PALEOPROTEROZOIC METAMORPHIC AND STRUCTURAL EVOLUTION OF THE
HARTVILLE UPLIFT, SOUTHEASTERN WYOMING

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ABSTRACT

The Hartville Uplift (HU) of southeastern Wyoming lies near the intersection of two major Paleoproterozoic crustal boundaries, the Cheyenne Belt (CB) and the Dakotan Orogen. This study aims to unravel the polydeformational and polymetamorphic tectonic history of the HU by analyzing geologic structures and the metamorphic history of metapelites and other metamorphic rocks during Paleoproterozoic orogenies.

The HU is bisected by the Hartville-Rawhide Fault Zone (HRFZ) which creates a metamorphic gradient from east to west. The first documented deformational event on the western side is a nappe-forming event, D1, which contain north-trending hinges. D2 structures refold D1 nappes about vertical W-SW fold axes. Pelitic schists west of the HRFZ exhibit peak metamorphic conditions of 500 °C and 6.5 kbar. Within the HRFZ, the dominant structural grain is defined by subvertical, easterly dipping, shear zones exhibiting east side up movement (D3). D3 faults juxtapose metamorphic rock with peak metamorphic conditions of 575-620 °C and 8.25 kbar on the east side against lower-grade, <500 °C metamorphic rocks on the west side. Late D4 open folds refold D3 foliation and have steeply plunging hinges defined by fibrolite.

D1, west-verging nappes suggest a pre-CB, east-west compression. North-south D2 compression is consistent with accretion of arc material along the CB. The large amount of vertical uplift and high-temperature metamorphism associated with D3 and D4 are attributed to the terminal collision of the Wyoming and Superior provinces during construction of Laurentia.