SEG 100 Conference: Celebrating a Century of Discovery

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Drilling Down into Geophysics to Uncover British Columbia's Next Porphyry Deposits

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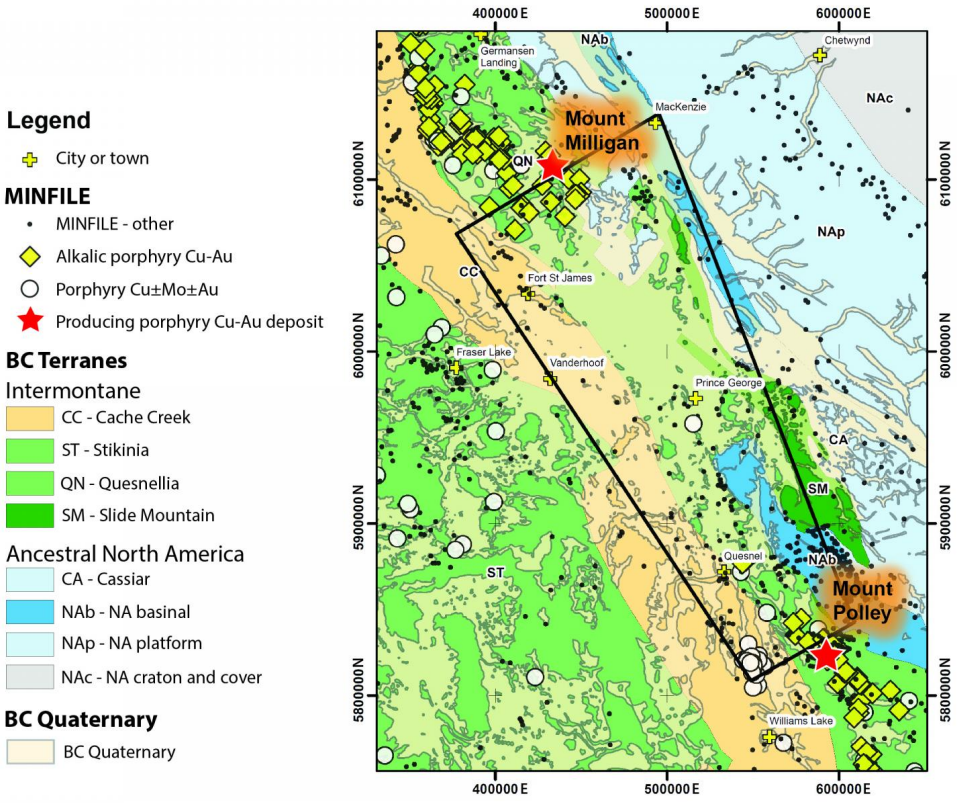
Rapid, near-surface mineral discovery is becoming less frequent in well-explored parts of the world. Investigating the deeper, undercover, or more difficult terrane within known mineral districts presents the next best chance for discoveries going forward. This requires a commitment to new data collection and application of multidisciplinary teams and approaches to exploring that data. The Quesnel Terrane of central British Columbia (B.C.) represents such a district, where excellent porphyry mineral potential is suggested by geologic trends but bedrock exposure is limited due to overburden. The full potential of this region will ultimately be realized when the wealth of geophysical data available is interpreted hand-in-hand with geologic knowledge.

Several important porphyry copper and gold deposits, including the Mount Milligan and Mount Polley mines, sit amongst hundreds of porphyry copper and gold showings along a terrane-parallel trend in B.C.'s Quesnel Terrane (Fig. 1). A significant 250-km gap in the trend of porphyry occurrences coincides with a region covered extensively by glacial till. From geologic mapping and geophysical survey data, the Quesnel Terrane volcano-magmatic arc package that hosts known porphyry deposits is contiguous along strike through the gap. Recognizing the opportunities of the region, two large geophysical surveys were deployed under the Quesnel Exploration Strategy (QUEST) program in 2007. These gravity and electromagnetic surveys provided significant new data and data coverage where geologic mapping has been obviously hindered. Fourteen years after the collection of these data, the results continue to provide opportunities to better understand the geology and mineral deposit settings in the Quesnel Terrane.

Recent work in the gap takes existing and new conductivity, magnetic susceptibility, and density geophysical inversion models and combines them with geologic map information, field data, and drilling data to extract details about the central Quesnel Terrane's hidden bedrock geology that are of interest to porphyry explorers. This 3D integrated analysis aims specifically to identify alkalic porphyry deposit host intrusions hidden beneath the overburden. Alkalic porphyry deposits are found throughout the Quesnel Terrane and are exciting targets due to their often elevated gold and platinum group element abundances. Intrusions related to alkalic porphyry deposits in the southern Quesnel Terrane have distinct geophysical signatures and commonalities in their spatial distributions. Magnetic, gravity, and electromagnetic data and models aided us in seeking similar rocks in the central Quesnel Terrane and also provided valuable understanding of the amount of cover material that could be obscuring them. In addition to highlighting areas of new porphyry potential in the central Quesnel Terrane, interpretations advanced during this work help extend our more developed knowledge of porphyry deposit settings in the northern and southern Quesnel Terrane into the covered region between.

An understanding of the value of a mineral district by geoscience organizations, a commitment to data collection, a passion by geoscientists to persevere in unravelling geologic and mineral settings, and crucially, an integrated approach to interpretation of data are the ingredients that will allow explorers to uncover the next porphyry deposit in central B.C.


Legend
City or town
MINFILE
MINFILE - other
Alkalic porphyry Cu-Au
Porphyry Cu±Mo±Au
Producing porphyry Cu-Au deposit
BC Terranes
Intermontane
CC - Cache Creek
ST - Stikinia
QN - Quesnellia
SM - Slide Mountain
Ancestral North America
CA - Cassiar
NAb - NA basinal
NAp - NA platform
NAc - NA craton and cover
BC Quaternary
BC Quaternary
400000 E
500000 E
600000 E
6100000 N
6000000 N
5900000 N
5800000 N
Germansen Landing
NAb
Chetwynd
NAc
MacKenzie
Mount Milligan
QN
NAp
CC
Fort St James
Fraser Lake
Vanderhoof
Prince George
CA
SM
Quesnel
NAb
ST
Mount Polley
Williams Lake