ABSTRACT

TITLE:	Preliminary Rock Varnish Exposure Ages on Pediment Boulders from the Henry Mountains, Utah: Implications for Pediment Formation Processes
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ABSTRACT: Here we report the first rock varnish exposure ages on boulders from two pediment surfaces adjacent to the Henry Mountains (~38.1 N latitude). Rock varnish is a slowly accreting, Mn- and Fe-rich surface coating precipitated in microstratigraphic layers on subaerially exposed surfaces. Varnish microlamination compositional differences are principally influenced by regional climate conditions. Pediments are gravel-covered, gently-sloping, low-relief planation surfaces incised into bedrock; their processes and formation have been a source of debate for more than a century. In the Henry Mountains region, ten discrete, dissected pediment levels (L0-L9; oldest to youngest) have been previously mapped. Varnish microlamination (VML) dating was conducted on pediment level L6 (northeast of Mt. Hillers; UTM: Z17, -2124969mE, 4640124mN) and pediment level L8 (west of Mt. Ellsworth; UTM: Z17, -2137380mE, 4618798mN). VML exposure ages were derived using the varnish microlamination record for the western USA. An age of ~157 ka was obtained for pediment L6. This date correlates to wet period (WP) 11 in layering unit (LU)-6, which is correlative with MIS-6 (Late Illinoian Stage or Bull Lake Glaciation). An age of ~105 ka was obtained for pediment L8, which corresponds to LU-5 (WP8) and is coeval with MIS-5d (a cooler, wetter MIS-5 interval). Microlamination layers precipitated during periods of wet climate are black on ultra-thin sections under transmitted light microscope and Mn and Ba achieve their highest concentrations in these dark layers. Microlamination stratigraphy and mineralogy indicate that gravel emplacement/pediment formation occurred during periods of cold and wet climate wherein enhanced moisture levels may have promoted gravel transport. The Henry Mountains were not glaciated, but patterned ground and other periglacial features in the highest elevations correspondingly indicate that the region was impacted by episodes of cold and wet climate. Our aim is to contribute a better understanding of pediment formation and determine whether pediments are shaped by brief, high-energy, fluvial flow regimes during wet climatic events. Additional VML ages (forthcoming) are needed to determine whether all pediments in the Henry Mountains region formed in a similar fashion.