

# **METAMORPHISM OF PRECAMBRIAN ROCKS IN THE SOUTHERN HIGHLAND MOUNTAINS, SOUTHWESTERN MONTANA**

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A diverse Precambrian sequence of garnet-rich gneiss and schist with lenses of marble, quartzite, iron formation, amphibolite, orthoamphibolite, serpentinite, quartzite, garnet amphibolite, and aluminous schist occurs in the thin and discontinuous X(A)g map unit (O'Neill et al, 1996) in the southern Highland Mountains of southwestern Montana. This distinctive unit is lithologically similar to sequences in the adjacent Precambrian basement of the Tobacco Root Mountains which were affected by the 1.7 Ga Big Sky orogeny. These similarities indicate a need to understand the relationship between these two ranges and extent of the Big Sky orogeny.

In the Highland Mountains, orthoamphibolite occurs only in the X(A)g unit whereas orthoamphibolite bearing sequences, similar to the X(A)g unit, occur in both the Spuhler Peak Metamorphic Suite (SPMS) and the Indian Creek Metamorphic Suite (ICMS) of the Tobacco Root Mountains. Unlike the X(A)g and ICMS, however, the SPMS does not contain marble. Orthoamphibolites in the Highland Mountains have complex textures and mineral assemblages. Kyanite and gedrite occur in the same rock, but kyanite is separated from gedrite by cordierite rims. Sillimanite bundles replace kyanite. Sapphirine-spinel-cordierite symplectites occur between kyanite and gedrite. Garnets have quartz inclusions in the core and quartz-absent rims. These mineral assemblages and textures are similar to orthoamphibolites from the Tobacco Root Mountains, for which a clockwise P-T path has been described.

The similarities between the Precambrian rocks of the Highland and Tobacco Root Mountains suggest that both ranges were affected by the Big Sky orogeny. This conclusion can be verified by radiometric dating of monazites from the Highland Mountains as has been done for the Tobacco Root Mountains.