Modern exploration methods - locating hidden gold paleochannels in the Cariboo Mining District, BC, Canada.

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D. Eberle¹,², D. Bastian¹,², N. Ebel¹, M. Pein¹, J. Wallisch¹ and R. Schwarz¹

¹ geotec Rohstoffe, Berlin, Germany, n.ebel@rohstoffe.org
² Berlin Technical University, Germany
Outline/Preview

• Geology of placer gold in the Cariboo gold mining district
• SkyTEM applied over the Mary Creek, Toop and Beaver Pass concessions
• Ground geophysics applied on selected buried target
  ➢ 2D Resistivity
  ➢ Refraction Seismics
• Drilling a conductive buried channel feature
• Discussion of results and conclusions
Location
Regional geology showing survey areas

(HostSci BC Geology Map, 2010)
Two types of glaciolacustrine deposit sediments
(James and Dalrymple, 2012)
Schematic of buried placer deposit settings.
(Levson and Giles, 1995)
Data Acquisition

Line direction  W – E
Spacing 50 m
Tie line direction N – S
Spacing 500 m

Nominal terrain clearance of system  30 m
Flight speed  40 – 80 km/h

Transmitter area  314 m²
• Tx Low Moment
  Repetition Frequency  210 Hz
  Peak Moment  ca. 3300 NIA
• Tx High Moment
  Peak Moment  ca.145 000 NIA
  Repetition Frequency  22.5 Hz
Generator

- flying 10 m beneath the helicopter
- powering the TDEM system

Mag sensor
Readings at 45 Hz are taken in between each HM pulse

DGPS sensors on frame and base station
Mary Creek magnetic and conductivity survey data
Conductivity at 5 m and 15 m below surface
Conductivity at 30 m and 60 m below surface
Z: 445 – 1020 m
Y: 5880170 – 5881010 m
X: 560990 – 563510 m

Cell size: 20x20x10m³
DC 2D resistivity
RS Refraction seismic
RC Reverse

DC 2D resistivity
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Lippmann IP and Earth Resistivity Meter combined with stainless electrodes manufactured by geoanalysis.de
2D resistivity section with 5 m electrode spacing
2D resistivity sections with 5 m electrode spacing
Mean thickness of glacial sediments between 40 and 60 m

Refraction seismics
Vertical lithology section along conductive channel fill constructed from borehole logs
## Synopsis

<table>
<thead>
<tr>
<th>Method</th>
<th>Depth to bedrock</th>
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<tbody>
<tr>
<td>2D resistivity</td>
<td>Near-surface resistive layer of 25 - 30 m thickness underlain by good conductor, bottom of which was not recognised</td>
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<tr>
<td>SkyTEM</td>
<td>Conductor in depth interval 15 – 35 m. Depth to resistive bedrock ca. 40 m.</td>
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<tr>
<td>Refraction seismics</td>
<td>60 – 80 m (3000 - 3500 m/s)</td>
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<tr>
<td>Drilling</td>
<td>40 - 45 m</td>
</tr>
</tbody>
</table>
3D Model all measured data (Geovia Surpac Software)
Pattern of buried high-level channels
Glacial moraine or dried channel?
DC 2D Resistivity
2D resistivity sections traversing up-hill channels
Conclusions

- SkyTEM survey data prove useful in the exploration of high-level buried channels in the Cariboo gold district.
- Drilling hit conductive channel fill in depth of burial predicted by 3D conductivity voxel.
- Channel fill is supposed to contain increased contents of heavy minerals, e.g. magnetite, as follows from Analytical Signal transform of the airborne magnetic field.
- Results from ground geophysical data (2D multi-electrode resistivity and refraction seismics) are inclusive.
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References