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Preservation of paleosurfaces in Jurassic-age rocks of the Golden Triangle, British Columbia, Canada - evidence from the world-class Treaty Creek Au camp

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The Golden Triangle area in northwest British Columbia covers an area of ~200x150 km and hosts numerous porphyry Cu-Au, epithermal Au-Ag, and base metal volcanogenic massive sulfide deposits and occurrences in Triassic and Jurassic age rocks of the Stikine island arc terrane of the North American Cordillera. The mineral deposits form at varying crustal depths and are associated with structural and time breaks between stratigraphic units that span the district; however, the age of prospective horizons can vary across the Golden Triangle. Exploration in the area is also challenging due to steep terrain and later normal faulting and thrusting associated with the Skeena fold and thrust belt that has fragmented the area into distinct structural blocks.

The Treaty Creek camp sits in one of the blocks at the northeast continuation of the northerly Sulphurets trend of world-class Cu-Au porphyry deposits. The Treaty Creek camp comprises the Goldstorm Au-Cu porphyry deposit (Indicated Mineral Resource of 730.2 Mt @ 1.19 g/t AuEQ), and the associated Calm Before the Storm (CBS) epithermal-style Au system. Features in mapped volcaniclastic and volcanic host rocks indicate a submarine depositional environment.

At CBS, a distinct zonation of high sulfidation alteration assemblages has been identified using geochemical proxies (K-Rb, Fe-S), petrography, and short wave infra-red (SWIR) analyses. A widespread alunite-kaolinite assemblage occurs, with zones of pyrophyllite-dickite that appear permeability-controlled, and white mica-chlorite assemblages sitting on the periphery. Highest Au grades occur in the alunite-kaolinite assemblages with abundant pyrite; Au is refractory in pyrite.

The Treaty Creek camp preserves a porphyry system relatively intact – from the deep porphyry dykes at Goldstorm to near-paleosurface (max 1,500 m paleodepth) high sulfidation assemblages at CBS that are similar to modern submarine magmatic-hydrothermal systems like the Brothers volcano. Our approach combines high-quality geochemistry and SWIR methods with remote sensing using WorldView3 satellite imaging and maps distinctive minerals associated with porphyry-related and advanced argillic alteration assemblages to trace the hydrothermal footprint and establish the original crustal position of the structural block. This can guide exploration at prospective levels of the stratigraphy and help understand the larger scale structural framework in the Golden Triangle.