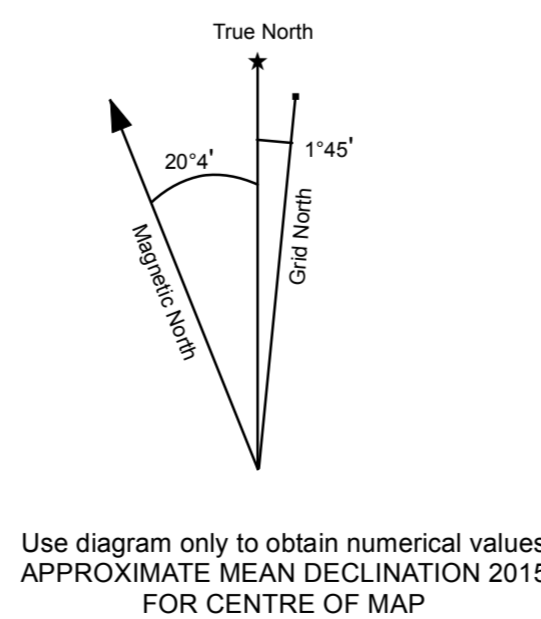
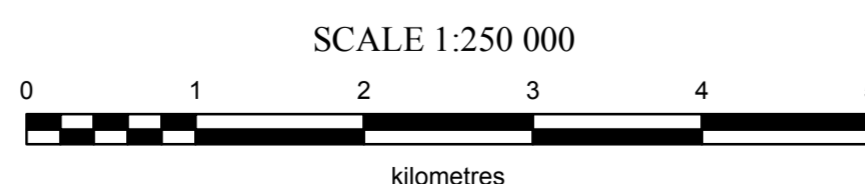


1:250 000-scale topographic base data produced by CENTRE FOR TOPOGRAPHIC INFORMATION, NATURAL RESOURCES CANADA

ONE THOUSAND METRE GRID Universal Transverse Mercator Projection North American Datum 1983 Zone 7

CONTOUR INTERVAL 100 FEET Elevations in metres above Mean Sea Level

### Orogenic Au Weighted sums model (Principal Component Residuals) Sheet 10 of 13



#### 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 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 Klauene Lake area (NTS 115F and part of 115G) were collected at a reconnaissance scale in 1986 as part of the Canadian-Yukon Mineral Resource Development Cooperation Agreement (Geological Survey of Canada, 1987). Field descriptions and initial geochemical data for 1005 sites were released in Geological Survey of Canada (GSC) Open File 1362. New geochemical data from the re-analysis of archive sample material from 699 sites were released in Yukon Geological Survey (YGS) Open File 2012-15 (Jackaman, 2015). The discrepancy in number of sites between the two releases is because samples that occur within present limits of protected areas were not re-analysed. The reader is referred to these reports for detailed descriptions of sampling techniques, analytical procedures and quality control measures.

#### MINERAL OCCURRENCES

A variety of types of base- and precious-metal mineralization are known to occur in the Klauene Lake area as shown in Table 1 (Yukon MINFILE, 2015). The most significant deposits are classed as Cu-Ni-PGE (Wellgreen and Canlake deposits), Cu-Mo porphyry (Rockside and Raf prospect), Skarn (Arn and Az prospects), and quartz vein Au (Aishnik Lake) contains several quartz vein-related Au occurrences (Mon, Shut and Lid prospects) that form a trend that projects towards the southeast corner of the Klauene map area supporting the prospectivity of the region for this type 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 selected principal components. Weighted sums models (WSM) have been generated using the processed data. The importance rankings used in WSMs are summarized in Table 2. Each model is optimized for a target deposit type however other deposit types may be represented in a given model due to similarities in elemental abundances and associations.

Exploratory data analysis using both raw element data and principal components indicate that the distribution of many commodity and pathfinder elements is strongly influenced by lithological variation. Additionally, there is evidence of scavenging of metals ions by secondary Fe- and Mn-oxides/hydroxides, clays, and/or organic material. The first principal component accounts for ~32% of the total geochemical variation and shows high positive loadings for Co, Mg, Ni and Cr, and high negative loadings for Bi, Pb, U, La, Cd, Y, Th, Ag and Zn. Respectively, these groupings form spatial patterns that match the distribution of mafic-ultramafic intrusions and felsic intrusions. The second principal component shows negative loadings for Hg, Mo, LOI, Cd, Sb and Cu, and using LOI as a proxy for carbon, is suggestive of scavenging by organic material. This interpretation is supported by the fact that the map pattern of inverse PC2 coincides with low lying regions where accumulation of organic material and/or clay is likely. Regression analysis of selected metals against the relevant principal component(s) effectively filters these effects while preserving responses related to known occurrences. Leveling by mapped geology has a more subdued effect on filtering the interpreted lithological control on the distribution of certain pathfinder elements. In order to reduce the impact this has on the WSM using this approach, certain elements were given low importance rankings or, in some cases, were omitted for certain deposit types.

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 (15 km<sup>2</sup>). 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 may also be of interest.

Table 1: List of Mineral Occurrences for NTS map sheet 115F and 115G (Yukon MINFILE, 2015)

Table with 10 columns: Number, Name, Type, Status, Commodity. Lists various mineral occurrences across the NTS sheets 115F and 115G, including deposits like SHARPE, GALOPING, FELD, GARLIK, HANRICKS, KOCKERIN, LIBERTY, GUESCO, CATS AND DOGS, MEMO, FROXWADLE, SEVENSMA, CANALAK, EPIC, ARN, SHAPETE, MEMOIA, RAU, MEMOR, MCELLEMAN, RABBIT, LEF, WHITE RIVER, SHARE, KLETSAN, CANYON MOUNTAIN, WELLSIDE, MEYER, MEYER, STEWART, HIRLEY, TALLINE, STOVE, COMBON, MALLER, DISKON, DESTRUCTION, COPPER JOE, SQUARE, WINDGAP, DUKE, HOSE, AMPHITHEATRE, AMP, CORK, GLEN, BURWASH, LIQUID, VAIG, DULE, VERBULKE, CALLAN, WELGREEN, ARWAYS, MEYER, SWIDE, JOHNSON, CEMENT, ST. ELIAS, SEXSMITH, NOK, BOITARD, DINKEL, EULEN, THIRTY, KENNEDY, TINSIP, NUNTAEA, DODPAC, BROOKS, TALBOT, RAFT, ROCKSIDE, NORTH STAR, BEG, ALASKITE, THRELL, DWARF, BRCH, BRAMER, RHOLITE, NCK, EASTER, ALTE, CUL, BOCK, WAPLE, COPULAR, LYNX CREEK, FRIEBERG, ROBERTSON, ELIAS, BIGZOK, LINDA, ARBY, HUYLIK, LONN, TONY, KILLANE, WASH, TAL, TREMBLAY, JUBI, COFER, BERDHAL, LAKE.

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

Table with 17 columns: Target Deposit Type, Other Deposit Type, Mn, Fe, Co, Ni, Cu, Mo, Zn, Pb, Ag, Au, As, Ba, Cd, Sn, Sb, Te, Hg, Tl, Bi, W. Rows include deposit types like Porphyry Cu-Mo, Polymetallic Ag-Pb-Zn, Magmatic Ni-Cu-PGE, Epithermal Au-Ag, Orogenic Au, and Hydromorphic Anomaly.

\*Polymetallic Ag-Pb-Zn type includes vein and matrix styles; SEDEX = sedimentary exhalative Pb-Zn (Ag); VMS = volcanic-hosted/associated massive sulphide deposits; Hydromorphic anomaly = principal component 5

Raw data following a log<sub>10</sub> transformation

**LEGEND**

- Town
- Mineral Occurrence
- Road
- Contour
- River
- Water body
- Welland
- Sample Location
- Catchment
- Catchments > 15km<sup>2</sup>

**Weighted sums model (PC residuals)**

**Orogenic Au deposits**

- incomplete element suite
- 0-50th percentile
- 50-75th percentile
- 75-90th percentile
- 90-95th percentile
- 95-98th percentile
- 98-100th percentile

RECOMMENDED CITATION  
MACKIE, R., ARNE, D. AND PENNIMPED, C., 2016. Weighted sums model for Orogenic Au deposits using principal component residuals. In: Enhanced interpretation of stream sediment geochemical data for NTS 115F and 115G. Yukon Geological Survey, Open File 2016-13, scale 1:250 000, sheet 10 of 13.

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 2016-13

Weighted sums model for Orogenic Au deposits using principal component residuals (NTS 115F and 115G) Sheet 10 of 13

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