GSA Connects 2024 Meeting in Anaheim, California

Paper No. 101-7
Presentation Time: 8:00 AM-5:30 PM

MINERALOGY AND CLAY MINERALOGY OF PALEOSOLS IN THE COLUMBIA RIVER BASALT GROUP IN WASHINGTON AND OREGON: IMPLICATIONS FOR A SHIFTING CLIMATE DURING THE MIDDLE TO LATE MIOCENE

FLANAGAN, Evangeline[1], PATTERSON, Rebecca[2], BADER, Nicholas E.[3] and PERSICO, Lyman P.[3], (1)Walla Walla, WA 99362, (2)Geology, Whitman College, Walla Walla, WA 99362-2044, (3)Department of Geology, Whitman College, 345 Boyer Avenue, Walla Walla, WA 99362

The Columbia River Basalt Group (CRBG), a series of flood basalts that erupted between 16.8-5.5 Ma, dominates the Columbia River Basin in eastern Washington and Oregon. Some flows were exposed at the surface long enough to undergo significant weathering before being capped by subsequent basaltic flows, thus preserving a terrestrial climate record for the Middle to Late Miocene. In this study, we used powder X-ray diffraction to analyze the mineralogy of paleosols from different stratigraphic positions, ranging in age from 15.6 to 8.5 Ma in order to interpret pedogenic processes. This research builds on previous work including field descriptions, thin sections, and geochemical analysis of these paleosols. To determine the mineralogy of bulk paleosol samples, we wet-ground samples in ethanol in a McCrone mill and analyzed the resulting powders in a Proto AXRD benchtop powder X-ray diffractometer. A sample from a paleosol developed on the 15.6 Ma Grande Ronde basalt contains abundant hematite that is absent from later samples. A paleosol developed on the 11.8 Ma Pomona member of the Saddle Mountains basalt lacks detectable hematite but contains calcite. We also isolated the clay fraction via centrifugation and created oriented mounts to identify clay minerals produced during chemical weathering. Clay minerals are more abundant in samples taken from the matrix of older paleosols than in samples from younger sites. Previous work on these paleosol sites shows a reduction in weathering through time that we interpret as evidence for a shift from a warm, wet climate to the cooler and more arid climate during the Miocene. Because different types of clay minerals are produced in soils under different climate regimes, identifying these minerals will provide an independent line of evidence for this climate shift.

Session No. 101--Booth# 33

T20. 36th Annual Undergraduate Research Exhibition Sponsored by Sigma Gamma Epsilon (Posters)
Monday, 23 September 2024: 8:00 AM-5:30 PM

Hall D (Anaheim Convention Center)

Geological Society of America *Abstracts with Programs.* Vol. 56, No. 5
doi: 10.1130/abs/2024AM-404640

Back to: T20. 36th Annual Undergraduate Research Exhibition Sponsored by Sigma Gamma Epsilon (Posters)

<< Previous Abstract | Next Abstract >>