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PROTEROZOIC EVOLUTION OF THE WYOMING PROVINCE: A VIEW FROM THE NORTH

HARMS, Tekla A.[1], CHENEY, John T.[1], BRADY, John B.[2] and BALDWIN, Julia A.[3], (1)Department of Geology, Amherst College, Amherst, MA 01002, (2)Department of Geosciences, Smith College, Northampton, MA 01063, (3)Dept. of Geosciences, University of Montana, 32 Campus Dr #1296, Missoula, MT 59812-1296, taharms@amherst.edu

Evidence for four Proterozoic thermotectonic events is preserved in the metaplutonic and distinctive metasupracrustal rocks of the Montana metasedimentary terrane (MMT), conventionally understood to constitute the NW margin of the Wyoming province (WP) in SW Montana. (1) At ≈ 2.45 Ga an event of crustal thickening and metamorphism significantly reworked any pre-existing Archean basement of the MMT. Zircon, monazite, and garnet growth in quartzo-feldspathic gneisses and in some but not all metasupracrustal suites of the MMT at this time has been documented by many. Also diagnostic are (i) gneissic fabric cross-cut by ≈ 2.06 Ga mafic dikes in the Tobacco Root and Highland Mtns, and (ii) widespread mylonitic garnet leucogneiss in the Ruby Range, interpreted as crustal melt, intruded and deformed at ≈ 2.45 Ga. The 2.45 Ga event is restricted to the MMT and to the adjacent Selway terrane (ST) of Foster et al. (2006) raising the question of whether the MMT was yet a part of the WP. (2) Mafic dikes and sills intruded quartzofeldspathic gneiss in the Tobacco Root and Highland Mtns at ≈ 2.06 Ga. We interpret this as an episode of crustal extension and possible rifting, which may have been related to a hypothesized period of mafic underplating in the region. (3) A subduction system initiated along the northwestern margin of the MMT at ≈ 1.87 Ga and was active for 75 Ma. Arc activity is represented by intrusive ages of intermediate-composition gneiss in the Little Belt Mtns (Mueller et al. 2002; Vogl et al. 2004) and by monazite ages in metasupracrustal rocks they intrude. A coeval back-arc basin is represented by widespread biotite-garnet-sillimanite gneiss with interlayered amphibolite of the Highland Mtns, which contain monazites that range in age from ≈ 1.89 – 1.76 Ga but no older. Trace element geochemistry of the amphibolite is consistent with a back-arc basin origin. This paleogeography places the MMT (and the WP) on the over-riding plate of a south-dipping subduction system, contrary to previous interpretations. (4) The 1.78-1.72 Ga Big Sky orogeny collapsed and obducted the arc and back-arc basin over the NW margin of the WP, producing the well-documented structural, metamorphic, and thermal effects seen north of Giletti's Line in the MMT. In sum, the northern WP did not become a stabilized part of Laurentia until ≈ 1.72 Ga.

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T222. Proterozoic Accretion of the North American Continent – United Plates of America Revisited I
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Back to: T222. Proterozoic Accretion of the North American Continent – United Plates of America Revisited I

<< Previous Abstract | Next Abstract >>