Drift Prospecting within the QUEST Project Area, Central British Columbia (NTS 093J): Potential for Porphyry Copper-Gold, Volcanogenic Massive Sulphide Mineralization and Gold-Copper Veins

SFU SIMON FRASER UNIVERSITY THINKING OF THE WORLD

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GNS SCIENCE TE PŪ AO

Geoscience BC

1. INTRODUCTION

Knowledge of the glacial history, specifically the ice flow history and dominant transport direction (Figs. 1, 2) is vital to interpret geochemical surveys. Regional-scale till sampling can be carried out to assess the mineral potential of areas covered with drift. Detailed investigations, when possible, of regional-scale till samples with elevated or anomalous values can help define potentially mineralized zones within covered bedrock units. The preferred sampling medium for till geochemical surveys is basal till, as it is commonly considered a first derivative of bedrock. As part of the larger Quaternary Geoscience BC project, 712 new till samples were collected in 2008/9, from NTS 093J/05, /06, /11, /12, /13 and /14 (Figure 1).

2. METHODS

- Only basal till samples were collected to ensure consistency. Basal till in the study area comprises a dense, dark, sandy silt matrix supported diamicton with 25-40% clasts.
- At each site three separate samples were taken: 1) for clay separation, aqua-regia digestion and then analysis by ICP-MS (package 1-DX) at ACME Labs; 2) for silt+clay separation and INAA analysis (Package 1D EnH) at Activation labs; and 3) for archiving at the Geological Survey of Canada.
- At 138 of these sites >10 kg till samples were taken to have heavy mineral separation and gold grain counts carried out at Overburden Drilling Management Services.
- Sample locations were chosen based on distance, with a target of 750 m to 500 m between each sample, typically dug from soil pits, and opportunistic sampling sites (ie. windblown trees, and road cuts) and ranged in depth from 0.8 m to 1.6 m below surface level.
- Due to sampling restrictions in Carp Lake Provincial Park, thick non-till surficial deposits (i.e., glaciofluvial, glaciolacustrine and aeolian) and areas without road access, there were several large regions that could not be sampled. This decreasing the average sampling density.
- Samples were all entered into a GIS database for interpretation and presentation.

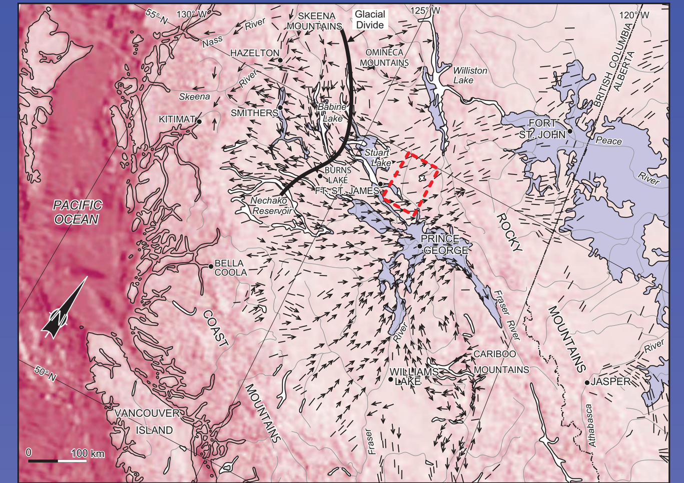


Fig 1. Till sampling project study area in relation to regional ice-flow (Stumpf et al., 2000).

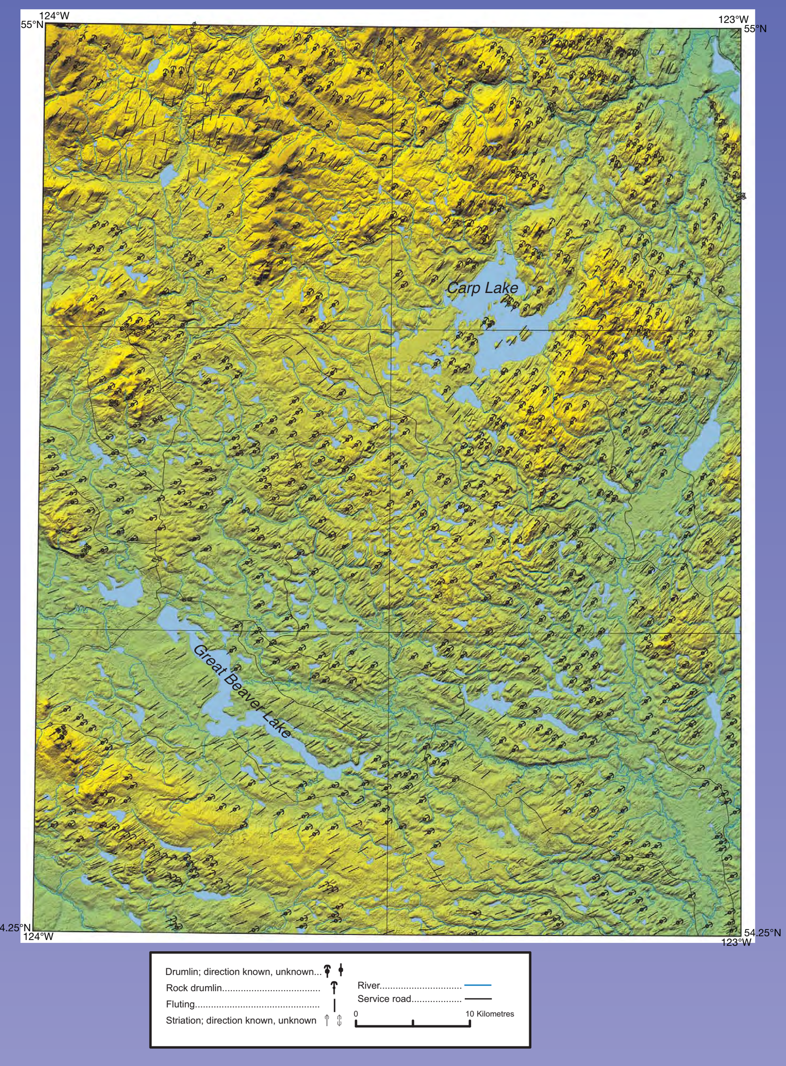


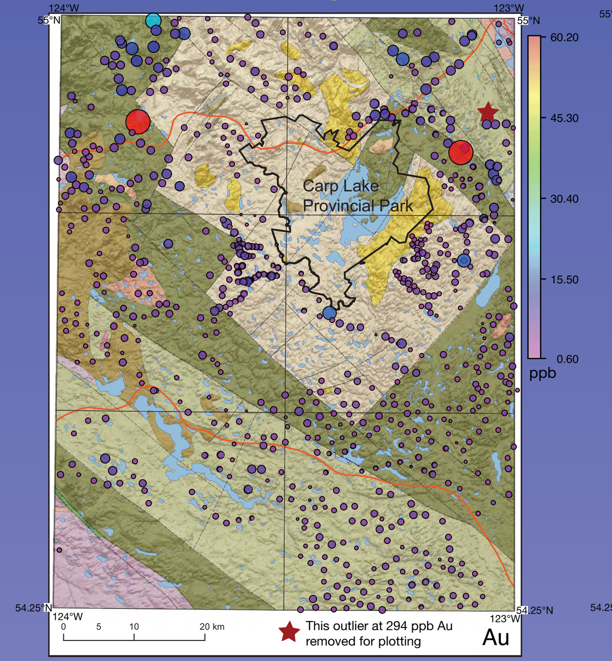
Fig 2. Dominant ice-flow for study area.

Fig 3. Major bedrock geologic units, mineral occurrences and the dominant ice-flow direction.

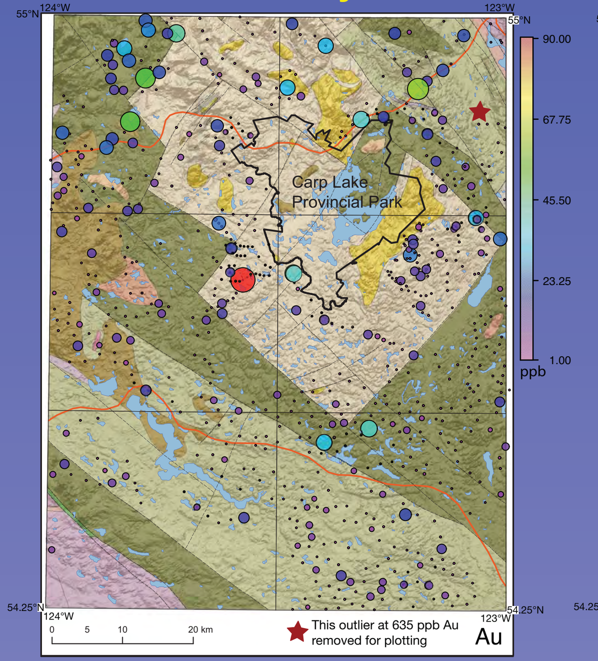
3. RESULTS

Epigenetic Au-Cu and Porphyry Cu-Au Mineralization

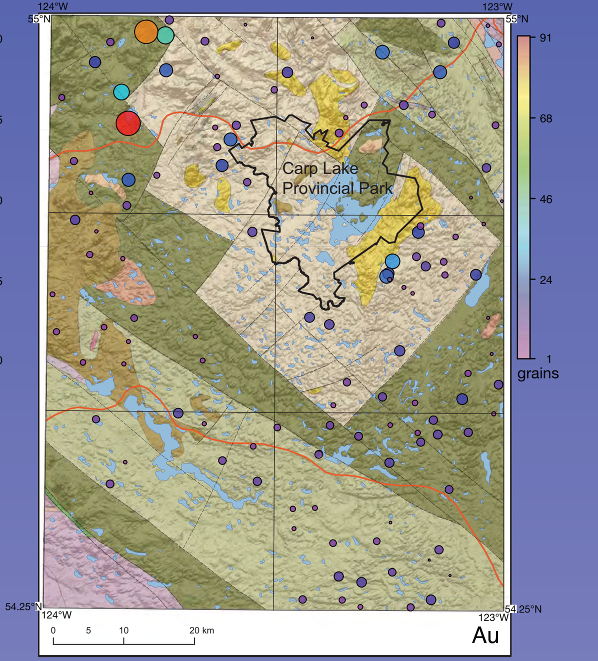
Au ICP-MS Clay Fraction



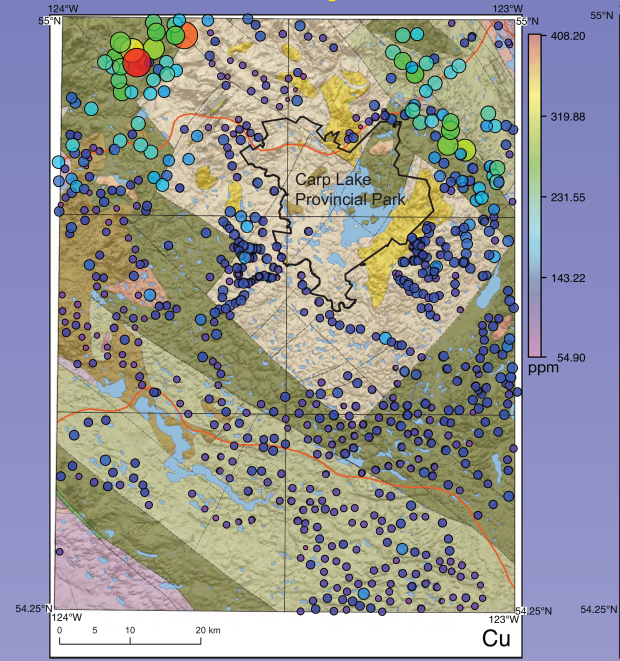
Au INAA Silt+Clay Fraction



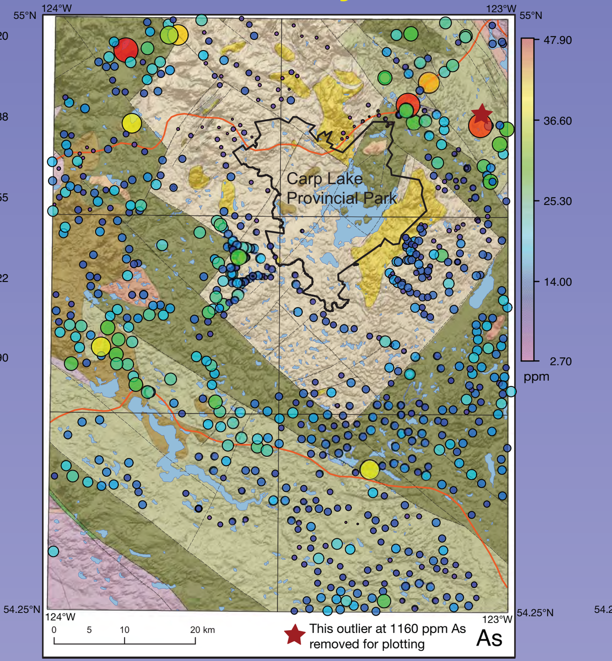
Au Grains HMC Fraction



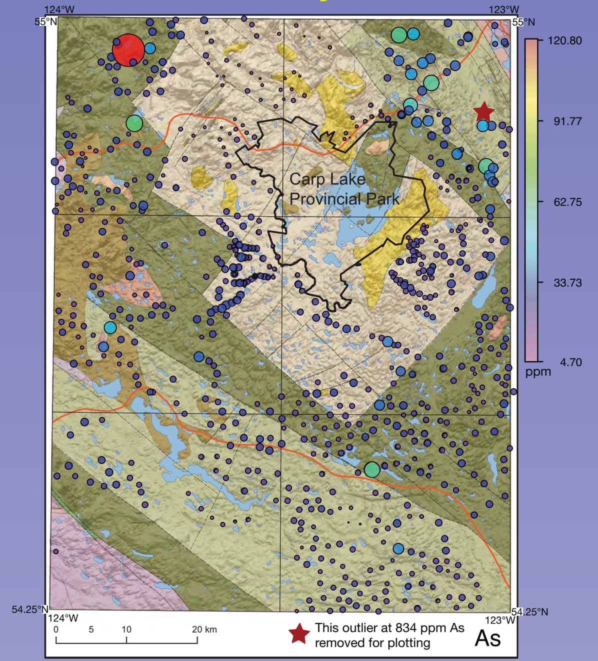
Cu ICP-MS Clay Fraction



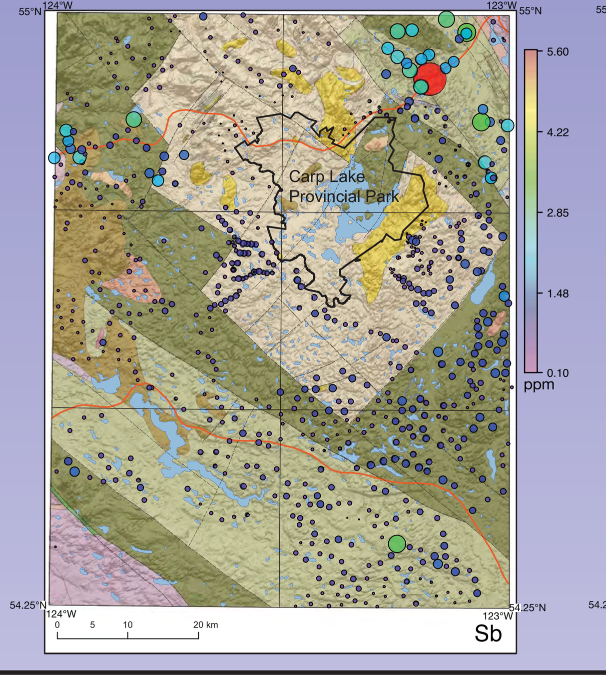
As INAA Silt+Clay Fraction



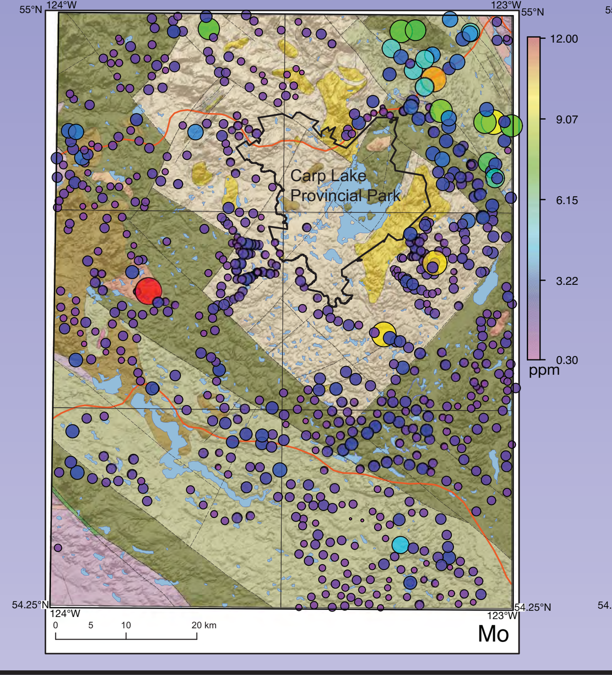
As ICP-MS Clay Fraction



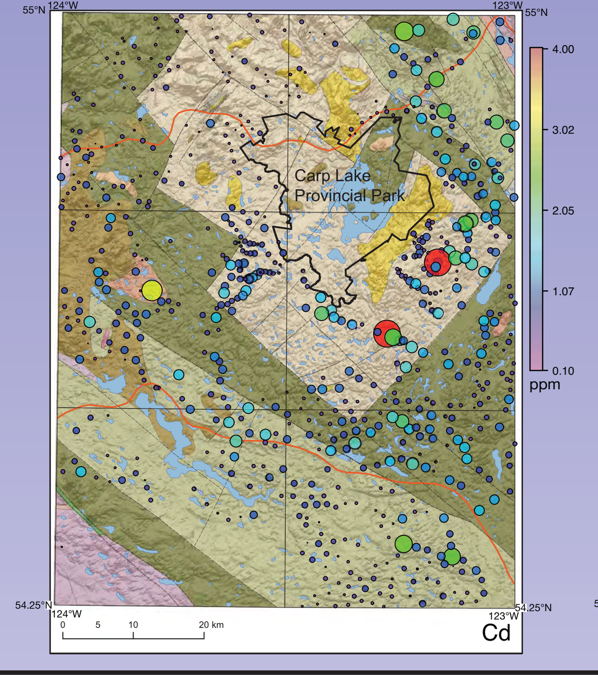
Sb ICP-MS Clay Fraction



Mo ICP-MS Clay Fraction

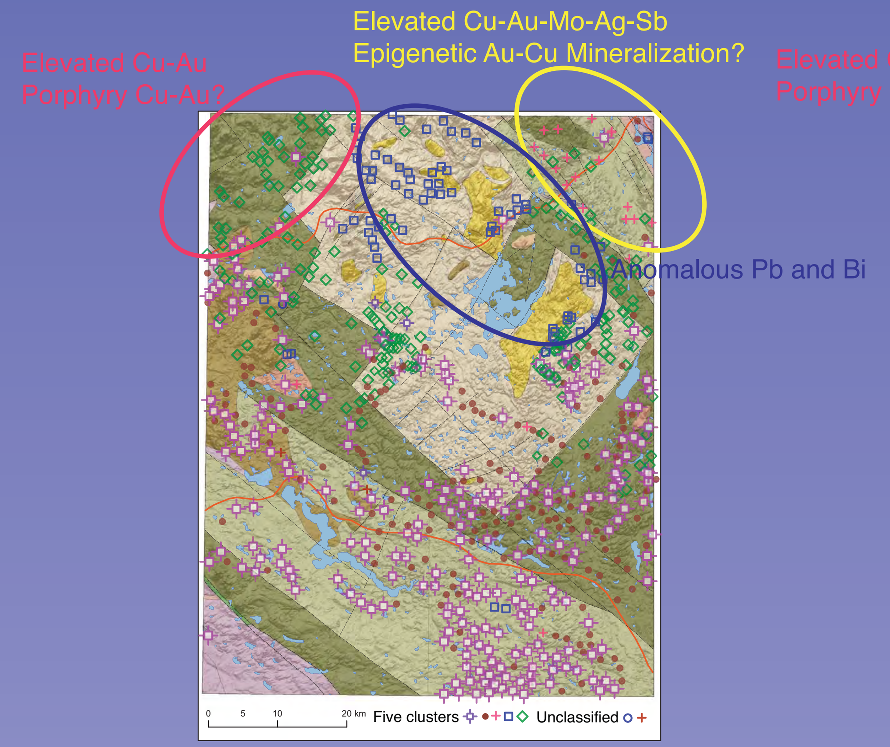


Cd ICP-MS Clay Fraction

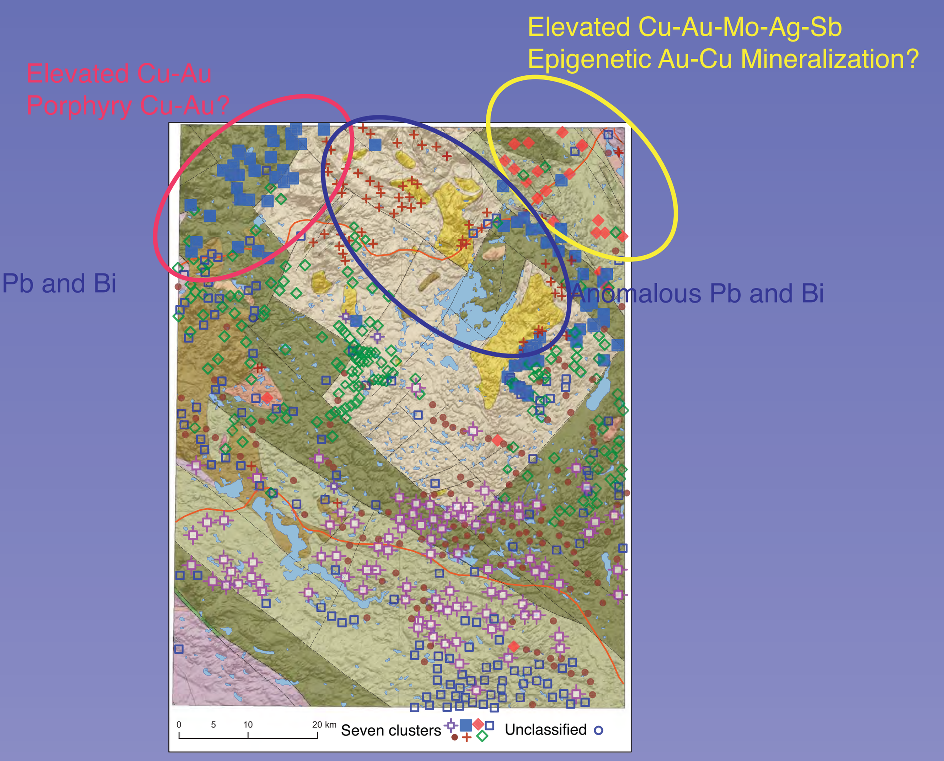


Cluster Analysis

A k-means cluster analysis was performed on the geochemical results from the clay fraction of the till samples. Cluster analysis helps to identify natural grouping of geochemical data that may not be easily evident from manual identification. These analyses graphically demonstrate the spatial associations between the clay analysis and likely reflect differences in the bedrock geology and their potential styles of mineralization.



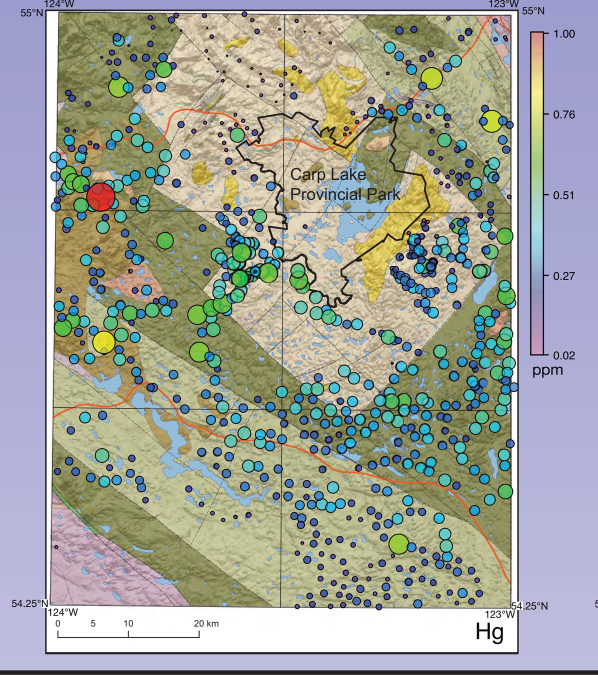
Five Clusters



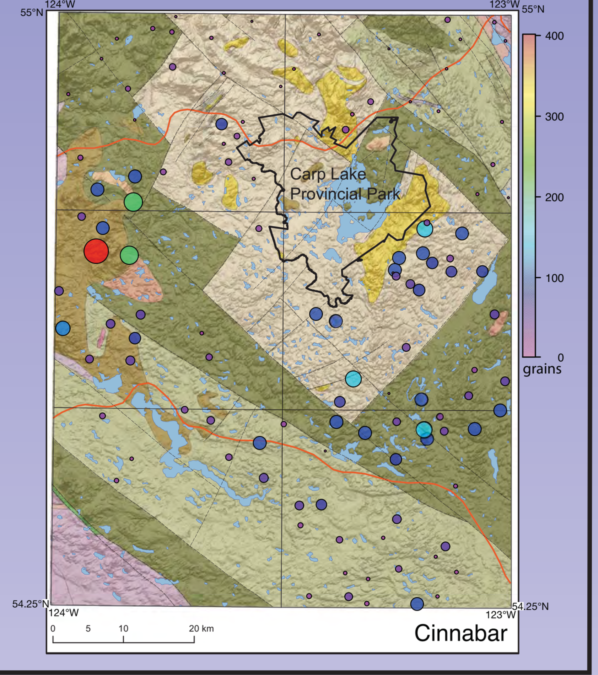
Seven Clusters

Mercury

Hg ICP-MS Clay Fraction

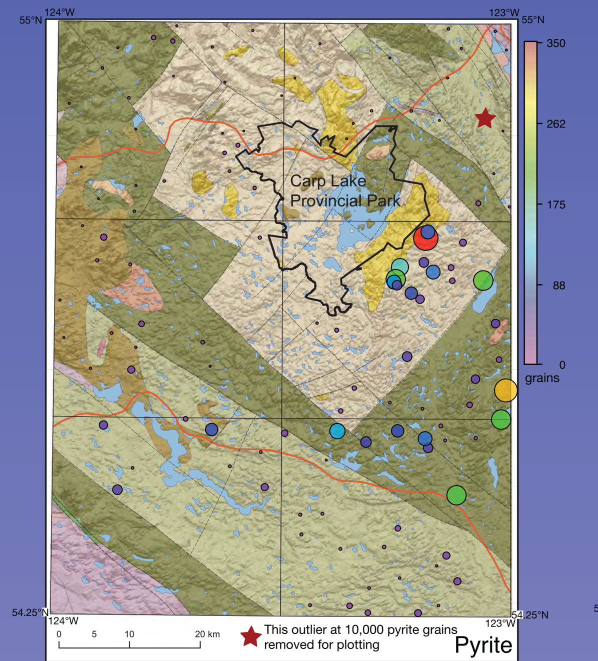


Cinnabar Grains HMC Fraction

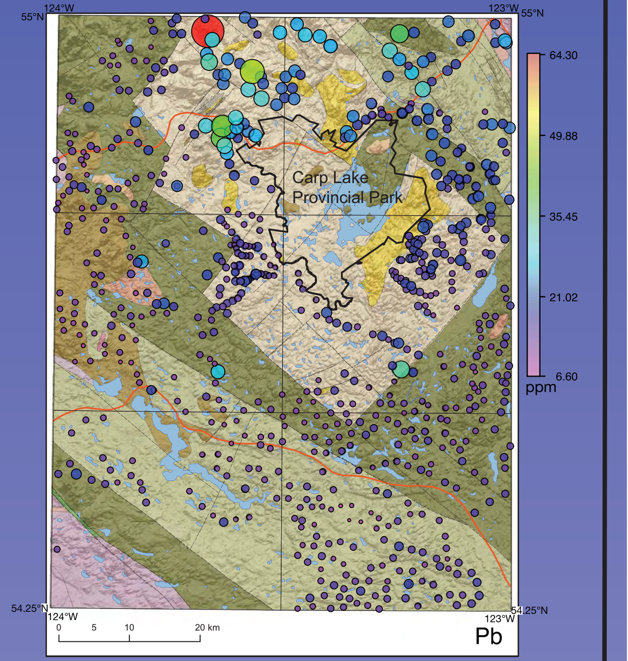


Volcanogenic Massive Sulphide Mineralization

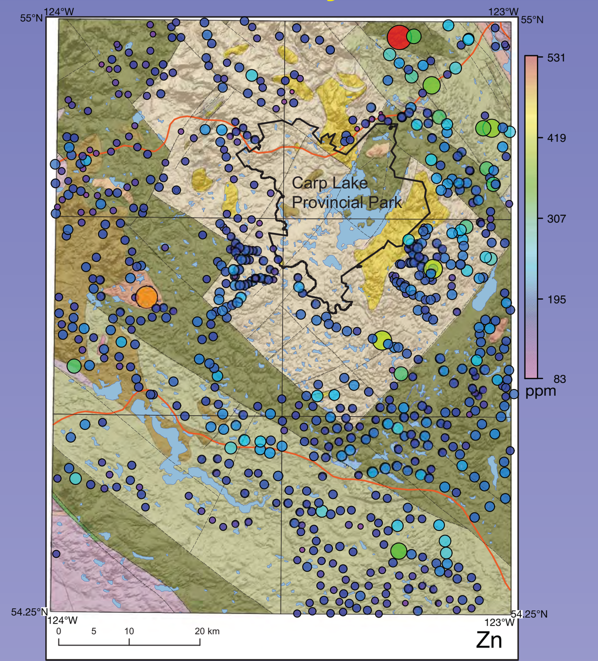
Pyrite Grains HMC Fraction



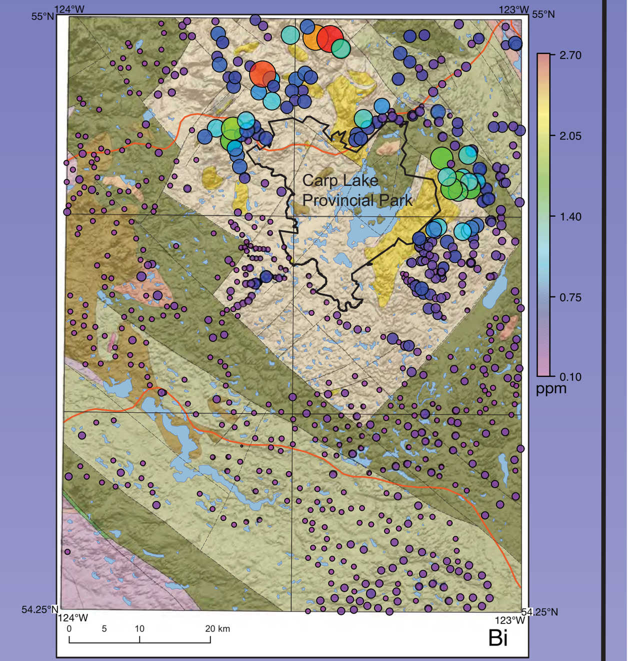
Pb ICP-MS Clay Fraction



Zn ICP-MS Clay Fraction



Bi ICP-MS Clay Fraction



4. CONCLUSIONS

Porphyry Cu-Au mineralization

In the northwestern part of the study area, adjacent to the Mt. Milligan Cu-Au porphery deposit, a large number of till samples with significantly anomalous Cu and Au contents along with pathfinder elements such as As, Hg, and Sb suggest Porphyry Cu-Au mineralization

Epigenetic Au-Cu Mineralization

In the northeastern part of the study area, there are Au, Cu, As, Ag, Sb and Cd anomalies that occur in an area with several epigenetic-type Cu-Au vein showings

VMS Mineralization

In the east-central portion of the study area, till samples have elevated Zn, Cd, and Bi contents, as well as high pyrite grain counts (up to 10 000 grains in a 10 kg sample). There are no known showings or mineralization in this part of the study area; the till geochemical results suggest the possibility of concealed VMS-type mineralization.

Mercury

In the west-central portion to the central portion of the study area, Hg values and elevated cinnabar grain counts suggest there is fault-associated Hg mineralization up-ice, perhaps similar to the Pinchi Lake mercury mine located to the west of the study area.