



INTRODUCTION

New geochemical data from re-analysis of archived stream sediment samples have been assessed using weighted sums modeling and catchment basin analysis as described in the methodology report that accompanies this map (Mackie et al., 2015). Both commodity and pathfinder element abundances are evaluated to highlight areas that show geochemical responses consistent with a variety of base and precious-metal mineral deposit types. The results of modeling, completed using two approaches, are presented as a series of catchment maps and associated data files. This release is a part of a regional assessment of stream sediment geochemistry that covers a large part of Yukon.

SAMPLING AND ANALYSIS PROGRAMS

Stream sediment and water samples from the Wolf Lake area (NTS 105B) were collected at a reconnaissance scale in 1978 under the direction of the Geological Survey of Canada as part of the Federal Uranium Reconnaissance Program (Geological Survey of Canada, 1986). The samples were analyzed in several stages and the geochemical data were originally released in Geological Survey of Canada (GSC) Open Files 563 and 1293 (Geological Survey of Canada, 1979 and 1986). A recent re-analysis program conducted by the Yukon Geological Survey (YGS) has generated new geochemical data from analysis of archived sample material as described in YGS Open File 2015-6 (Jackaman, 2015). The reader is referred to these reports for detailed descriptions of sampling techniques, analytical procedures, and quality control measures.

MINERAL OCCURRENCES

The most significant mineral occurrences discovered within the Wolf Lake area have been classed as polymetallic Ag-Pb-Zn vein (e.g., Dale, Logjam and Logan deposits), porphyry W (e.g., Logtong deposit and Cordilleran prospect), Pb-Zn skarn (e.g., Atom and Bar prospects), Sn skarn (e.g., Partridge prospect) or Sn vein and greisen (e.g., Cusp prospect). Other deposit types represented in the map area include epithermal Au-Ag (e.g., Shoolamook prospect), volcanogenic massive sulphide (e.g., Convert Prospect), and porphyry Cu-Mo (e.g., McPres prospect). Polymetallic Ag-Pb-Zn vein and manto-type prospects trend into the map area to the south (NTS 104O), within British Columbia, supporting the prospectivity of the region for this class of mineralization.

WEIGHTED SUMS MODELING

As described in the methodology report (Mackie et al., 2015), two approaches have been used to subdue the influence of background lithological variation and secondary absorption on the composition of stream sediments. One uses data levelled by the dominant geology mapped within each catchment, while the other uses residuals calculated from regression against principal components. Weighted sums models (WSM) have been generated using the processed data. The importance rankings used in WSMs are summarized in Table 2 for a variety of deposit types. Each model is optimized for a target deposit type however

Table 2: Importance rankings for weighted sums models using residuals on principal components.

Table with columns for Target Deposit Type, Other Deposit Type, and mineral elements (Mn, Fe, Co, Ni, Cu, Mo, Zn, Pb, Ag, Au, As, Ba, Cd, Sn, Sb, Te, Hg, Tl, Bi, W) with numerical ratings.

*Polymetallic Ag-Pb-Zn type includes vein and manto styles; SEDEX = sedimentary exhalative; VMS includes both Zn- and Cu-rich classes of volcanoclastic/associated massive sulphide deposits.

Raw data following a log10 transformation.

LEGEND

Legend defining symbols for Town, Mineral Occurrence, Road, Contour, River, NTS map sheet, Water Body, Wetland, Sample Location, Catchment, and Catchments >10 km². It also includes the 'Weighted sums model (PC residuals)' color scale from 0-50th to 98-100th percentile.

other deposit types may be represented in a given model due to similarities in elemental abundances and associations.

Exploratory data analysis of both raw element data and principal components show that the distribution of many commodity and pathfinder elements is strongly controlled by lithologic variation. The first principal component, accounting for ~25% of the total variation, shows high positive loadings for Co, Ni, Mg, Cu, Fe, Ca and Sn, and negative loadings for Sn, U, Ti and Rb. Respectively, these element groupings form spatial patterns matching distribution of mafic volcanic rocks in the southwest and Kachika group sedimentary and mafic igneous rocks in the northeast part of the map area and granite plutons throughout the map area. The second principal component, accounting for ~15% of the total variation, shows high loadings for Cd, As, Sb, Ag, Zn, Cu and Mo and forms a spatial trend matching the distribution of sedimentary rocks of the Earn, Finlayson, Klintkit groups and Snowcap assemblage that form a northwest trending package in the southwest part of the map area. Several basalite skarn occurrences occur in this area suggesting that the second principal component may represent, in part, a mineralization signature for this deposit type. Regression analysis of these metals against the relevant principal component effectively filters these postulated terrane-effects resulting in enhanced responses elsewhere in the map area and preserving responses related to known occurrences in most instances. Levelling by dominant mapped geology has a more subdued effect on filtering the interpreted lithologic control. In order to reduce the impact this has on the WSM using this approach, certain elements were given low importance rankings or, in the case of Cd, were omitted for certain deposit types. Negative rankings were used in both approaches to help distinguish signatures of different deposit types that have similar mineral associations.

The effectiveness of historical sampling coverage has been assessed empirically using graphs of WSMs plotted against catchment surface area to determine the ideal maximum catchment size (10 km²). Catchments that cover larger areas (shown on the map with bold outlines) are interpreted to have been under-sampled and thus require further sampling to properly evaluate the area for geochemical anomalies. Given the likelihood that a mineralization signal would be progressively diluted with increasing catchment size, marginally high WSM scores in large catchments could also be of interest.

Table 1: List of Mineral Occurrences for NTS map sheet 105B (Yukon MINFILE, 2015). Columns include Number, Name, Type, Status, and Commodities.

RECOMMENDED CITATION

MACKIE, R., ARNE, D. AND PENNIMPEDE, C., 2016. Weighted sums model for Sn skarn/greisen deposits using principal component residuals. In: Enhanced interpretation of stream sediment geochemical data for NTS 105B. Yukon Geological Survey, Open File 2015-8, scale 1:250 000, sheet 13 of 15.

Catchment basin polygons generated by the Yukon Geological Survey (J. O. Bruce). Any revisions or additional geological information known to the user would be welcomed by the Yukon Geological Survey.

Paper copies of this map and the accompanying report may be obtained from the Yukon Geological Survey, Energy, Mines and Resources, Government of Yukon, Room 102-300 Main St., Whitehorse, Yukon, Y1A 2B5. Ph. 867-667-3201, Email geology@gov.yk.ca.

A digital PDF (Portable Document File) file of this map may be downloaded free of charge from the Yukon Geological Survey website: http://www.geology.gov.yk.ca.

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Open File 2016-8

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