

GS407/507-River Environments Field Trip Reading Questions

Read through the course readings and answer the following questions on separate pages. Neat, word-processed answers are most preferable, but field sheets / hand-written notes are also acceptable. Many of the field stops on the trip will also help answer these questions.

Section 1. Orr and Orr, 1999 - Overview of Deschutes-Columbia Plateau

- 1-1. Briefly describe the physiographic setting (elevation, physical boundaries, general characteristics) of the High Lava Plains province of Oregon.
- 1-2. What fault zone dominates the High Lava Plains? What is its orientation?
- 1-3. What three major fault/fracture zones converge in the proximity of Newberry Volcano? What is the likelihood of a Newberry Eruption during our field trip?
- 1-4. What is meant by “bimodal” lava composition of the High Lava Plains? List and discuss the two types of lavas that have been erupted in the High Lava Plains.
- 1-5. How does the age of volcanic deposits in southeastern Oregon (e.g. Owyhee uplands) compare the age near Newberry?
- 1-6. What is the geologic explanation for the formation of Fort Rock, southeast of Newberry?
- 1-7. When were the basalts of Lava Butte (south of Bend) erupted? What impact did the eruption have on the Deschutes river in that area?
- 1-8. What type of volcano is Newberry? How did the central Newberry crater (and associated lakes) form? What other famous Oregon volcano experienced similar processes?

Section 2. Jenson and Chitwood, 2000 - Overview of Newberry Volcano

- 2-1. How long has Newberry Volcano been active? What type of volcano is it? What is the chemical composition of lavas associated with Newberry?
- 2-2. How has Newberry volcanic activity impacted river systems in the region (e.g. Deschutes and Crooked River)?
- 2-3. What is the Newberry “caldera”? How did it form? What topographic features are located in the caldera at present?
- 2-4. How far south and north of Bend does the Newberry Volcano extend? Is Bend part of Newberry Volcano?
- 2-5. In chronological order, briefly list the dates and names of known eruptions at Newberry.

Section 3. Orr and Orr, 1999 - Overview of Deschutes-Columbia Plateau

- 3-1. What are the major rivers that drain the Deschutes-Columbia Plateau region? What is the dominant type of bedrock material that characterizes the region?

- 3-2. Where does the Deschutes river drain from and to? How long is it? How does it relate to the Columbia River?
- 3-3. What is the significance of the Columbia River Basalt (CRB) group in this region? When were the CRB's erupted? Over how long of a period were they erupted?
- 3-4. Describe the geographic extent of the Columbia River Basalts in terms of Washington and Oregon? How far north do they extend? How far south? How far east? How far west?
- 3-5. Approximately how many individual lava flows have been identified in the Columbia River Basalt Group? Approximately how often did the eruptions take place?
- 3-6. Where is the source region for the Columbia River Basalts? Were these erupted by volcanic mountains? Explain your answer.
- 3-7. How do the Clarno and John Day formations compare to the CRB's? Are they older or younger? Are they also composed of basalts? What are they composed of? What type of rock material?
- 3-8. How do the "Dalles Formation" and "Wasco windblown silts" compare to the CRB's? Are they older or younger? Are they also composed of basalts? What are they composed of? Are the lithified rocks are unconsolidated sediment?
- 3-9. How did the Pleistocene ice ages and Missoula floods impact the Columbia Plateau? What types of deposits and landforms record the history of the Missoula floods?

Section 4. Bebee et al., 2002 - Middle Deschutes Field Geology

- 4-1. What is the drainage area of the Deschutes River? What are the physiographic boundaries of the Deschutes? (to the east, west, north, south)
- 4-2. How old are the Clarno and John Day Formations? What types of rocks are these formations composed of? How did they form?
- 4-3. What part of the Deschutes River valley are these rock exposed (see Fig. 2).
- 4-3. How old are the Columbia River Basalts? What part of the Deschutes River valley are these rocks exposed (see Fig. 2)?
- 4-4. How old is the Deschutes Formation? What types of rocks is this formation composed of? How did these rocks form?
- 4-5. How have lava flows impacted the Deschutes River drainage in the past 1.5 million years?
- 4-6. How have lahar deposits from Mt. Jefferson impacted the Deschutes River? What is a "lahar"? How long ago were these lahars deposited? How far away from Mt. Jefferson can lahars travel?
- 4-7. How have landslides impacted the Deschutes River drainage over the past 40,000 years? How do the landslides influence river rafting on the Deschutes?

- 4-8. Does the flow and discharge of the Deschutes change drastically throughout the year? Why or why not? What geologic processes control the discharge of the Deschutes river?

Section 5. O'Connor et al., 1995 - Overview of Missoula Floods

- 5-1. What are the “Missoula Floods” and how do they relate to the Columbia River Gorge of Oregon?
- 5-2. How long ago did the Missoula Floods occur? How did they originate? Where was “Lake Missoula”?
- 5-3. What was the maximum discharge of water that flowed through the Columbia Gorge during the Missoula flood events? How does this discharge compare to modern rivers of the world?
- 5-4. What types of deposits and erosional landforms associated with the Missoula Floods remain on the landscape today, in Washington and Oregon? (How do we know that the Missoula Floods happened?).
- 5-5. Will the Missoula Floods happen again in the future? What types of geologic conditions would be required for the Missoula Floods to happen again?

Section 6. Orr and Orr, 1999 - Overview of Willamette Valley

- 6-1. What is the drainage area of the Willamette Basin? What are the physiographic boundaries of the basin? What two mountain ranges form the primary boundaries of the basin?
- 6-2. What percent of Oregon’s population live in the Willamette Valley? What is the primary land-use type in the basin?
- 6-3. How did the Willamette Valley form in relation to the Coast Range and Cascades? Is the Willamette Valley the result of erosion (like the Grand Canyon), uplift, or a combination of the two?
- 6-4. What type of plate tectonic setting is the Willamette Valley associated with?
- 6-5. Which side of the valley is associated with large alluvial fans? What mountains are these fans associated with?
- 6-6. How did the Missoula Floods impact the Willamette Valley? What is the name of the Missoula Flood deposits left behind in the valley?
- 6-7. What is an “erratic”? How are “erratics” related to the Missoula Floods? Did Missoula Flood waters extend south to Eugene? How do you know?
- 6-8. How many “Missoula Floods” were there, as recorded in the Willamette Valley? How often did they occur?
- 6-9. Was Monmouth impacted by Missoula Floods? Was Monmouth covered by Missoula Flood waters? How do you know?