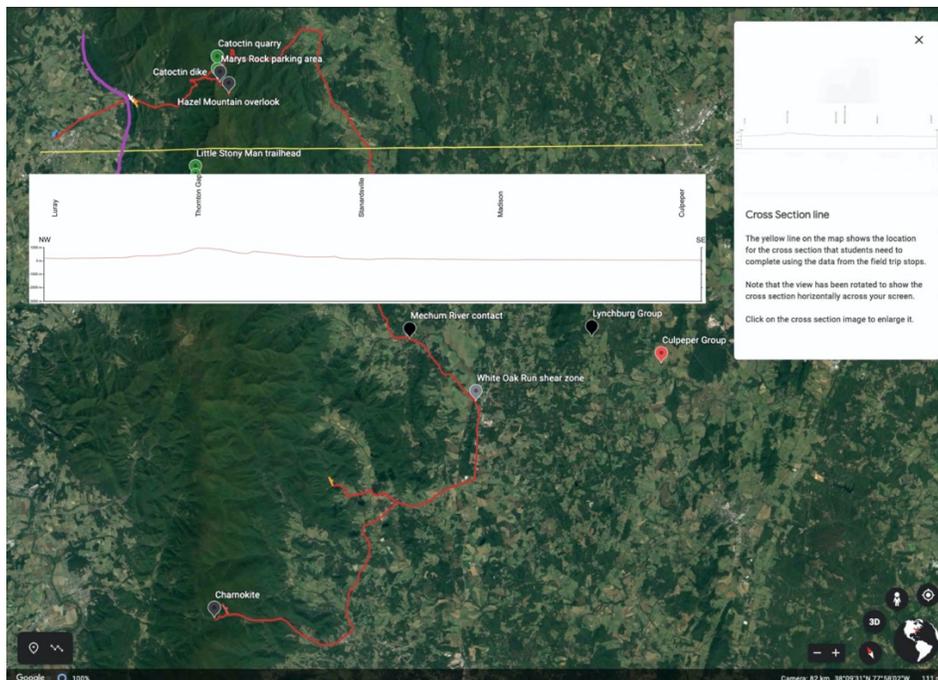
Deliverable #1: A Geologic History of the Blue Ridge Province Region

1. Arrange your field notes in sequential order from oldest formation to youngest.
2. Write a tectonic history from formation to formation in chronologic order, oldest to youngest, following the instructions below:
 - Begin each stage in the history with the formation name as its title.
 - For each formation, in a bulleted list:
 - Structure: Briefly describe orientation of bedding or foliation (or both), including deformation or faulting evidence.
 - Stratigraphy: Briefly describe (1 sentence ±) the facies elements: composition, color, texture, sequences (all those descriptive features of the rock).
 - Write the environmental interpretation, (igneous and metamorphic rocks also have “environments”) and the evidence on which you based it.
 - Write a summary paragraph of your tectonic interpretation, in the following order (~ 1 sentence for each point below, with your evidence):
 - the kind of tectonic/depositional basin that existed and your evidence for it,
 - how conditions have changed from the previously described formation,
 - the kinds of tectonic processes/events responsible for the formation’s deposition/emplacement/metamorphism/deformation, and in what sequence each event happened.

Your geologic history will be evaluated primarily on: 1. How well you use evidence from the field trip to logically argue or justify interpretations, and 2. How well you can weave a coherent tectonic story from formation to formation, based on theoretical models.

Deliverable #2: Geologic Cross Section across the Blue Ridge Province Region

1. Draw a geologic (structural) cross section of the Blue Ridge Province based on the evidence seen on the field trip.
 - On the Google Earth screen, the cross section is the yellow line that trends northwest-southeast, perpendicular to strike, from Luray through Culpeper (see the image below).
 - Use the attached cross section box to draw your cross section in a drafting program like Adobe Illustrator, PowerPoint, or Google Slides. The steps for drafting your cross section are as follows:
 - Align your cross section parallel to the yellow cross section line (see image below) and indicate where each unit/formation would intersect the cross section by extrapolating the locations up or down to the cross section box.
 - Mark the locations for each unit/formation on the cross section box and then determine where the contacts between the units would likely be located. As you rarely see actual contacts, you will have to infer these locations.
 - Draw in the contacts on your cross section as thin black lines, and then color the areas between the contact with a characteristic color for each unit (e.g. Beekmantown = blue, Catoctin = green, etc.)
 - NOTE: there are locations on the Google Earth field trip that are located away from (east of) the red line of the field trip, but you also must include the units/formation details at these sites on your cross section.
 - Your cross section should correlate with your geologic history (Deliverable #1), capturing the spatial and temporal relationships among the units/formations.



Your geologic cross section will be evaluated primarily on: 1. How well your cross section depicts a reasonable interpretation of the geology of the field trip region, and 2. Visual presentation and neatness of your drafted cross section. If you have questions about the mechanics of drawing a geologic cross section, talk to your instructors.