

Joint 120th Annual Cordilleran/74th Annual Rocky Mountain Section Meeting - 2024

Paper No. 26-11

Presentation Time: 9:00 AM-5:30 PM

SHIFTING CLIMATES REFLECTED IN PALEOSOLS OF THE COLUMBIA RIVER BASALT GROUP BETWEEN 15.0 MA AND 10.5 MA

GREENOUGH, Cameryn, Whitman College, 280 Boyer Ave, Walla Walla, WA 99362, **PATTERSON, Rebecca**, Geology, Whitman College, Walla Walla, WA 99362-2044, **BADER, Nicholas E.**, Department of Geology, Whitman College, 345 Boyer Avenue, Walla Walla, WA 99362 and **PERSICO, Lyman P.**, Department of Geology, Whitman College, 345 Boyer Avenue, Walla Walla, CO 99362

The Columbia River Basin in Southeast Washington is dominated by a series of flood basalts of the Columbia River Basalt Group (CRBG) that erupted between 16.8-5.5 Ma. We characterize paleosols in two stratigraphic positions in the CRBG: (1) paleosols developed following the 15.0 Ma Frenchman Springs eruption that were later overlain by the 13.0 Ma Umatilla member, and (2) paleosols developed following the 11.8 Ma Pomona Eruption of the Saddle Mountains Basalt that were later overlain by the 10.5 Ma Elephant Mountain member. Multiple sites were excavated from both stratigraphic positions. At each site we identified basalt flow contacts using flowtop characteristics such as reddened material and vesicularity. During our field research we built a 3D model of each outcrop using Pix4D. Multiple lines of evidence suggest that weathering was more intense in the earlier period following the Frenchman Springs eruption. The 15.0-13.0 Ma paleosol contains saprolitic corestones surrounded by a clay-rich matrix and is significantly thicker, more reddened than the younger paleosol. In thin section, clay and weathered cores are abundant in the older (15.0 Ma-13.0 Ma) paleosol but rare in the younger (11.8 Ma-10.5 Ma) paleosol. Analysis of a series of samples along a depth profile at each site using Wavelength Dispersive X-Ray Fluorescence reveals that base cations (Na, K, Ca, and Mg) are depleted from all paleosols in our study. These comparisons provide evidence for a shift from a warmer, more humid climate to a cooler, more arid climate between 15.0 and 10.5 Ma, which continues to the present day. These findings are consistent with cooling following the Mid Miocene Climatic Optimum, as well as drying associated with the uplift of the high Cascades and their orographic rain shadow.

Session No. 26--Booth# 32

[T27. Undergraduate Research \(Posters\)](#)

Thursday, 16 May 2024: 9:00 AM-5:30 PM

[Grand Ballroom \(Davenport Grand Hotel\)](#)

Geological Society of America *Abstracts with Programs*. Vol. 56, No. 4
doi: 10.1130/abs/2024CD-399413

© Copyright 2024 The Geological Society of America (GSA), all rights reserved. Permission is hereby granted to the author(s) of this abstract to reproduce and distribute it freely, for noncommercial purposes. Permission is hereby granted to any individual scientist to download a single copy of this electronic file and reproduce up to 20 paper copies for noncommercial purposes advancing science and education, including classroom use, providing all reproductions include the complete content shown here, including the author information. All other forms of reproduction and/or transmittal are prohibited without written permission from GSA Copyright Permissions.

[Back to: T27. Undergraduate Research \(Posters\)](#)

[<< Previous Abstract](#) | [Next Abstract >>](#)
