PETROLOGIC INVESTIGATION OF AMPHIBOLITES ACROSS A MAJOR DUCTILE SHEAR ZONE IN THE RUBY MOUNTAINS, SW MONTANA: IMPLICATIONS FOR THE NATURE OF EARLY PROTEROZOIC(?) MAFIC MAGMATISM

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ABSTRACT

Geologic mapping in the southern portion of the Ruby Mountains reveals a highly variable metamorphic lithostratigraphy. An NE-SN striking high strain shear zone exposed in the divide between the Sweetwater and Timber Creek drainages forms the boundary between two distinct Archean/early Proterozoic metamorphic terranes. The terrane to the north is comprised dominantly of granitic gneiss, marble, amphibolite, pelitic gneiss, and quartzite, with minor, metaconglomerate, meta-banded iron formation. The terrane to the south is comprised dominantly of granitic gneiss, locally migmatitic pelitic metapyroxenite. The shear zone and the southern terrane contain distinctive 1-10 m thick layers of white garnet leucogneiss which are absent from the northern terrane.

Mineral assemblages & recrystallized microtextures in the mylonitic gneisses form the base of the northern terrane. The shear zone is marked by complex development of parallel planes, normally subparallel planes, and plane parallel to the foliation. In the shear zone, mylonitized amphibolite is present throughout the southern terrane, with a general increase in foliation dip angle and areal extent toward the northern terrane.

Petrography

Amphibolites are dominated by the assemblage hornblende + plagioclase + quartz, with some containing relict skeletal garnet and minor biotite. They vary texturally from well-banded or laminated to more massive and granular. The abundance of quartz increases into the terrane north of the high strain ductile shear zone.

Amphibolite Geochemistry

Geochemical analyses of amphibolites structurally above, below, and within the ductile shear zone were acquired in an effort to determine petrologic variations and possible tectonic settings. The goal of these analyses was to provide insights on the roles that tectonism and magmatism played in the evolution of the shear zone and its host terranes.

Summary

Kinematic analysis indicates a two-phase movement history within the Southern Ruby Shear Zone (SRSZ). Amphibolite geochemistry suggests amphibolite units above the shear zone were derived from a different source region than those below the shear zone. These results are consistent with the findings of this study and support the idea of a distinct tectonic setting for the SRSZ.

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