**ES322 Geomorphology Journal Reading Review Exercise**

Balbas and others, 2017, 10Be dating of late Pleistocene megafloods and Cordilleran Ice Sheet retreat in the northwestern United States: Geology, v. 45, p. 583-586.

Web Link to journal article:

<http://www.wou.edu/las/physci/taylor/g322/Balbas_etal_2017_missoula_flood_Cosmogenic_dates.pdf>

Objective: to read and review a combination of short Youtube videos and scientific journal articles to gain knowledge on principles of cosmogenic age dating as applied to problems deciphering the history late Pleistocene glaciation and catastrophic outburst flooding in the Pacific Northwest.

**Task 1. Background Informational Videos – 1 Paragraph Summaries**

Before you read the Balbas and others (2017) journal article, watch the three short Youtube video clips linked below. Two of the videos provide background information on the history of late Pleistocene glaciation and megaflooding in the Pacific Northwest. The third video clip provides a basic introduction to cosmogenic isotopes; how they are analyzed and applied to problems in geomorphic analysis. Take notes and pay attention as these videos will help you read and interpret the scientific writing in the assigned journal article.

Ice Age Floods of the Pacific Northwest (~16 min)

<https://www.youtube.com/watch?v=i1BFb_uYlFQ>

Washington Coulees / Channeled Scablands (~3 min)

<https://www.youtube.com/watch?v=XrtLQljT9GI>

Overview of Cosmogenic Isotope Dating (~30 min)

<https://www.youtube.com/watch?v=AO6TLtQ7N6k>

***Write a 1-paragraph summary of the important concepts from each video clip above.***

**Task 2. Journal Reading and Review Questions**

Read the Balbas and others (2017) journal article entitled: “10Be dating of late Pleistocene megafloods and Cordilleran Ice Sheet retreat in the northwestern United States”. Use the instructional videos, your favorite web resources (google, Wikipedia, etc.), and the journal article to answer the following questions and define key words.

Key Word Definitions and short answer – define the following key words / answer the questions, include cut-and-paste graphics or sketches where required:

1. Isotope
2. Cosmogenic isotopes – define, where are they produced and why? Draw and label a sketch to show how cosmogenic isotopes are formed and accumulated in the Earth system.
3. Stable Isotope vs. Radioactive isotope
4. List three of the primary cosmogenic isotopes, element and atomic weight, that are used in this type of age dating technique
5. “in situ production”- describe and draw a sketch
6. List three common target minerals that are associated with the accumulation of cosmogenic isotopes over time
7. “cosmic ray flux” – define and describe importance for cosmogenic age dating
8. Describe three examples of how cosmogenic isotopes are used in geomorphology
9. What is “AMS” – describe what it is and what it is used for.
10. List three draw backs and problematic aspects of cosmogenic isotope dating.
11. What geologic time period is covered by the term “late Pleistocene”, how does this time period relate to the notion of “the ice ages” in North America?
12. Draw a sketch map of western North America showing the extent and coverage of the Cordilleran Ice Sheet. In your drawing, sketch the states of Washington-Oregon-Idaho-Montana.
13. On your sketch map in question 3 above, show the location of Glacial Lake Missoula and the Channeled Scablands.
14. Briefly describe how glacial lake Missoula formed, what the channeled Scablands are, and the processes that created them.
15. Describe the methodology, isotopes and materials used by Balbas and others, 2017, to examine chronologies of ice age outburst floods in Washington and Idaho.
16. When and where was the “Bonneville Flood”, how does it compare / contrast with the “Missoula Flood”.
17. What was the “Okanagan Lobe”, how does it related to late Pleistocene glaciation? How did it influence the geomorphic evolution of the upper Columbia River basin?
18. List and discuss the four primary conclusions of the Balbas and others, 2017, Megaflood paper.