

**British Columbia's "Golden Triangle":
Arc-axial porphyry belt, or mineralized deep-crustal corridor?**

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The "Golden Triangle" refers to the Iskut district, an exceptionally well-mineralized region within the Stikine multiphase arc terrane of northwestern British Columbia. The district extends 250 kilometers from Kitsault in the south to the village of Iskut in the north and the Stikine River in the northwest. Major porphyry camps within it include Schaft Creek and Galore Creek (Late Triassic) in the northwest, the Red Chris-GJ-North Rok-Tatogga cluster near Iskut (latest Triassic), and the KSM-Brucejack and Snip Bronson (Early Jurassic; porphyry-gold vein) camps in the centre of the belt. The host intrusions have been considered arc-axial bodies, associated with the Late Triassic Stuhini and Early Jurassic Hazelton arcs. Although coeval volcanic sequences are present, new paleogeographic interpretations suggest that the main Stuhini and Hazelton arc fronts lay elsewhere within Stikinia.

This presentation focuses instead on the first-order features of the Iskut district: its prolonged, complex and varied metallogenetic history, and the key role of structures in localizing both individual deposits and the mineralized district as a whole. The overall structural grain of northwestern Stikinia shows sets of northerly fault arrays that are interrupted at intervals by narrow, orthogonal easterly fault systems. Schaft Creek and Galore Creek show strong northerly control by penecontemporaneous faults. The ~12 km long northerly KSM porphyry trend lies in the immediate footwall of a north-striking Cretaceous thrust fault, interpreted as a reactivated Early Jurassic synmineral lineament. Red Chris is localized along a minor splay of the easterly Pitman fault system, as is the newly discovered Saddle Zone at the Tatogga property which, like KSM, lies in the immediate footwall of a later thrust fault. The sets of northerly and easterly lineaments exerted control on some of the oldest intrusive bodies in Stikinia, the Late Devonian Forrest Kerr and More Creek plutons, as well as the youngest post-accretionary overlap unit, the Quaternary-Recent Mt. Edziza volcanic complex. They probably originated as fundamental zones of weakness in the unexposed, unknown pre-Devonian basement of north-central Stikinia.

Besides porphyry and porphyry-related gold deposits, the Iskut district also hosts volcanogenic massive sulphides, notably Granduc (Late Triassic), and Eskay Creek and Anyox (Middle Jurassic). Eskay Creek and Anyox lie within a narrow, post-arc rift zone, the Eskay rift, that follows the entire length of the northerly axis of the Iskut district, with older porphyry deposits on both sides. Granduc lies along the western bounding fault of the rift, the South Unuk-Harrymel fault, which is probably an expression of a co-spatial Late Triassic back-arc structure. A second, subsidiary rift hosts the Dolly Varden Ag-rich VMS deposit (Middle Jurassic), which lies along strike with the Homestake Au-rich porphyry occurrence.

The great mineral endowment of the Iskut district is due to its location along intersecting sets of long-lived deep crustal lineaments that provided conduits for magmas and fluids during a succession of tectonic regimes. Although the bulk of "Golden Triangle" mineralization is of Late Triassic – Early Jurassic age, the Kitsault molybdenum porphyry deposit at its southern tip was emplaced in Eocene time. The multi-phase tectonic and metallogenetic history of the Iskut district is reminiscent of large-scale crustal breaks such as the Larder Lake – Cadillac fault zone in the Superior province. Such lineaments provide ideally fertile ground and permeability conditions that can, and do, result in near-superposition of vastly different mineral deposit types.

JoAnne Nelson biography

JoAnne Nelson is an Emeritus Scientist with the British Columbia Geological Survey (BCGS), after a 31 year career as a regional mapping geologist specializing in the tectonics, structural geology and metallogeny of the northern Cordillera. She is the senior author on two articles synthesising Cordilleran tectonics and metallogeny (SEG Special Volume 17, 2013; GAC-MDD Special Publication 5, 2006); co-edited GAC Special Volume 45 with Maurice Colpron on Cordilleran pericratonic terranes; and co-authored *The Geology of British Columbia* with Sydney and Richard Cannings (Greystone Books, 2011).

JoAnne's accomplishments were formally recognized in 2013 when she was listed in the top *100 Global Inspirational Women in Mining* by the United Kingdom's Standard Bank. In 2015, she was presented with the *Gold Pick Award* by the Kamloops Exploration Group (KEG) in recognition of "outstanding services and contributions to the minerals industry". AME awarded her a Special Tribute for scientific leadership in 2016, and in 2017 she received the Canadian Provincial and Territorial Geologists' medal.