Online Proceedings

POSTER SESSION 2

Commons East, Easel 61

1:00 PM to 2:30 PM

Cosmogenic Nuclide Dating the Glaciation of the Waterville Plateau in Eastern Washington during the Last Glacial Maximum (LGM)

Elizabeth Jean Horton, Senior, Earth and Space Sciences: Geology

Mary Gates Scholar, UW Honors Program

Mentor: John Stone, Earth & Space Sciences

Mentor: Joel Gombiner

During the Last Glacial Maximum (LGM), the Cordilleran Ice Sheet advanced into the northwestern United States and dammed the Clark Fork river in western Montana, forming Glacial Lake Missoula. The ice dam in the valley repeatedly broke, sending at least 100 massive outburst floods known as the Missoula Floods into eastern Washington where they incised deep canyons forming the Channeled Scabland. During the period of flooding, the Okanogan Lobe of the Cordilleran Ice Sheet crossed the Columbia Gorge onto the Waterville Plateau, diverting floodwaters away from the Columbia River into Grand Coulee, before blocking Grand Coulee itself. My research project examines the timing of glaciation of the Waterville Plateau and how it influenced the paths of the successive floods. To determine the timing of glaciation, my advisers and I studied glacially transported boulders that began to accumulate the cosmic ray produced isotope beryllium-10 (10Be) after they were exposed by ice sheet retreat. In the lab, we separated and dissolved quartz from our samples, purified beryllium, and then measured $^{10}Be/^{9}Be$ ratios using Accelerator Mass Spectrometry (AMS). From AMS measurements, we calculated the exposure ages of our samples. We expect the ages to fit within the established sequence of ice advance across the Columbia River, redirection of floodwaters down Grand Coulee, and eventual ice retreat to north of the Columbia River. Following this sequence, we expect our samples from the northern edge of the Waterville Plateau to be younger than the last floods down Grand Coulee (15,300 years) but older than samples from the Omak Plateau north of the Columbia Gorge (13,900 years). Along with dates from previous studies, the new exposure dates from this project explain how the Okanogan Lobe guided Missoula floodwaters and influenced landscape evolution in eastern Washington.

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Cosmogenic Nuclide Dating of the Ephrata Fan to Determine the Span of the Grand Coulee's Flood History

Nolan Charles Conway, Junior, Earth and Space Sciences: Geology

Mentor: John Stone, Earth & Space Sciences

Mentor: Joel Gombiner

During the last ice age outburst floods from glacially-dammed lakes incised canyons across eastern Washington, transporting large amounts of sediment ranging in grainsize from silt to boulders. Around Ephrata, floodwater channeled through Grand Coulee escaped the confinement of the canyon and deposited much of this sediment in the Ephrata Fan. Deposited at the mouth of Grand Coulee extending 45 kilometers south across Quincy Basin to the Frenchman Hills, this deposit is up to 90 meters thick. Older, high-standing deposits within the fan are cut across by successively younger scarps and channels to produce a stepped landform that records many episodes of flooding. The aims of my project are to date the deposits forming the oldest surfaces, and to determine the source of the granite boulders contained within these steps. I made elevation, slope and aspect maps of the Ephrata Fan using digital elevation data and ArcInfo Geographical Information System (ArcGIS) software in order to distinguish the relative age of deposits within the fan. I collected samples from granite boulders on surfaces of different ages for exposure dating with cosmic-ray-produced beryllium-10 (Be-10). I am currently separating quartz from these samples. Quartz will be dissolved, and beryllium will be extracted and purified for isotopic analysis, to determine the concentration of cosmic-ray-produced Be-10. The abundance of this isotope measures the exposure time of the samples. The range of dates from the oldest to youngest surfaces in the fan will constrain the age and duration of the floods epoch. Furthermore, granite samples from the sequence of deposits will be compared to granites exposed in the floor of upper Grand Coulee. If found, the appearance of this specific rock type in the Ephrata Fan deposits will help determine when floods eroded the canyon to its present depth offering an insight into its development.