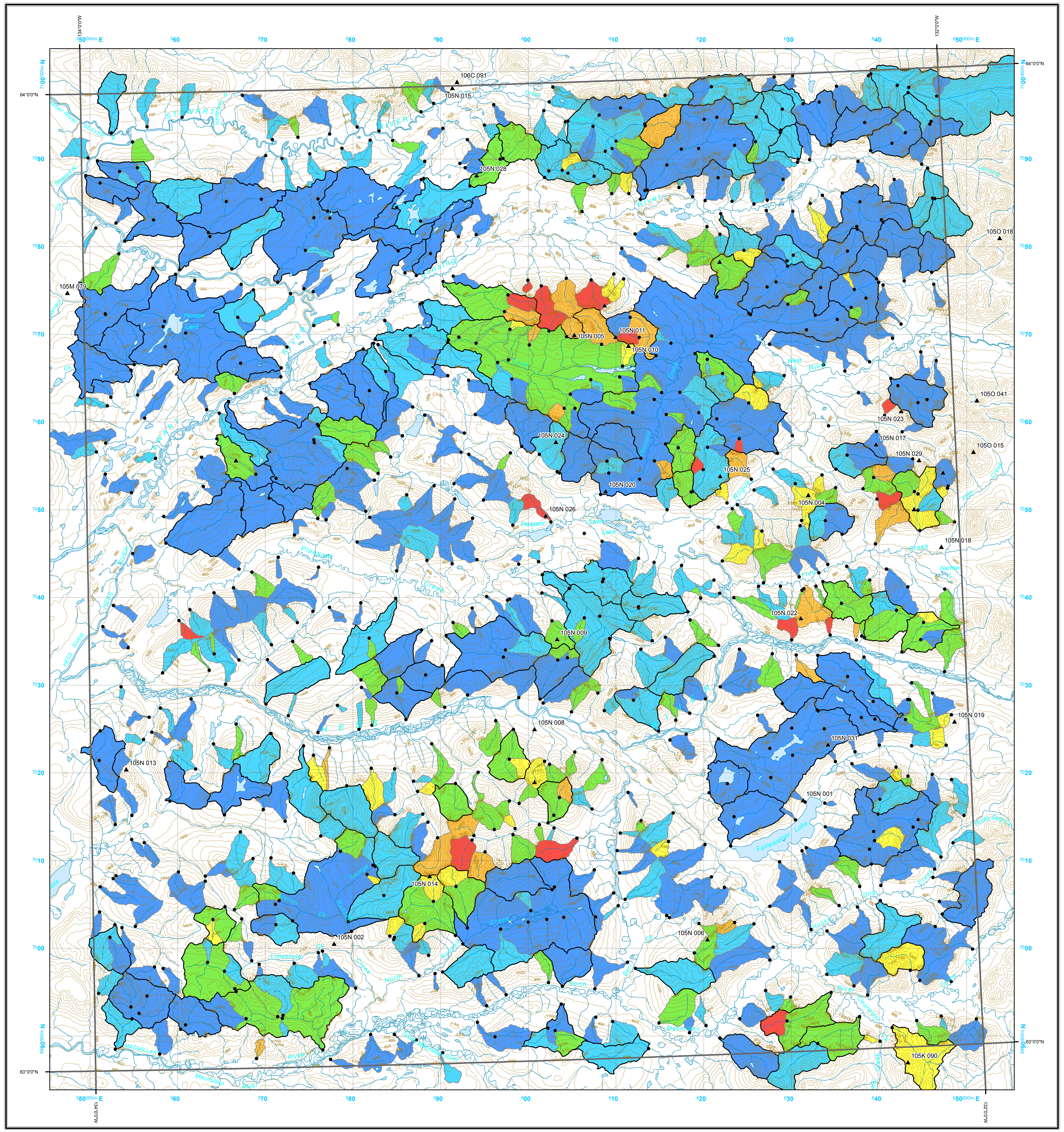
YUKON GEOLOGICAL SURVEY

CSA Global
Resource Industry Consultants

Yukon
Energy, Mines and Resources



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 were collected from the Lansing Range area (NTS 105N) in 1990 and the original geochemical data was released in Geological Survey of Canada Open File 2363 (Friske *et al*., 1991). Archived sample material was re-analyzed for Bi and Se as reported in GSC Open File D3685 (Friske *et al*., 1998). Subsequently, the samples were re-analyzed by Inductively Couple Plasma Mass Spectrometry (ICP-MS) as described in GSC Open File 6272 and YGS Open File 2009-27 (Day *et al*., 2009a & 2009b). The reader is referred to these open files for detailed descriptions of sampling techniques, analytical procedures and quality control measures.

MINERAL OCCURRENCES

A variety of base- and precious-metal deposit types have been documented in NTS map sheet 105N as shown in Table 1 (Yukon MINFILE, 2015). The Inca and Plata polymetallic Ag-Pb-Zn (±Au) deposits are located near the eastern edge of the map area. Additionally, Cu (±Ag) vein type (Joy, Dean, Cartier and Etzel showings), sedimentary exhalative Pb-Zn-Ag (Kidd Prospect) and W skarn mineralization (Tongue Prospect) have been discovered. In the adjacent map sheet to the north (106C), Carlin-type gold (Rackla Gold Project of Atac Resources Ltd.) and Mississippi Valley-type Pb-Zn-Ag mineralization (Craig Deposit) is noted. Other types of deposits in the region include Cu skarn (Golf Showing), Zn-Pb-Cu volcanogenic massive sulphide (Marg Deposit) and various types of gold mineralization, such as unclassified quartz-vein hosted/related (Cynthia and Cache Creek prospects; Berdahl showing) and intrusion-related (LM and Niddery Prospects).

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 of both raw element data and principal components shows that the distribution of many commodity and pathfinder elements is strongly influenced by lithological variation. The first principal component (38% of the total variation) shows high positive loadings for Cd, Ag, Se, Mo, Sb and Zn; and forms a coherent spatial trend matching the distribution of Earn and Road River group and Mount Christie Formation sedimentary rocks. The second principal component (~11% of the variation) shows high positive loadings for Cu, Co and Ni and spatially coincides with sedimentary rocks of the Hyland Group. Regression of these metals against the appropriate principal component effectively filters the interpreted lithological control and enhances responses related to known mineral occurrences. Levelling by dominant mapped geology does not subdue these 'terrane effects' to the same degree for certain elements (*e.g.*, Ag, Ba, Cd, Cu, Hg, Mo, Sb and Zn). To reduce the impact on the WSMs using geology levelled data these elements were given low importance rankings, or in some cases were omitted. Negative importance rankings were used, when relevant, to distinguish deposit types with similar element associations and also to dampen terrane effects.

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 (12 km^2). 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 anomalism. 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 105N (Yukon MINFILE, 2015)

Number	Name	Type	Status	Commodities
105N 001	HUGO	Unknown	Anomaly	Zinc
105N 002	ARMSTRONG	Vein and Greisens Sn	Anomaly	Gold, Tin, Tungsten, Lead
105N 003	PLATA	Vein Polymetallic Ag-Pb-Zn±Au	Deposit	Lead, Gold, Silver, LEAD + ZINC, Zinc, Cobalt, Copper
105N 004	ROGUE	Unknown	Anomaly	Cadmium, Zinc, Manganese, Nickel
105N 005	JOY	Vein Cu±Ag Quartz	Anomaly	Copper
105N 006	GOLF	Skarn Cu	Showing	Copper, Gold
105N 007	ETZEL	Vein Cu±Ag Quartz	Showing	Copper, Gold
105N 008	CARTIER	Vein Cu±Ag Quartz	Showing	Copper, Silver, Zinc, Lead
105N 009	PEBBLE	Vein Polymetallic Ag-Pb-Zn±Au	Unknown	Lead
105N 010	DEAN	Vein Polymetallic Ag-Pb-Zn±Au	Showing	Lead
105N 011	AUREOLE	Vein Cu±Ag Quartz	Showing	Copper
105N 012	BLOOM	Vein Polymetallic Ag-Pb-Zn±Au	Showing	Copper, Lead, Molybdenum
105N 013	PLEASANT	Skarn W	Showing	Copper, Lead, Silver, Tungsten, Zinc, Gold
105N 014	TONGUE	Skarn W	Drilled Prospect	Copper, Tungsten
105N 015	KIDD	Sediment hosted Sedimentary Exhalative Zn-Pb-Ag (Sedex)	Drilled Prospect	Zinc
105N 016	ANDREA	Sediment hosted Stratiform Barite	Prospect	Barite
105N 017	FLATASA	Vein Polymetallic Ag-Pb-Zn±Au	Anomaly	Lead, Silver
105N 019	DOG	Vein Barite	Showing	Barite, Copper, Zinc
105N 020	JAGOWERITE	Vein Barite	Showing	Barite
105N 022	FIDO	Sediment hosted Stratiform Barite	Anomaly	Barite, Zinc
105N 024	BERDAHL	Unknown	Showing	Antimony, Silver, Zinc, Arsenic, Gold
105N 031	THUNDERHEAD	Vein Cu±Ag Quartz	Anomaly	Copper, Gold, Silver
105N 032	END OF THE	Plutonic Related Au	Showing	Gold
105N 030	ROOTS	Sediment hosted Stratiform Barite	Showing	
105N 023	KEG	Sediment hosted Sedimentary Exhalative Zn-Pb-Ag (Sedex)	Anomaly	
105N 026	PLEASURE	Sediment hosted Shale-Hosted Ni-Zn-Mo-PGE (Nick)	Unknown	
105N 028	CDN	Unknown	Unknown	
105N 025	ROG	Unknown	Anomaly	
105N 018	STRIP	Unknown	Unknown	
105N 029	ABBOTT	Sediment hosted Stratiform Barite	Showing	

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

Target deposit type	Other deposit types	Mn	Fe	Co	Ni	Cu	Mo	Zn	Pb	Ag	Au[1]	As	Ba	Cd	Sn	Sb	Te	Hg	Tl	Bi	W[1]
Polymetallic Ag-Pb-Zn	SEDEX; MVT; VMS; Pb-Zn skarn; Au-Ag epithermal				-2		-2	1	4	3		1									
Sediment-hosted Zn-Pb	SEDEX; MVT; VMS; Pb-Zn skarn; Polymetallic Ag-Pb-Zn							4	2	1				1							
Sediment-hosted Ni-Zn-Mo	SEDEX				3		1	1													
Intrusion-related Au	Carlin-style Au							-1	-1		4	2								2	
Carlin-style Au	Intrusion-related Au							-1	-1		4	3				2		1	1		
Epithermal Au-Ag								-1	-1	4	3	2				1					
Porphyry Cu-Mo	Porphyry Mo; Cu skarn					4	3	-1	-1	2	1										
W Skarn	Intrusion-related Au														1					2	3

[a]Polymetallic Ag-Pb-Zn type includes vein and manto styles; SEDEX = sedimentary exhalative; VMS = volcanogenic massive sulphide

[1]Raw data following a log_{10} transformation

LEGEND

- Town
- Mineral Occurrence
- Road
- Contour
- River
- NTS map sheet
- Water Body
- Wetland
- Sample_Location
- Catchment
- Catchment >12 km^2

Weighted Sums Model (PC residuals)

Sediment hosted Ni-Zn-Mo Deposits

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

RECOMMENDED CITATION

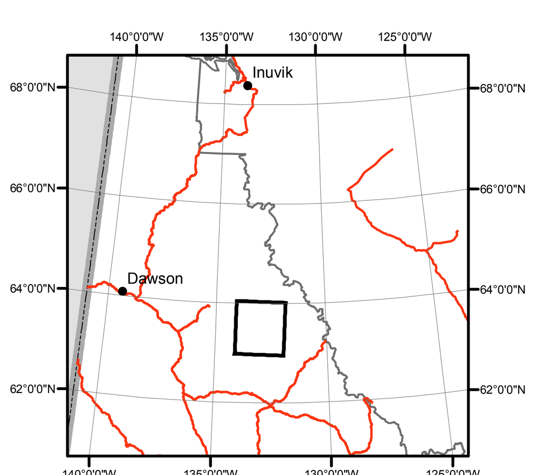
MACKIE, R., ARNE, D. AND BROWN, O., 2015. Weighted sums model for Carlin Au deposits using principal component residuals. In: Enhanced interpretation of stream sediment geochemical data for NTS 105N. Yukon Geological Survey, Open File 2015-29, Scale 1:250,000, sheet 14 of 17 .

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 purchased 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.



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 8

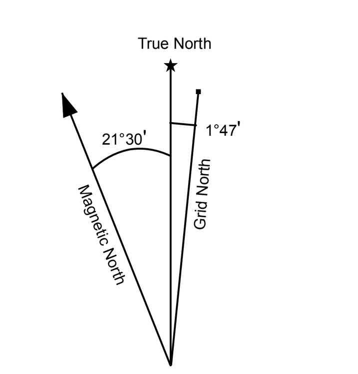
CONTOUR INTERVAL 100 FEET
Elevations in metres above Mean Sea Level

Sediment hosted Ni-Zn-Mo Deposits Weighted sums model (Principal Component Residuals) Sheet 14 of 17

SCALE 1:250 000

0 1 2 3 4 5

kilometres



Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 2015
FOR CENTRE OF MAP

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Open File 2015-29

Weighted sums model for Sediment hosted Ni-Zn-Mo Deposits Principal Component Residuals (NTS 105N) Sheet 14 of 17

by

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