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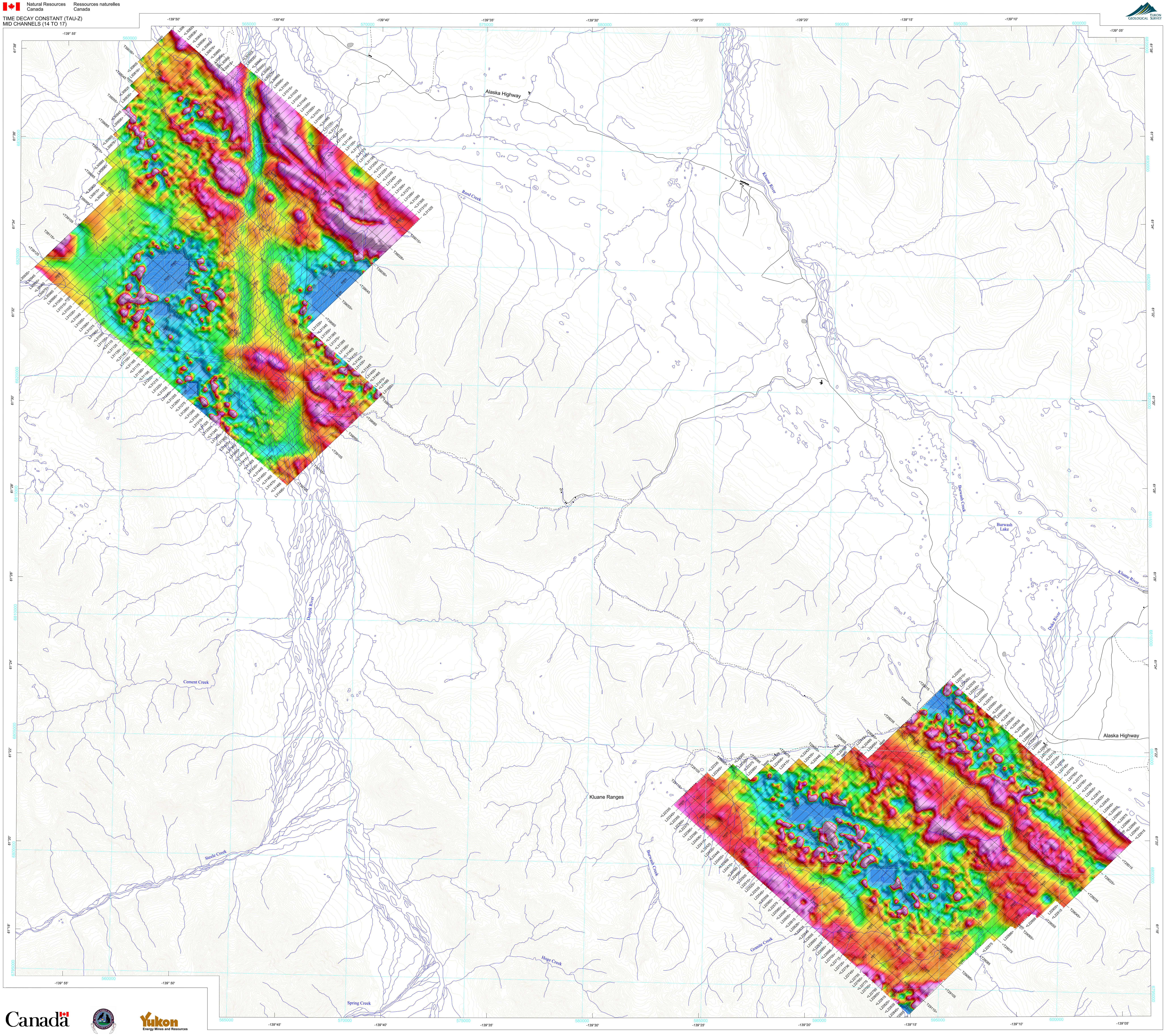
TIME DECAY CONSTANT (TAU-Z)
MID CHANNELS (14 TO 17)



Technical Information

This map was compiled from data acquired during an airborne electromagnetic/magnetic survey carried out by CGG utilizing a HELITEM® Time-Domain Electromagnetic (TDEM) system. The system was mounted on a Eurocopter AS350B3 helicopter (registration C-FKMX) and was carried out between April 17th and April 30th, 2015. The aircraft flight elevation was maintained at a nominal ground clearance of 83 m. Aircraft navigation used a 12-channel NovaTel dual frequency GPS. Post-flight differential corrections were subsequently applied to finalize flight path position. A vertically mounted video camera was used to record images of the ground. The radar height was recorded ten times per second using a Sperry unit and the barometric altitude was recorded ten times per second using a Motorola altitude transducer. The magnetic data were recorded 10 times per second using a Scintrex CS-2 cesium-vapor magnetometer.

Survey Area Parameters:

Parameter	
Traverse line azimuth	45°/225°
Traverse line spacing	250 m
Tie line azimuth	130°/310°
Tie line spacing	1000 m
Aircraft nominal clearance	83 m
EM transmitter nominal clearance	35 m
Magnetic sensor nominal clearance	35 m
EM Receiver nominal clearance	63 m

Electromagnetics

The TDEM system operating at a base frequency of 30 Hz transmits a 4 ms time-varying signal from a two-turn, 708 m^2 horizontal loop mounted approximately 47.0 m below and 12.5 m behind the aircraft. This configuration provides a dipole moment of 1.84×10^6 A/m^2. The response of conductors in the subsurface is sampled 2048 times per half-cycle using a three axis (X, Y and Z) electromagnetic receiver mounted to a platform approximately 26.6 m above and 12.4 m in front of the transmitter loop. The EM system records data in a continuous stream for each of the three components. A 3-second tapered stack was used before outputting the data as 30 time windows at a final recording rate of 10 samples per second. The EM receiver directly measures the change in the magnetic field with respect to time (dB/dt) from which the secondary total magnetic field (B) is numerically integrated. High-altitude background sections flown at the start and end of each flight allow a 1st-order removal of system drift.

Electromagnetic System Specifications:

Base Frequency	30 Hz
Waveform	Half-sine wave
Pulse width	4 ms
Transmitter Area	708 m^2 (2 turns)
Transmitter Off-time	12.6 ms
Transmitter Loop	30 m diameter
Transmitter Current	1300 A
Dipole moment (approximately)	1.84×10^6 Am^2 (@1°C)
Windowed data sampling rate	10 Hz
Receiver	3-component induction coil (X, Y, Z)
Measured Response	Voltage (dB/dt)
Digital recording	All raw data channels (30 channels)
1st off-time channel	Channel 5 at ~4.199 ms after pulse turn on
Tx-Rx Configuration	Towed transmitter below towed receiver

Apparent Conductivity

The apparent conductivity values were derived from selected early, middle and late channels (6, 14 and 22) of the off-time signal, fitted to a homogeneous half-space model. This is performed using a look-up table that contains the response over a range of half-space conductivities and altimeter heights as depicted in the nomogram below.

Electromagnetic Decay Constant

Decay constant (Tau) values are obtained by fitting the data from selected early, middle and late channel ranges (6 to 9, 14 to 17 and 22 to 25) of the off-time signal to a single exponential. The decay constant indicates the relative strength of the conductor. In semi-log space, the slope of this function will reflect the exponential decay rate of the transient field and therefore the strength of the conductivity. A slow rate of decay, reflecting a high conductivity, will be represented by a high decay constant value.

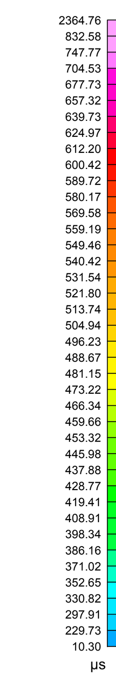
Magnetics

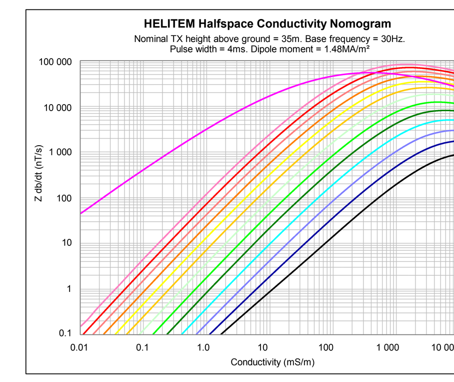
The magnetic field was sampled 10 times per second using a split-beam caesium vapour magnetometer (sensitivity = 0.005 nT) mounted on the transmitter loop towed below the aircraft. Differences in magnetic values at the intersections of control and traverse lines were analysed to obtain a mutually levelled set of flight-line magnetic data. The levelled values were then interpolated to a 62.5 m grid. The International Geomagnetic Reference Field (IGRF) defined at a mean GPS altitude (1073.6) for a constant mid-survey date (April 24th, 2015) was then removed. Removal of the IGRF, representing the magnetic field of Earth's core, produces a residual component related essentially to magnetizations within Earth's crust.

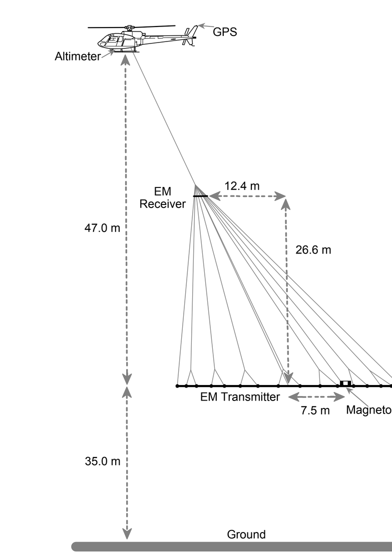
The first vertical derivative of the magnetic field is the rate of change of the magnetic field in the vertical direction. Computation of the first vertical derivative removes long-wavelength features of the magnetic field and significantly improves the resolution of closely spaced and superposed anomalies. A property of first vertical derivative maps is the coincidence of the zero-value contour with vertical contacts at high magnetic latitudes (Hood, 1965). The first vertical derivative of the magnetic field was calculated by fast Fourier transform on the gridded total magnetic field with a grid cell size of 62.5 m.

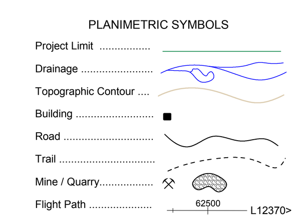
References

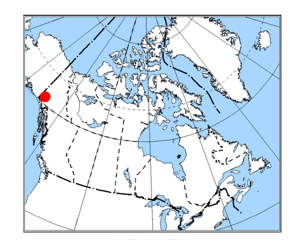
Hood, P.J., 1965. Gradient measurements in aeromagnetic surveying; Geophysics, v. 30, p. 891-902.



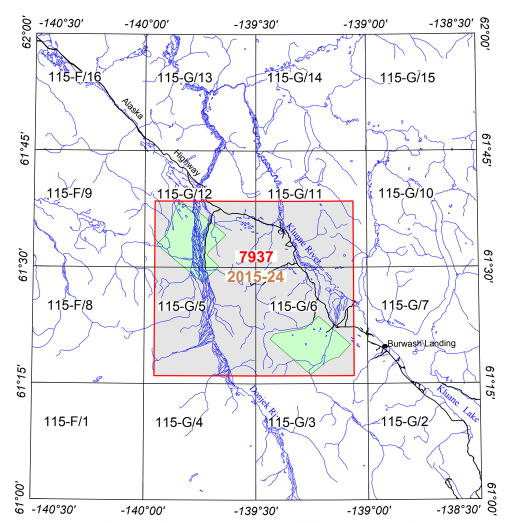








MAP LOCATION



NATIONAL TOPOGRAPHIC REFERENCE SYSTEM
AND GEOPHYSICAL MAP INDEX

NTS Map Number
GSC Open File Number
YGS Open File Number

Sheet Titles

- Sheet 1: Time Decay Constant (Tau-Z) – Early Channels (6 to 9)
- Sheet 2: Time Decay Constant (Tau-Z) – Mid Channels (14 to 17)
- Sheet 3: Time Decay Constant (Tau-Z) – Late Channels (22 to 25)
- Sheet 4: Apparent Conductivity – Early Channel (6)
- Sheet 5: Apparent Conductivity – Mid Channel (14)
- Sheet 6: Apparent Conductivity – Late Channel (22)
- Sheet 7: Residual Total Magnetic Field
- Sheet 8: First Vertical Derivative of the Magnetic Field

The Kluane Lake West electromagnetic survey was jointly conceived and funded by the Yukon Geological Survey (YGS) and Kluane First Nation (KFN). YGS and KFN gratefully acknowledge the Strategic Initiatives in Northern Economic Development Program of Northern Economic Development Canada as the source of its funding contribution. Natural Resources Canada generously provided survey oversight and data processing and produced the maps as part of the Geo-mapping for Energy and Minerals (GEM) Program of the Earth Sciences Sector, Natural Resources Canada, efforts for which YGS and KFN are both sincerely appreciative.

Digital versions of this map are available for free download through GEOSCAN (http://geoscan.nrcan.gc.ca/). Corresponding digital profile and gridded data as well as similar data for adjacent airborne geophysical surveys can be downloaded, at no charge, from Natural Resources Canada's Geoscience Data Repository for Geophysical Data at http://gdr.agg.nrcan.gc.ca/index_e.html. The same products are also available, for a fee, from the Geophysical Data Centre, Geological Survey of Canada, 615 Booth Street, Ottawa, Ontario K1A 0E9. Telephone: (613) 995-5326, email: infogdc@agg.nrcan.gc.ca.

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Project management and map production by the Geological Survey of Canada, Ottawa, Ontario.

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KLUANE LAKE WEST ELECTROMAGNETIC SURVEY
YUKON
Parts of NTS 115-G/5, 6, 11 and 12

TIME DECAY CONSTANT (TAU-Z)
MID CHANNELS (14 TO 17)

Scale 1:50 000

NAD 83 / UTM zone 7N

North American Datum,1983

Topographic Data from Natural Resources Canada

OPEN FILE
DOSSIER PUBLIC
7937
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
2015
Sheet 2 of 8

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2015
Sheet 2 of 8

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