

PT-t PATHS IN INDIAN CREEK METAMORPHIC SUITE ALUMINOUS SCHISTS, TOBACCO ROOT MOUNTAINS, MONTANA

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The Precambrian basement of the Tobacco Root Mountains (TRM) is composed of four suites of rocks: the felsic gneisses of the Pony-Middle Mountain Metamorphic Suite (PMMMS), felsic gneisses, meta sedimentary schists, quartzites and amphibolites of the Indian Creek Metamorphic Suite (ICMS), orthoamphibolites probably from metamorphosed upper ocean crust of the Spuhler Peak Metamorphic Suite (SPMS), and metamorphosed mafic dikes and sills. The ICMS and PMMMS rocks alone contain evidence for at least two metamorphic events – one at 2.4 Ga and a collisional event at 1.78 Ga, the Big Sky orogeny. All four rock suites were metamorphosed in the Big Sky orogeny, initially at $P > 10$ kb during a complex clockwise PT-t path. The PT-t paths for the ICMS have been primarily based upon the study of rare and problematic occurrences of orthoamphibolites but, because these rocks are compositionally similar to the SPMS rocks and contain only 1.78 Ga monazites, they could be tectonic fragments of the SPMS and not reflective of ICMS metamorphism.

ICMS aluminous schists contain sillimanite and/or kyanite, quartz, biotite, garnet, rutile and ilmenite, with plagioclase and K-feldspar. The occurrence of garnet with sillimanite inclusions in migmatites indicates late garnet growth during melting. The melting likely occurred during decompression on the clockwise PT-t path proposed by Cheney et al. (2004) for the ICMS.

PT-t paths for aluminous schists in the ICMS determined from an analysis of mineral assemblages, compositional zoning of prophyroblasts, and textures establish the true ICMS PT-t path and confirm the role of the ICMS during the Big Sky orogeny in southwest Montana.