Arctic Geophysics Inc.

Geophysical Surveys • Prospecting • Consulting

Geophysical Survey with 2D Resistivity
51 Pup, Yukon

FOR

Melvin Zeiler
Mayo, Yukon
Y0B 1G0

AUTHORS
Stefan Ostermaier

WORK PERFORMED
July 28th 2011

DATE OF REPORT
January 21st 2012

Table of Contents

1. Introduction

This geophysical investigation was done for Melvin L. Zeiler.

The survey, using 2D Resistivity /IP, was conducted to prospect the ground for placer mining interests.

The ground was tested with one 495m-measuring line, depth 90m, in July 2011. This line is located in close neighbourhood to another resistivity profile measured by Arctic Geophysics Inc. in 2010.

2. Claims

Grant Number	Claim Name	Owner
P 39339	DISCOVERY	Melvin L. Zeiler

3. Location

The placer claim Disc (P 39339) is located on *51 Pup,* which is a tributary of *Gold Run Creek* which in turn is a tributary of *Dominion Creek*.

4. Access

The claim Disc (P 39339) was accessed by the mining road that runs along the Gold Run Creek valley and a trail which connects 51 Pup to the mining road.

5. Geophysical Method

Resistivity is not a time domain geophysical method such as Ground Penetrating Radar or Seismic. Resistivity measures a material property. In the Resistivity model the different underground zones are material-dependently differentiated according to their electrical conductivity. Thus, Resistivity promises good chances in respect of measuring the kind and character of the subsurface materials as well as the groundwater distribution, which would be of interest for placer mining. The equipment used (see below) allows for measuring of layer interfaces in depths from 0.5m to 100m by varying the electrode spacing. – Therefore, this prospecting concept is based on the use of 2D Resistivity.

Induced Polarization (IP): IP data are simultaneously taken when measuring Resistivity, with the same equipment and line staking. So these data are automatically at hand when using Resistivity. The IP model serves as the basis for the interpretation of the mineral and petrologic conditions in hardrock. Thus, IP is an industry proven standard method for the detection of primary mineral deposits. However, the IP model can also support the interpretation of the Resistivity profiles done for placer prospecting.

Figure 1: 2D Resistivity measurement, Stefan Ostermaier, Arctic Geophysics Inc., Yukon 2009

6. Use of Geophysical Methods

6.1. Instrumentation

For this survey a lightweight, custom-built 2D RESISTIVITY and INDUCED POLARIZATION (IP) imaging system with rapid data acquisition was used. The system includes:

- “4 POINT LIGHT” EARTH RESISTIVITY METER[1]
- 100 ELECTRODE CONTROL MODULES[2]
- 100 STAINLESS STEEL ELECTRODES[3]
- 500m MULTICORE CABLE: CONNECTOR SPACING: 5m[4]

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[1] Constructed and produced by LGM (Germany)
[2] Ditto
[3] Constructed and produced by GEOANALYSIS.DE (Germany)
[4] Ditto

This system weighs approximately 120 kg which is about one third of regular standard equipment. It can be run with a 12V lead battery. The equipment facilitates high mobility and rapid data acquisition with a small crew.

6.2. Data Acquisition

Resistivity/IP

The data acquisition is carried out by the automatic activation of 4-point-electrodes. Thus several thousand measurements are taken, one every 1-2 seconds. The AC transmitter current of 0.26 to 30 Hz is amplified by the electrode control modules, up to a maximum of 100mA and 400V peak to peak. The voltage measured at the receiver electrodes (M, N) is also amplified. In this geoelectrical survey the **Schlumberger-array** was used. This array is appropriate to image horizontally running layers as is needed for placer prospecting.

The 2D Resistivity imaging system, used for this survey, allows measurements with a depth of up to 100m. With a depth to bedrock of more than 6m, an electrode spacing of 5m can be used for placer surveys. This allows the measuring of large profile lengths in short time with a horizontal measuring resolution of 2.5m. This quantification has proven itself to be reliable in the determination of the bedrock topography and sedimentary arrangement for placer investigation at the most environmental conditions.

The **IP** data is getting noisy below approx. 50m depth because the sender current is limited to a 100 m Amp. The noise of the IP data in greater depth can significantly be decreased by using an IP-specific data acquisition mode that is much more time consuming.[5] Since this survey is focused on the detection of placer-geological aspects, the data acquisition was not optimized for IP.

The Schlumberger array, used in this geoelectrical survey, is appropriate to measure subsurface conditions predominantly showing a horizontal zoning of the ground materials.

6.3. Processing

Resistivity/IP

The measured Resistivity data were processed with the **RES2DINV** inversion program[6].

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[5] 1) Transition Resistivity between electrodes and ground lower than 1 Kilo Ohm; 2) More single 4point measurements to calculate the average of each data point etc.

[6] Produced by GEOTOMO SOFTWARE (Malaysia)

6.4. Interpretation

The resistivity profile is the basic source for the interpretation of placer-related subsurface aspects of overburden and bedrock. The IP model supports the interpretation of the resistivity profile.

The interpretation of the data should be verified by physical prospecting methods such as drilling, trenching, or digging test holes since this information about the subsurface cannot be guaranteed.

7. Profile image

In the **Resistivity profile** the interpreted layer interfaces are marked with a black line. The profiles show ground-layers approximately 15% thicker than they are in reality. The thickening of the model layers is caused by the inversion software. The **correction factor** of 0.85 for the determination of the true layer thickness has been established by the Arctic Geophysics Inc. team on the basis of numerous geoelectrical profiles verified by drilling, trenching, and mining done by our customers.[7]

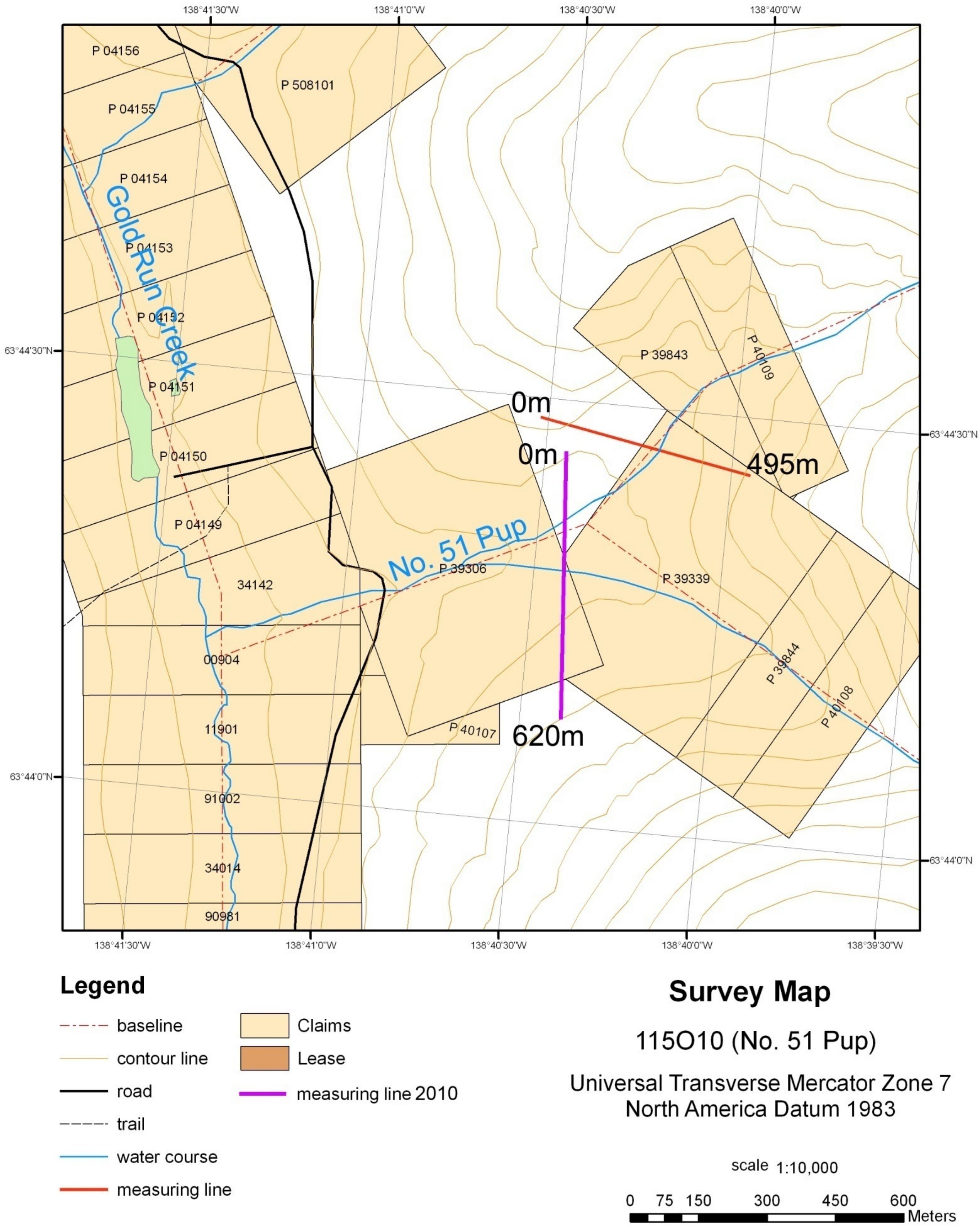
The **graphical markings** showing the interpreted layer interfaces in the profiles (using a black line) are done according to the data structure in the profile itself. This means: the layers there will also show up approximately 15% thicker than they are expected in reality. In the interpretation text, the layer thicknesses and depths have been recalculated to the expected real values.

8. Line Arrangement

The **line locations** were discussed and decided upon by Josy Strunden from Arctic Geophysics Inc. and Melvin Zeiler.

9. Survey Map

[7] Program settings in RES2DINV for modifying the layer thickness do frequently not work well for our use and could falsify the profile. That's why this mode was not used.



Survey Map

115O10 (No. 51 Pup)

Universal Transverse Mercator Zone 7
North America Datum 1983

scale 1:10,000

0 75 150 300 450 600 Meters

10. Profiles

51 Pup_02
2D Resistivity/IP, Schlumberger array
100 Electrodes: spacing 5m, Horizontal resolution 2.5m
Horizontal and vertical measure in [meter], Iteration error in [%]
Vertical exaggeration in model section display = RES 0.69; IP 0.74

Data acquisition: Josy Strunden, Mark Mac Bride, 28th July 2011
Processing: Josy Strunden, 29th July 2011
Profile shows the ground-layers approx. 15% thicker than in reality.
Comments to this/these profile/s are interpretation.

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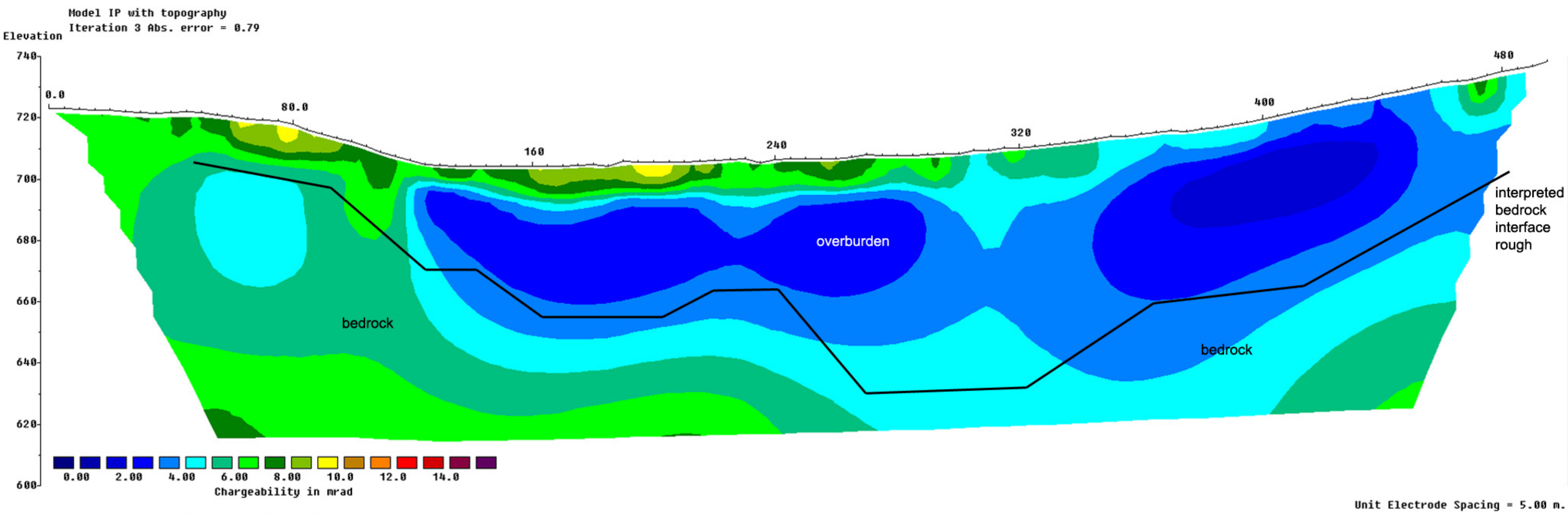

Horizontal scale is 18.58 pixels per unit spacing
Vertical exaggeration in model section display = 1.00
First electrode is located at 0.0 m.
Last electrode is located at 495.0 m.

51 Pup_02
2D Resistivity/IP, Schlumberger array
100 Electrodes: spacing 5m, Horizontal resolution 2.5m
Horizontal and vertical measure in [meter], Iteration error in [%]
Vertical exaggeration in model section display = RES 0.69; IP 0.74

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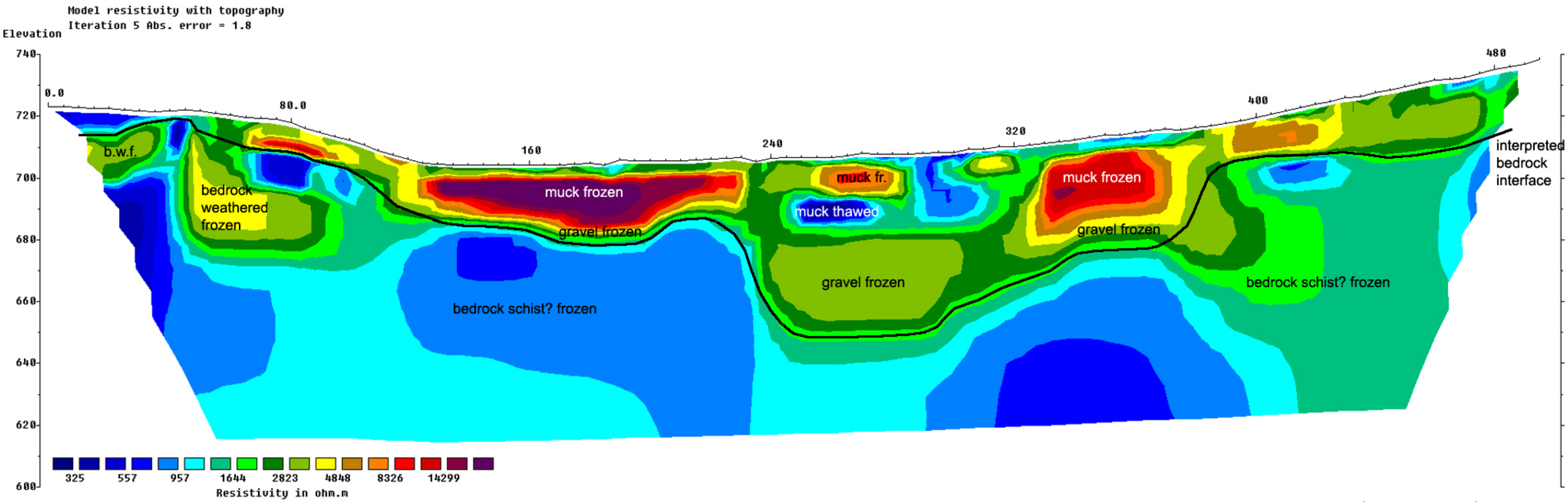

Horizontal scale is 18.58 pixels per unit spacing
Vertical exaggeration in model section display = 1.00
First electrode is located at 0.0 m.
Last electrode is located at 495.0 m.

Interpretation

The interpretation of the resistivity profile shows some quite heterogeneous, partly frozen overburden that appears to be 8-48m thick, with a 22m deep paleochannel, and a pronounced 48m deep main channel. The bedrock seems to be some kind of schist and might be in the permafrost zone.

At the very beginning of the profile, between 0m and 40m, the overburden is thawed and thus well conducting. The bedrock interface in this area rises from about 8m almost to the surface and could be a part of a channel; this is however speculative and should be tested by another resistivity measuring line that extends the one discussed in this report. The reason for the high conductivity in this part of the overburden is most likely water saturation. The bedrock is most likely some kind of schist (blue) that has been weathered and is frozen or partly frozen (green). The IP model doesn't show any structure in this section of the subsurface.[8]

From 45-125m the approx. 8m thick overburden has moderately high resistivity values which would conform with dry or frozen gravel, at this location; on this south-east facing slope dry gravels seem most likely; although the small area at 80m with high resistivity values (red) could be the remnants of permafrost, most likely frozen muck. The bedrock appears to have a zone of weathered and frozen material (yellow-green) in this area. The IP model conforms to the resistivity profile and indicates slightly higher conductivity values for the gravel layer on the surface, this continues all the way to 345m in the profile.

A channel appears to be located between 125m and 215m in the profile. There appears to be an app. 3m thick layer of thawed gravel on top of frozen muck and gravel; there might be 2/3 of muck and 1/3 of gravel. The channel seems to have its deepest part at 185m with a max. depth of 22m. The bedrock is most likely frozen schist, and the IP model conforms to the resistivity profile showing some bedrock (green) that has higher conductivity values than the overburden (blue).

At 225m the bedrock interface apparently drops down into the main channel that appears to have a max. depth of 48m. From 295m to 370m the bedrock interface rises gradually to a depth of 32m and then rises steeply to a depth of 10m at 390m – both forming two prominent bedrock benches. The overburden in this part of the profile is heterogeneous and shows the typical data mosaic of partly thawed permafrost. Between 235m and 325m to a depth of app. 20m the overburden seems to consist mostly of muck that is either thawed (blue) or still frozen (red), with all the stages of partial thawing (green) in between. Below 20m in this area we have most likely frozen gravels since the resistivity values are too high for most non-frozen gravels. The IP model conforms with the resistivity profile.

From 390m to the end of the profile the bedrock levels out and appears to have a depth of 10m to a max. of 20m in the small bedrock depression at 455m on the slope. This bedrock depression could be a channel. The overburden in this part of the profile is most likely gravel that is at least partly frozen. The IP model in this part of the profile is inconclusive.[9]

It is recommended that the possible channels should be confirmed by drilling, however, it is also recommended to extend the resistivity profile to the west beyond 0m to investigate the possible channel there and to have investigated all the possible drilling targets with geophysical methods before the drill actually gets there; this make the drill program most cost-effective.

[8] IP profiles are normally much rougher than resistivity profiles, especially at the fringes of the profile image

[9] Ditto

11. Qualifications

Stefan Ostermaier

- Study of geology, University of Tübingen, Germany
- Visit of geophysical field courses, University of Karlsruhe and University of Stuttgart, Germany
- Geological prospecting for precious metals and minerals in the Yukon and Alaska since 2001
- Geophysical Surveying for Mining Exploration in the Yukon since 2005
- Study of computer science, University of Stuttgart, Germany

Stefan Ostermaier

Appendix

Literature

Location-specific

Asg, C. H.: Origin and Tectonic Setting of Rocks in the Atlin Area, BC (NTS104N), Ophiolitic, Ultramafic and Related, Geological Survey Branch, Bulletin 94, 1994

Black, J. M.: Report in the Atlin Placer Camp, 1953

British Columbia Geological Survey Branch, Bulletin 105v25C05, Chapter 5

KERR, DAWSON AND ASSOCIATES LTD. 1984 "GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL REPORT - on the – EAGLE, MARGARITA AND BUTTERFLY CLAIMS, ATLIN MINING DIVISION, BRITISH COLUMBIA"

W. Gruenwald, B. Sc.: Geological, Geochemical and Geophysical Report on the Eagle, Margarita and Butterfly Claims, Atlin Mining Division, BC, 1984

Arctic Geophysics: Geophysical Survey with 2D Resistivity 51 Pup, Yukon; 2010

Literature – Background

Chesterman W. Ch. and Lowe K.E. Field Guide to Rocks and Minerals - North America, Chanticleer Press Inc. New York 2007

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Griffiths, D.H.,Turnbull, J. and Olayinka,A.I. Two dimensional resistivity mapping with a computer-controlled array, First Break 8: 121-129 (1990)

Griffiths, D.H. and Barker, R.D. Two-dimensional resistivity imaging and modeling in areas of complex geology. Journal of Applied Geophysics 29 : 211 - 226. (1993)

Keller, G.V.and Frischknecht, F.C. Electrical methods in geophysical prospecting. Oxford: Pergamon Press Inc. (1966)

Loke M.H. and Barker R.D. Rapid least-squares inversion of apparent resistivity pseudosections by a quasi-Newton method. Geophysical Prospecting 44: 131-152 (1996)

Ostensoe Eric A. "Report on the Gladstone Creek, Placer Gold Property, Kluane Area" (Feb 1984), for: CATEAR RESOURCES LTD.

Press F., Siever R., Grotzinger J., Thomas H.J. Understanding Earth, W.H. Freeman and Company, New York (2004)

Robb L. Introducing to Ore-Forming Processes, Backwell Science Ltd., 2005

Maps

Energy, Mines and Resources: CSW_MINING.PLACER_LANDUSE_PERMIT_POLY_50K

Government of Canada, Natural Resources Canada, Centre for Topographic Information: 115O10; 2005

Geophysical Data Table

Rock type	Resistivity range (Ωm)
Granite porphyry	4.5×10^3 (wet) – 1.3×10^6 (dry)
Feldspar porphyry	4×10^3 (wet)
Syenite	$10^2 - 10^6$
Diorite porphyry	1.9×10^3 (wet) – 2.8×10^4 (dry)
Porphyrite	$10 - 5 \times 10^4$ (wet) – 3.3×10^3 (dry)
Carbonatized porphyry	2.5×10^3 (wet) – 6×10^4 (dry)
Quartz diorite	$2 \times 10^4 - 2 \times 10^6$ (wet) –1.8×10^5 (dry)
Porphyry (various)	$60 - 10^4$
Dacite	2×10^4 (wet)
Andesite	4.5×10^4 (wet) – 1.7×10^2 (dry)
Diabase (various)	$20 - 5 \times 10^7$
Lavas	$10^2 - 5 \times 10^4$
Gabbro	$10^3 - 10^6$
Basalt	$10 - 1.3 \times 10^7$ (dry)
Olivine norite	$10^3 - 6 \times 10^4$ (wet)
Peridotite	3×10^3 (wet) – 6.5×10^3 (dry)
Hornfels	8×10^3 (wet) – 6×10^7 (dry)
Schists (calcareous and mica)	$20 - 10^4$
Tuffs	2×10^3 (wet) – 10^5 (dry)
Graphite schist	$10 - 10^2$
Slates (various)	$6 \times 10^2 - 4 \times 10^7$
Gneiss (various)	6.8×10^4 (wet) – 3×10^6 (dry)
Marble	$10^2 - 2.5 \times 10^8$ (dry)
Skarn	2.5×10^2 (wet) – 2.5×10^8 (dry)
Quartzites (various)	$10 - 2 \times 10^8$
Consolidated shales	$20 - 2 \times 10^3$
Argillites	$10 - 8 \times 10^2$
Conglomerates	$2 \times 10^3 - 10^4$
Sandstones	$1 - 6.4 \times 10^8$
Limestones	$50 - 10^7$
Dolomite	$3.5 \times 10^2 - 5 \times 10^3$
Unconsolidated wet clay	20
Marls	3 – 70
Clays	1 – 100
Oil sands	4 – 800

Cost

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Survey Location: 51 Pup

Invoice # 20110729

Date: July 29th, 2011

Services provided:

Quantity	Description	Amount $CAN
Transportation		
1 day	Vehicle $ 50.-- / day	50.--
140 Km	$ 0.45 / km	63.--
Geophysical Survey		
1 day	Geoelectrical 2D-Resistivity Survey, run by one operator and second operator $ 930.-- / day	930.--
5	Extra hours: Survey leader 20,-- Field assistant 15.--	175.--
1/4 day	Data processing, literature work, interpretation; first Documentation $ 300.-- / day	75.--
1 day	Writing report $ 300.-- / day	300.--
	Printing / Binding /Shipping	50,--
	NET Amount	1 643.--
GST Number 846363216RT0001	**G.S.T. (5%)**	82.15
Total		**$ 1 725.15**

GPS-Data of Measuring Line

Electrode No.	Location in Profile [m]	GPS-Coordinates Latitude/ Longitude	GPS-Accuracy [m]	Post [*]
1	0	N63 44 28.6 W138 40 31.3	3	*
2	5	N63 44 28.6 W138 40 31.0	3	
3	10	N63 44 28.5 W138 40 30.7	3	
4	15	N63 44 28.5 W138 40 30.4	3	
5	20	N63 44 28.4 W138 40 30.1	3	
6	25	N63 44 28.4 W138 40 29.8	3	
7	30	N63 44 28.3 W138 40 29.4	3	
8	35	N63 44 28.3 W138 40 29.2	3	
9	40	N63 44 28.3 W138 40 28.9	3	
10	45	N63 44 28.3 W138 40 28.5	3	
11	50	N63 44 28.3 W138 40 28.2	3	
12	55	N63 44 28.3 W138 40 27.8	3	
13	60	N63 44 28.2 W138 40 27.5	3	
14	65	N63 44 28.2 W138 40 27.1	3	
15	70	N63 44 28.2 W138 40 26.8	3	
16	75	N63 44 28.1 W138 40 26.4	3	
17	80	N63 44 28.0 W138 40 25.8	3	
18	85	N63 44 28.0 W138 40 25.5	3	
19	90	N63 44 28.0 W138 40 25.1	3	
20	95	N63 44 27.9 W138 40 24.9	3	
21	100	N63 44 27.9 W138 40 24.5	3	
22	105	N63 44 27.9 W138 40 24.2	3	
23	110	N63 44 27.9 W138 40 23.9	3	
24	115	N63 44 27.9 W138 40 23.6	3	
25	120	N63 44 27.9 W138 40 23.3	3	*

Electrode No.	Location in Profile [m]	GPS-Coordinates Latitude/ Longitude	GPS-Accuracy [m]	Post [*]
26	125	N63 44 27.8 W138 40 22.8	3	
27	130	N63 44 27.8 W138 40 22.5	3	
28	135	N63 44 27.8 W138 40 22.2	3	
29	140	N63 44 27.8 W138 40 21.8	3	
30	145	N63 44 27.8 W138 40 21.5	3	
31	150	N63 44 27.7 W138 40 21.1	3	
32	155	N63 44 27.7 W138 40 20.7	3	
33	160	N63 44 27.7 W138 40 20.4	3	
34	165	N63 44 27.7 W138 40 20.0	3	
35	170	N63 44 27.6 W138 40 19.6	3	
36	175	N63 44 27.7 W138 40 19.3	3	
37	180	N63 44 27.6 W138 40 19.0	3	
38	185	N63 44 27.6 W138 40 18.6	3	
39	190	N63 44 27.6 W138 40 18.2	3	
40	195	N63 44 27.6 W138 40 17.9	3	
41	200	N63 44 27.6 W138 40 17.5	3	
42	205	N63 44 27.5 W138 40 17.2	3	
43	210	N63 44 27.5 W138 40 16.8	3	
44	215	N63 44 27.5 W138 40 16.5	3	
45	220	N63 44 27.5 W138 40 16.1	3	
46	225	N63 44 27.4 W138 40 15.8	3	
47	230	N63 44 27.4 W138 40 15.4	3	
48	235	N63 44 27.3 W138 40 14.9	3	
49	240	N63 44 27.3 W138 40 14.7	3	
50	245	N63 44 27.3 W138 40 14.3	3	*

Electrode No.	Location in Profile [m]	GPS-Coordinates Latitude/ Longitude	GPS-Accuracy [m]	Post [*]
51	250	N63 44 27.2 W138 40 14.0	3	
52	255	N63 44 27.2 W138 40 13.7	3	
53	260	N63 44 27.1 W138 40 13.3	3	
54	265	N63 44 27.1 W138 40 13.0	3	
55	270	N63 44 27.0 W138 40 12.6	3	
56	275	N63 44 27.0 W138 40 12.3	3	
57	280	N63 44 27.0 W138 40 11.9	3	
58	285	N63 44 26.9 W138 40 11.5	3	
59	290	N63 44 26.9 W138 40 11.2	3	
60	295	N63 44 26.9 W138 40 10.9	3	
61	300	N63 44 26.8 W138 40 10.5	3	
62	305	N63 44 26.8 W138 40 10.2	3	
63	310	N63 44 26.8 W138 40 09.9	3	
64	315	N63 44 26.7 W138 40 09.5	3	
65	320	N63 44 26.7 W138 40 09.2	3	
66	325	N63 44 26.7 W138 40 08.8	3	
67	330	N63 44 26.7 W138 40 08.5	3	
68	335	N63 44 26.7 W138 40 08.1	3	
69	340	N63 44 26.7 W138 40 07.7	3	
70	345	N63 44 26.7 W138 40 07.4	3	
71	350	N63 44 26.7 W138 40 07.0	3	
72	355	N63 44 26.6 W138 40 06.7	3	
73	360	N63 44 26.6 W138 40 06.3	3	
74	365	N63 44 26.6 W138 40 05.9	3	
75	370	N63 44 26.5 W138 40 05.6	3	*

Electrode No.	Location in Profile [m]	GPS-Coordinates Latitude/ Longitude	GPS-Accuracy [m]	Post [*]
76	375	N63 44 26.5 W138 40 05.3	3	
77	380	N63 44 26.5 W138 40 05.0	3	
78	385	N63 44 26.5 W138 40 04.6	3	
79	390	N63 44 26.5 W138 40 04.2	3	
80	395	N63 44 26.5 W138 40 03.8	3	
81	400	N63 44 26.5 W138 40 03.4	3	
82	405	N63 44 26.5 W138 40 03.0	3	
83	410	N63 44 26.4 W138 40 02.7	3	
84	415	N63 44 26.4 W138 40 02.3	3	
85	420	N63 44 26.4 W138 40 02.0	3	
86	425	N63 44 26.3 W138 40 01.7	3	
87	430	N63 44 26.3 W138 40 01.3	3	
88	435	N63 44 26.2 W138 40 01.0	3	
89	440	N63 44 26.2 W138 40 00.7	3	
90	445	N63 44 26.1 W138 40 00.4	3	
91	450	N63 44 26.1 W138 40 00.1	3	
92	455	N63 44 26.1 W138 39 59.8	3	
93	460	N63 44 26.1 W138 39 59.5	3	
94	465	N63 44 26.0 W138 39 59.1	3	
95	470	N63 44 26.0 W138 39 58.8	3	
96	475	N63 44 26.0 W138 39 58.4	3	
97	480	N63 44 25.9 W138 39 58.1	3	
98	485	N63 44 25.9 W138 39 57.6	3	
99	490	N63 44 25.9 W138 39 57.3	3	
100	495	N63 44 25.9 W138 39 56.9	3	*