

Lauren Collins

Rock Study and Identification in the Field Study

Overview:

In this lesson students will use previous knowledge of different kinds of rocks and will travel to an outdoor environment where these can be viewed in person. They will be asked to identify three distinct kinds from the natural landscape. In this lesson the rocks discussed are [columnar](#) and [pillow lava](#) basalt and [erratic rocks](#) but the lesson can be modified to the study of rocks in any area. Students should already have a foundational knowledge of this before this field trip experience.

National Geography Standards:

7. The physical process that shape the patterns of Earth's surface

17. How to apply geography to interpret the past

Oregon Geography Content Standards:

2.7. Use basic information on maps and other geographic tools to locate and identify physical and human features of the community.

3.10. Identify and compare physical features of Oregon and other Northwestern states.

Oregon Science Content Standard:

2-ESS1-1. Use observations from several sources to provide evidence that Earth events can occur quickly or slowly.

Connections to Common Core:

2.RI.3 Describe the connection between a series of historical events, scientific ideas or concepts or steps in technical procedures in a text.

Objectives:

In completing this activity, students should be able to:

- With assistance, use a map to locate rock formations they see in person
- Describe how pillow lava ended up in the area we are studying
- Identify three different types of rock (columnar, pillow and erratic) in the natural environment
- Sketch and label the landscape noting the different rock types

Grade Levels: 2-3

Time: All day field trip

Materials:

- Several copies of maps of the area, in this case Columbia River Gorge (See Appendix A)
- Several student compasses
- Photo examples of different rocks, in this case columnar, pillow lava, and erratic (see Appendix B)
- Clip boards
- Pencils
- Erasers
- Assessment rubric for teacher (Appendix C)
- Lunches for the field trip (optional, depending on length of trip)
- Background information page and provoking questions for chaperones (Appendix D)

Background:

Students should already have had at least a week of instruction on the Missoula Floods, how long ago they happened, how rocks from far away places ended up in the Gorge, and how these rocks formed. Teachers can see referenced sources below and the embedded hyperlinks for Wikipedia pages on Missoula Floods, columnar basalt, pillow lava

basalt, erratic rocks, Latourell Falls, and Multnomah Falls for background information.

This lesson is a field study so they can observe evidence of this in person.

Students should be reminded of appropriate field trip expectations in regards to academic output and behavior. Students will be assigned into groups of 3-5 with chaperones who are responsible for the maps, compasses and clipboards. Chaperones should also be somewhat familiar with the vocabulary and concepts so they can help students. This information (Appendix D) can be distributed the week before so they can prepare for this trip.

Procedures:

Before leaving on the field trip, students will get a refresher on the information they have already learned on the different types of rocks they can and will see in the Columbia River Gorge.

5 minutes: Teacher will lead a reminder discussion about the types of rocks they have learned about, how they ended up in the area they are, and how this happened as a fast, catastrophic event, as opposed to a long, gradual change over time.

10 minute: Students will sit in table groups with photo examples of each rock (Appendix B) and they need to decide together if they are columnar, pillow lava or erratic rocks. Teacher should walk around the room and monitor for understanding.

5 minutes: Teacher will call on a student to remind everyone what the differences between these rocks are and how you can know for sure. Teacher will ask students to remember how the erratic rocks got to Oregon since they originated somewhere else. Teacher will let students know that they are going to go out in the field to find examples of

columnar, pillow lava and erratic rocks. Teacher should place students into chaperone groups and remind them of expectations.

If you are not located in the Columbia River Gorge area, teachers can look up local examples of the common rocks in the area. The example below is for the Columbia River Gorge/Multnomah County area but the same procedure can be carried out for any rocks.

30 minutes: Buses will arrive at the first rock location. For the Columbia River Gorge [Multnomah Falls](#) is a great example of pillow lava basalt. Students will bring their clipboards, paper and pencils and gather around the teacher. When they get with their chaperone groups, they will be instructed to first find the direction of north on the compass and then to find where they are on the map. After this they are to face the rocks and sketch what they see. They should label as much as possible as well and discuss with their chaperone groups if they think this particular rock is pillow lava or columnar and how they know.

30 minutes: Buses will arrive at [Latourell Falls](#) in Corbett, OR (6 miles away) to observe columnar basalt. They will do the same compass, map, sketch, and discuss procedure.

30 minutes: Buses will arrive at the [Erratic Rock State Natural Site](#), South of McMinnville, OR. Same procedure as previous stops.

30 minutes: Back at school, students will meet back as a whole group and the teacher will lead a discussion about what they saw, which rock was which and how they could tell. Students will complete a labeled diagram as part of the assessment of this activity.

Assessment:

When the students get back to class they will be asked to diagram and label what they saw that day using their rough field sketches. They should include labels of the areas we were, the types of rocks, and draw them with enough detail to show they know the characteristics. See rubric (appendix C) for further details.

Extensions and/or Adaptations:

Human Geography Extension - Over the next several lessons, students can continue their investigation and discussion of the formation of the Gorge through the Missoula Floods. Students can learn about how these floods created the Land Bridge located in what is now Cascade Locks and how the Chinook and other native tribes used this to access the north bank of the river until this was washed away when other waves of the floods came through. They can compare this to the Bridge of the Gods which is in the same location at present day. Students can discuss the similarities and differences between these two bridges and methods of crossing the river.

ELD or SPED - Students who are not able to write can verbally explain their diagram. They should still be able to tell the locations we visited and show they understand the difference between the rocks using their drawings. The teacher can add labels.

Gifted or Advanced - Students who are more advanced should write a paragraph telling about the rocks, their differences, where they were located, and how they got there.

Sources:

The Columbia River - Multnomah Falls, Oregon. (2010, September).

Retrieved August 11, 2016, from

http://columbiariverimages.com/Regions/Places/multnomah_falls.html

Columnar jointing. (2016, April 24). In *Wikipedia, The Free*

Encyclopedia. Retrieved 20:45, August 11, 2016, from

https://en.wikipedia.org/w/index.php?title=Columnar_jointing&oldid=716810193

Erratic Rock State Natural Site. (2016, July 22). In *Wikipedia, The Free*

Encyclopedia. Retrieved 21:31, August 11, 2016, from

https://en.wikipedia.org/w/index.php?title=Erratic_Rock_State_Natural_Site&oldid=731089125

Latourell Falls. (2016, July 20). In *Wikipedia, The Free Encyclopedia*.

Retrieved 21:31, August 11, 2016, from

https://en.wikipedia.org/w/index.php?title=Latourell_Falls&oldid=730611725

Missoula Floods. (2016, July 29). In *Wikipedia, The Free Encyclopedia*.

Retrieved 22:31, August 10, 2016, from

https://en.wikipedia.org/w/index.php?title=Missoula_Floods&oldid=732133808

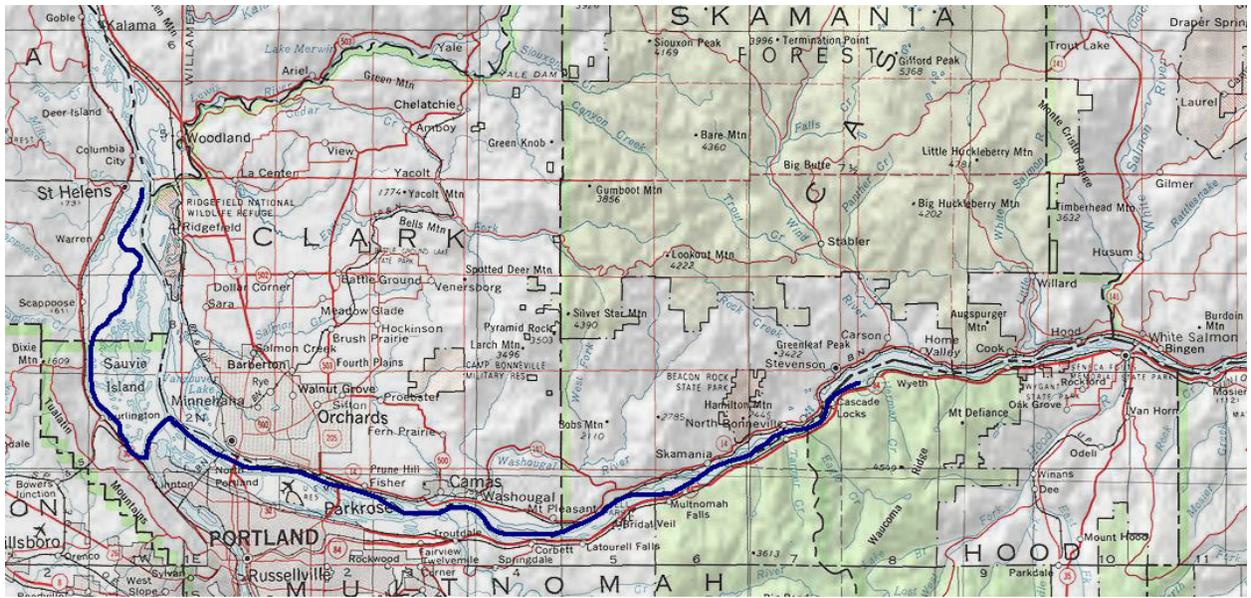
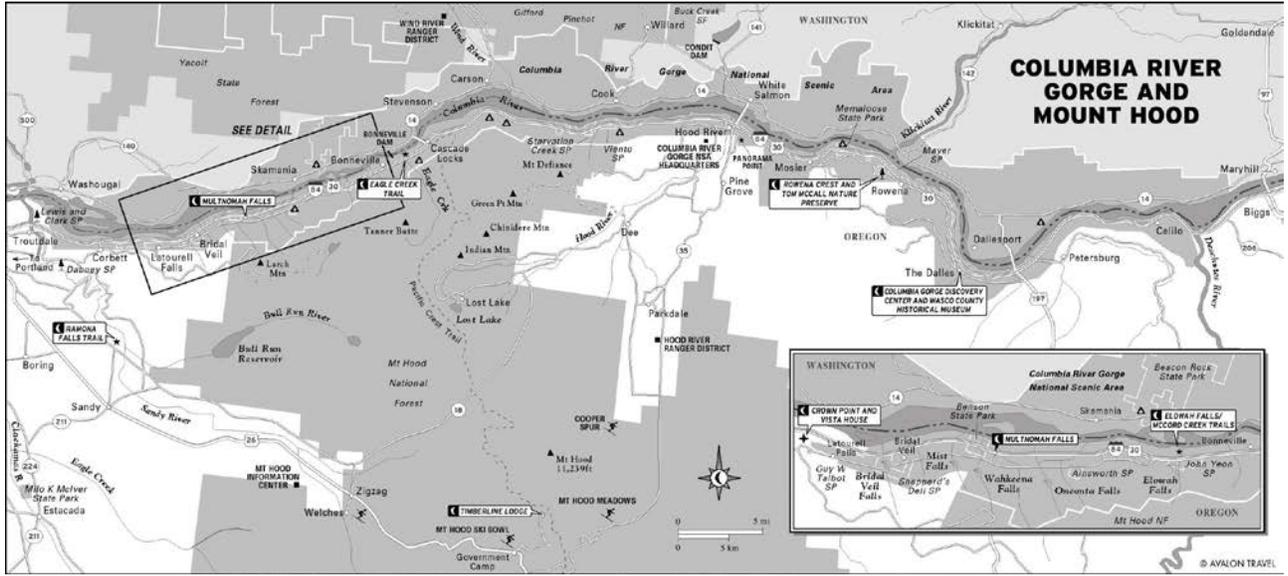
Pillow lava. (2015, October 9). In *Wikipedia, The Free Encyclopedia*.

Retrieved 20:44, August 11, 2016, from

https://en.wikipedia.org/w/index.php?title=Pillow_lava&oldid=684872261

Appendix A

Maps of Columbia River Gorge





Appendix B

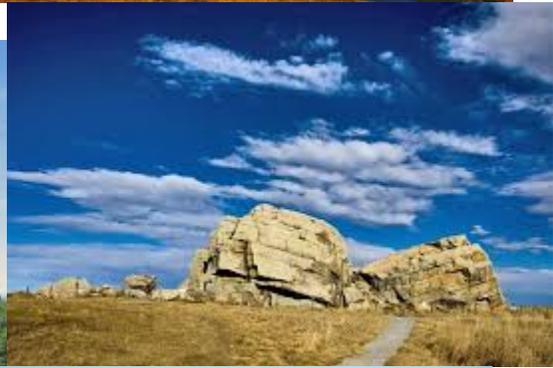
Photo Examples: Pillow Lava



Columnar Basalt



Erratic Rocks



Appendix C

Assessment Rubric: Scientific Drawings : Rock Identification in the Field

CATEGORY	4	3	2	1
Title	Title is informative, centered, and larger than other text.	Title is informative and larger than other text.	Title is informative and centered.	The title is incomplete and does not clearly indicate what organism is pictured.
Labels	Every item that needs to be identified has a label. It is clear which label goes with which structure.	Almost all items (90%) that need to be identified have labels. It is clear which label goes with which structure.	Most items (75-89%) that need to be identified have labels. It is clear which label goes with which structure.	Less than 75% of the items that need to be identified have labels OR it is not clear which label goes with which item.

<p>Drawing - general</p>	<p>Lines are clear and not smudged. There are almost no erasures or stray marks on the paper. Color is used carefully to enhance the drawing. Stippling is used instead of shading. Overall, the quality of the drawing is excellent.</p>	<p>There are a few erasures, smudged lines or stray marks on the paper, but they do not greatly detract from the drawing. Color is used carefully to enhance the drawing. Overall, the drawing is good.</p>	<p>There are a few erasures, smudged lines or stray marks on the paper, which detract from the drawing OR color is not used carefully. Overall, the quality of the drawing is fair.</p>	<p>There are several erasures, smudged lines or stray marks on the paper, which detract from the drawing. Overall, the quality of the drawing is poor.</p>
<p>Drawing - details</p>	<p>All assigned details have been added. The details</p>	<p>Almost all assigned details (at least 85%)</p>	<p>Almost all assigned details (at least 85%)</p>	<p>Fewer than 85% of the assigned details are</p>

	are clear and easy to identify.	have been added. The details are clear and easy to identify.	have been added. A few details are difficult to identify.	present OR most details are difficult to identify.
Accuracy	95% or more of the assigned structures are drawn accurately and are recognizable. All assigned structures are labeled accurately.	94-85% of the assigned structures are drawn accurately and are recognizable. All assigned structures are labeled accurately.	94-85% of the assigned structures are drawn accurately and are recognizable. 94-85% of the assigned structures are labeled accurately.	Less than 85% of the assigned structures are drawn AND/OR labeled accurately.
General Formatting	Unlined paper is used. The drawing is large enough to be clear (about 1/2 of a page	Unlined paper is used. The drawing is large enough to be clear	Unlined paper is used. The drawing is a little too large or a little too	Lined paper is used AND/OR the drawing is much too

	<p>of typing paper). Student name, class, and date are in the lower left corner. There is a figure caption that describes the drawing. The caption includes information about magnification, when appropriate.</p>	<p>(about 1/2 of a page of typing paper). Student name, class, and date are in the lower left corner.</p>	<p>small. Student name, class, and date are in the lower left corner.</p>	<p>small or much too large.</p>
--	---	--	--	---------------------------------

Appendix D

Chaperone Information Guide

Thank you for taking time to spend time in the field with the kids!
Please read the below information so that you are better able to answer questions and direct discussion out in the field.

The three types of rocks we are studying are:

Pillow lava basalt is lava that contains characteristic pillow-shaped structures that are attributed to the extrusion of the lava under water. Pillow lavas in volcanic rock are characterized by thick sequences of discontinuous pillow-shaped masses, commonly up to one metre in diameter. They form the upper part of 'Layer 2' of normal oceanic crust. We will see this at Multnomah Falls.



Columnar basalt is a geological structure where sets of intersecting closely spaced fractures, referred to as joints, result in the formation of a regular array of polygonal prisms, or columns. Columnar jointing occurs in many types of volcanic rocks and forms as the rock cools and contracts. Columnar jointing can occur in cooling lava flows.

The columns can vary from 3 meters to a few centimeters in diameter, and can be as much as 30 meters tall. They are typically parallel and straight, but can also be curved and vary in diameter. We will see this at Latourell Falls.



Erratic rocks are a piece of rock that differs from the size and type of rock native to the area in which it rests. "Erratics" are carried by glacial ice, often over distances of hundreds of kilometres. Erratics can range in size from pebbles to large boulders such of 15,000 tonnes. We will see an erratic rock outside McMinnville.



When we are in the field you will be helping student to:

- Use a compass - find north
- Use a map - using the compass, the known location of north, and any natural features such as the river, locate where we are on the map

- Provoke discussion about these rock formations and map skills.

You could ask them:

- Where is north? How do you know?
- Do you see anything else on this map here in real life?
- What types of rocks do you see?
- Where do you think the erratic rock came from?
- How did it end up where it did?
- How can you tell the difference between columnar and pillow lava?
- Could you tell the difference between columnar and pillow lava if you could only feel them?
- Which was your favorite type of rock and why?
- Students will be making field sketches of the rocks they see and the area surrounding them. Please monitor and encourage them to add as much detail as possible while working within the time frame. Remind them to add labels and be legible as they will have to read it once we get back to class

Thank you again for coming on our trip and making learning meaningful for our students! You are appreciated!