

QUARTZ C-AXIS ANALYSIS OF PRECAMBRIAN ROCKS IN THE TOBACCO ROOT MOUNTAINS OF MONTANA

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Quartz c-axis orientations in thirteen oriented samples, selected from both sides of the contact between the Spuhler Peak Metamorphic Suite (SPMS) and both the Indian Creek (ICMS) and Pony Middle Mountain (PMMMS) Metamorphic Suites in the Tobacco Root Mountains of southwestern Montana, reflect shear at the contact. The ICMS consists of quartzofelspathic gneisses, aluminous schists, and iron formation; the PMMMS contains quartzofelspathic gneisses and amphibolites; the SPMS consists of gedrite-bearing amphibolites, hornblende plagioclase gneisses, gedrite-garnet-plagioclase gneisses, sillimanite schists, and quartzites. The contact between them is defined by a basal quartzite on the SPMS side and lies along quartzofelspathic gneiss on the PMMMS or ICMS side. These three Precambrian rock suites contain meta-supracrustal (ICMS and PMMMS) and oceanic crust (SPMS) sequences that have been metamorphosed to amphibolite to granulite facies.

Evidence for shear is widespread in these Precambrian rocks. Outcrop-scale structures indicative of simple shear include: asymmetric and sheath folds, asymmetric augen, and well developed mineral lineation. Furthermore, the SPMS and ICMS/PMMMS contact itself is in the shape of a map-scale sheath fold. As these structures are common throughout the three suites and involve peak metamorphic minerals, the widespread shear in the Tobacco Root Mountains probably occurred during and/or after the juxtaposition of the rock suites in a single regional metamorphic and deformational event best dated at ~1775 Ma. Quartz c-axis patterns contribute to a characterization of the kinematics of this event.