

Update on Geology of the Gladys Lake area, Northwest British Columbia, and ultramafic associated massive sulfide potential

Introduction

- Itramafic-associated massive sulfide (UAMS) form above seafloor detachments today •massive sulfide lenses can be tens of meters thick and kilometres long, are Ni-Co-enriched, with remarkably high Cu-Zn grades (20-40% combined)
- •oceanic crustal sections mapped in the Gladys Lake area, last sytematically mapped before the advent of plate tectonics, show evidence of having formed during ocean floor detachment
- •we discovered hemipelagite mineralized with Ag, Zn, Pb, Cu sulfides deposited above peridotite
- •our hypothesis is that the sulfides may be distal precipitates of hydrothermal plumes from UAMS fields formed above exposed, cooling mantle
- Atlin terrane detachments have been identified along strike of the map area for more than 400 km, representing a significant untested mineral exploration opportunity.
- •this work is part of a joint Provincial-Federal GEM-GeoNorth initiative

Regional Geology



Mineralization



Mineralized settings in the Atlin area span the magmatostratigraphic section. Au placer gravels (a), their lode sources (b), skarn, porphyry (c includes d, e), and possible ultramafic associated massive sulfide (UAMS, f-h).



(a) placer exploration and production of Otter Creek, (b) lode gold in Kedahda phyllite host, (c) porphyry with unidirectional solidification textures, (d) polished thin section of porphyry mineralization in x-polarized transmitted,

Units & relations



and (e) reflected light (f) mineralized hemipelagite in reflected light (see photo at poster center for setting), (g-h) Joss'alun showing discovered by BCGS crews in 2002, a chalcopyrite-rich lens in a basalt section possibly thinned by

detachment faulting, (i) massive sulfide UAMS along central Atlantic; inset shows shaded relief map of Lost City mullions, (h) setting of UAMS on detachment fault exposing hot mantle. Clear metal zonation may aid future exploration.







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ecommended citation:





A basalt story... ... with age and buoyancy subplots

Following widespread recognition and adoption of plate tectonic principles, "oceanic rocks" in the Atlin area were thought to represent a exotic Mississippian-Permian (M-P) carbonate platform capping an Ocean Island Basalt (OIB) plateau that was rooted on chertcovered, mid-ocean ridge basalt (MORB) and underlying mantle. However, geochemical analyses reveal only scraps of OIB and MORB, most basalts are island arc tholeiites and are Permo-Triassic, not pre-M-P. In addition, most of the chert and volcaniclastic rocks are Triassic to Early Jurassic, not M-P, with clastic rocks derived from the tholeiitic arc, but also from younger felsic volcanic sources. Age and composition of these Late Triassic -Early Jurassic volcanic source terranes are like adjacent Stikine and Quesnel arc terranes.

Evidence of an extensive OIB plateau is lacking in the Atlin area. Was it subducted? Was carbonate platform instead constructed atop buoyant sialic crust? If so, where is it today?

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Why should you care?

Cooling mantle at seafloor detachments are today driving the formation of UAMS fields

with grades of 20-40% combined Cu + Zn. Fossil detachments preserved for ~ 400 km along the length of the Atlin terrane are largely untested, but worthy exploration targets.

Reflected light photomicrograph of Cu-rich massive sulfide at Joss'alun, ~100 km south of Gladys Lake -a detachmentrelated deposit?

Future work

Project plans in 2024 include:

1. (re)examine the regional detachment surface and its immediate environs for further evidence of seafloor UAMS mineralization.

2. Looking for evidence of carbonate chimney complexes and indications of hydrothermal zonation.

3. integration of the Gladys transect geology with lower plate carbonate platform to the west and Paleozoic, quartz clastic terrane (Big Salmon complex) to the east

4. further documentation, testing, and dating of overlap relationships

5. test linkages with adjacent Quesnel, Stikine, and Slide Mountain terranes