

Mid-Cretaceous Barrovian Metamorphism in the Central Kootenay Arc, Southeastern British Columbia

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Amphibolite-facies Barrovian rocks are exposed in an elongate region running parallel to northern Kootenay Lake in the central Kootenay Arc, southeastern British Columbia. Metamorphic grade ranges from the biotite zone on the flanks of this metamorphic high to the sillimanite+K-feldspar zone in its centre. Regional amphibolite-facies metamorphism was accompanied by formation of the dominant (D2) west-dipping foliation and orogen-parallel stretching lineation. New LA-MC-ICP-MS U-Pb monazite ages indicate a mid-Cretaceous age for this metamorphism and deformation. Analyses from a sillimanite+K-feldspar-bearing gneiss yield a concordia intercept age of 99.3 ± 1.3 Ma, generated by anchoring to a common $^{207}\text{Pb}/^{206}\text{Pb}$ value of 0.86 ± 0.06 . Similarly, two ky+sil-bearing schists yield ages of 97.8 ± 1.1 Ma and 98.9 ± 1.3 Ma.

To the west of this intermediate-pressure (ca. 7 kbar) belt, rocks around the Nelson Batholith underwent greenschist-facies regional metamorphism followed by low-P (3.5 ± 0.5 kbar) contact metamorphism in the Middle Jurassic (ca. 170 Ma). The boundary between these regions with contrasting metamorphic and structural histories is marked by the early Tertiary Gallagher-Schroeder fault zone (GSFZ). The GSFZ is a west-dipping zone containing a number of normal fault strands and west-side-down shearbands. Rocks in the hanging wall yield Jurassic/early Cretaceous K/Ar - $^{40}\text{Ar}/^{39}\text{Ar}$ mica cooling ages whereas those in footwall rocks are early Tertiary.

The GSFZ controls the isograd pattern around northern Kootenay Lake and is responsible for the current juxtaposition of rocks that were metamorphosed during the mid-Cretaceous at mid-crustal levels against those that have resided in the upper crust since the Middle Jurassic. However, early Tertiary normal faulting was not responsible for exhumation of the Barrovian rocks from their maximum burial depth; low-P (and±crd) contact aureoles on post-tectonic bodies of known or presumed mid-Cretaceous age demonstrate exhumation to upper crustal levels immediately following peak metamorphism, prior to development of the GSFZ and related structures. The Barrovian rocks of the central Kootenay Arc were not affected by younger (late Cretaceous/early Tertiary) metamorphism and top-to-the-east ductile deformation found at deeper structural levels in the nearby Priest River and Valhalla Complexes.