



THE EARLY PROTEROZOIC RACKLAN AND FORWARD OROGENIES OF NORTHWESTERN LAURENTIA: GEOLOGICAL AND SEISMIC EVIDENCE

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The Racklan and Forward orogenies comprise contractional deformation of northwestern Laurentia in Early Proterozoic time. The Racklan orogeny was identified from an angular unconformity between the Wernecke Supergroup and the Pinguicula Group in Yukon, Canada. The main pulses of deformation that preceded this unconformity occurred prior to emplacement of 1.60 Ga hydrothermal breccias that cut across the deformed 13 km-thick Wernecke Supergroup (>1.71 Ga). Three phases of Racklan deformation have been recognized through the identification of penetrative foliation and superposed crenulations and kink bands. Development of foliation occurred during regional metamorphism with peak temperatures near 550°C. Related folds tend to be north-trending and east-verging, although probable tightening, rotation, and refolding of Racklan structures during subsequent Proterozoic and Phanerozoic deformational events have obscured the structural details. To the east, in the Northwest Territories, Canada, the correlative Forward Orogeny encompasses deformation observed in the subsurface by seismic reflection and in surface exposures. At least two phases of Forward deformation affected the Paleoproterozoic Hornby Bay Group including an early phase dated at 1.667 Ga. Forward deformation occurred as thick-skinned contraction of variable vergence involving crystalline basement. Racklan deformation to the west may have been largely thin-skinned according to deep seismic imagery acquired by Lithoprobe. Together, Racklan-Forward orogenesis records moderate compressional tectonism of western Laurentia following the Wopmay and Trans-Hudson orogenies.

Racklan-Forward deformation is broadly time-equivalent to the Yavapai-Mazatzal arc-continent collisions in southwestern Laurentia. All of these orogenies may be linked to the late stages of the Kimban Orogeny and/or the early stages of the Isan Orogeny in Australia.