Geophysics of the Bendigo-Ophir Gold Deposit, Central Otago Region, New Zealand

Barry Bourne and Ronald Yupa

Terra Resources Pty Ltd

Santana Minerals Limited ASX:SMI NZX:SMI

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The information in this report that relates to Mineral Resources or Ore Reserves is based on information in numerous announcements to the ASX and NZX including information relating to general Resources, Exploration Targets and Exploration Data associated with the Company's projects.

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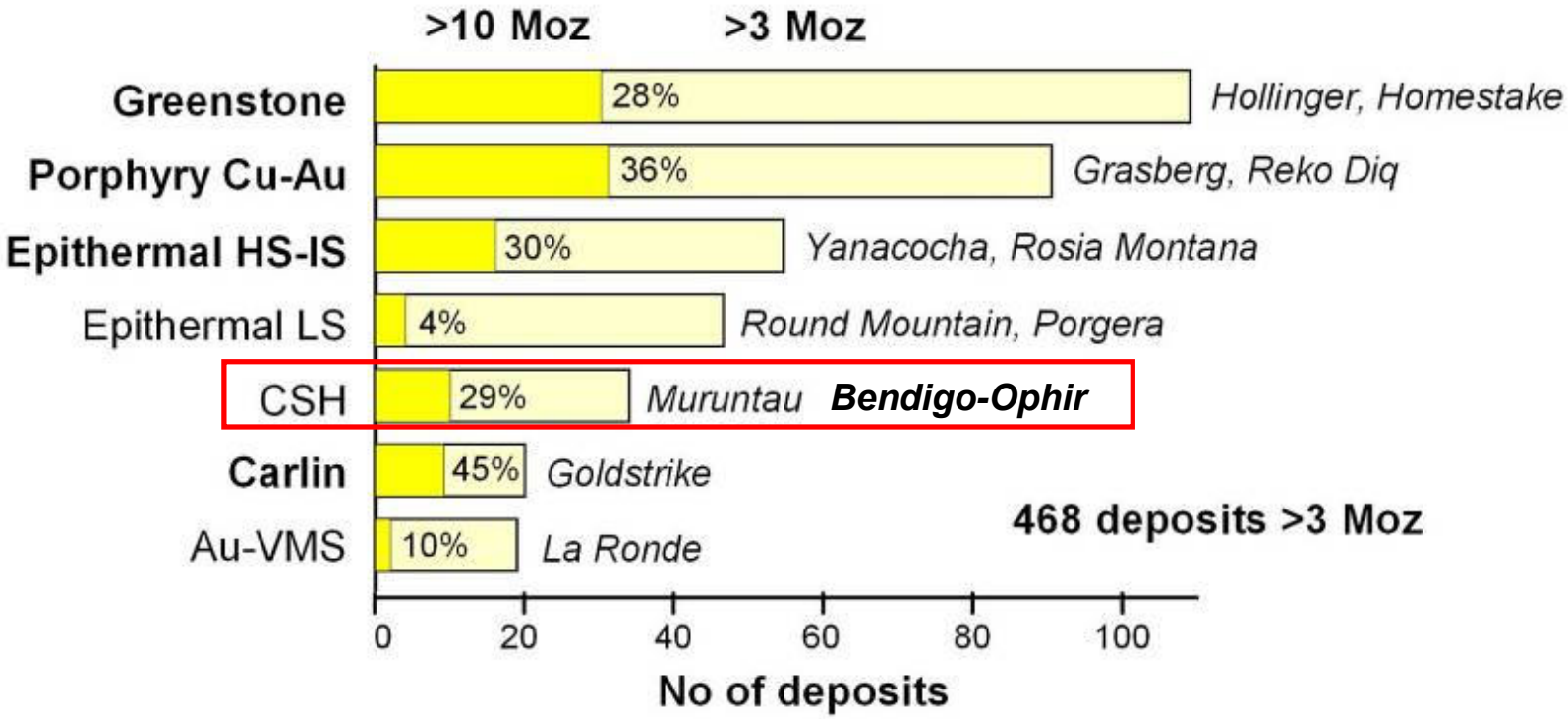
Gold Price - Rise and Shine!

Top 20 Continuous Intercepts – Gram Meters

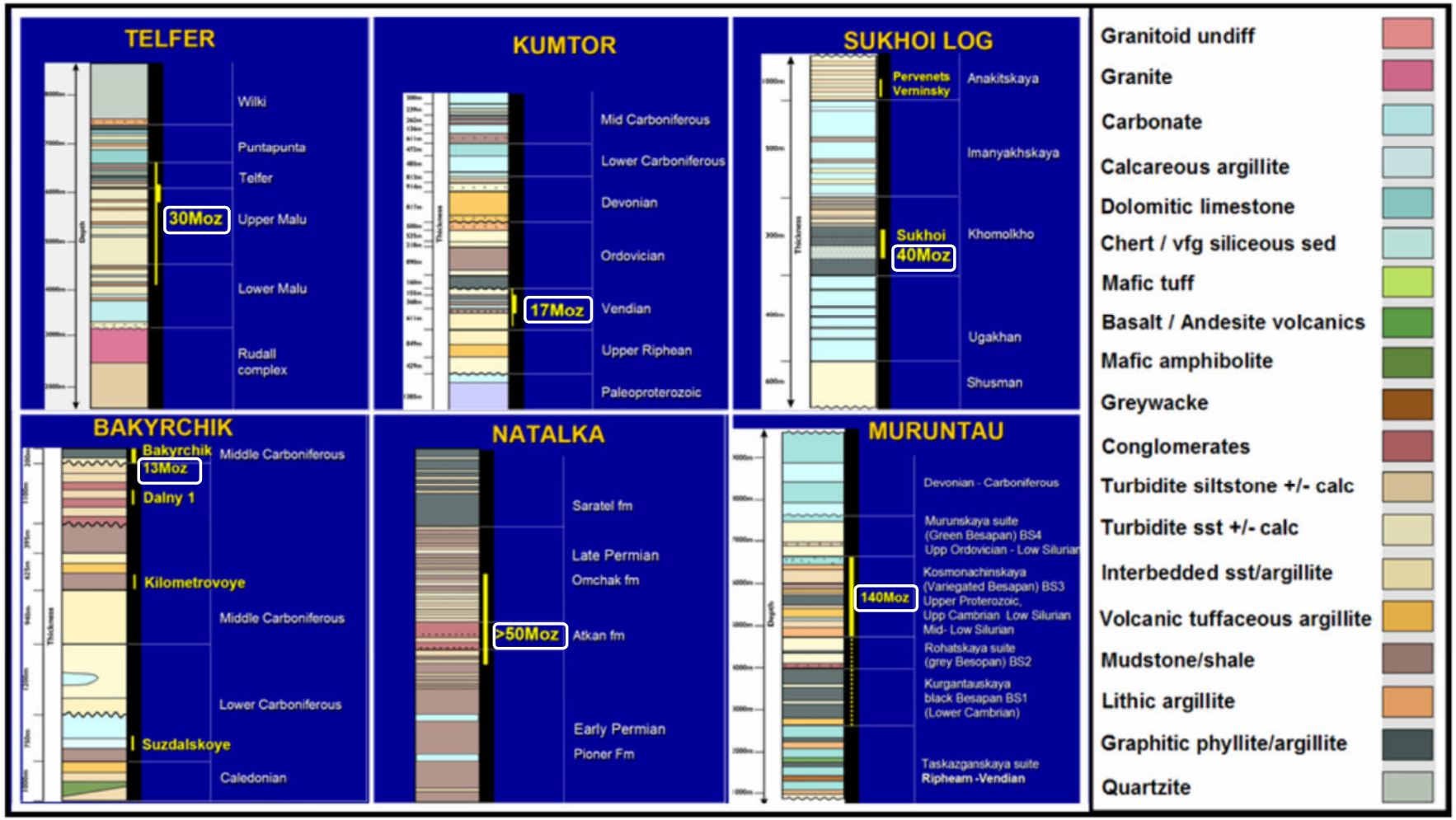
29.3m @ 14.0 g/t from 165.8m` 410 g.m Au MDD054
39.5m @ 5.1 g/t from 167.5m 201 g.m Au MDD330
34.5m @ 10.9 g/t from 269.5m 376 g.m Au MDD215
11.2m @ 17.4 g/t from 193.8m 195 g.m Au MDD016
41.6m @ 8.6 g/t from 164.4m 358 g.m Au MDD326
17.1m @ 10.9 g/t from 177.9m 186 g.m Au MDD084
42.9m @ 7.3 g/t from 152.1m 313 g.m Au MDD051
34.5m @ 5.4 g/t from 173.5m 186 g.m Au MDD329
35.4m @ 8.3g/t from 161.6m 294 g.m Au MDD332
35.9m @ 5.0 g/t from 173.1m 180 g.m Au MDD085
46.0m @ 6.2 g/t from 179.0m 285 g.m Au MDD080
40.9m @ 4.1g/t from 165.2m 168 g.m Au MDD244
30.7m @ 7.9 g/t from 170.3m 243 g.m Au MDD313
18.1m @ 8.7g/t from 182.9m 157 g.m Au MDD221
41.8m @ 5.8 g/t from 167.3m 242 g.m Au MDD328
25.1m @ 6.2g/t from 174.9m 156 g.m Au MDD239
31.7m @ 6.9 g/t from 183.3m 219 g.m Au MDD226
19.6m @ 7.6g/t from 217.4m 150 g.m Au MDD256
4.0m @ 50.8 g/t from 168.0m 203 g.m Au MDD192
16.0m @ 9.1g/t from 268.1m 146 g.m Au MDD281

Gold Deposit Types

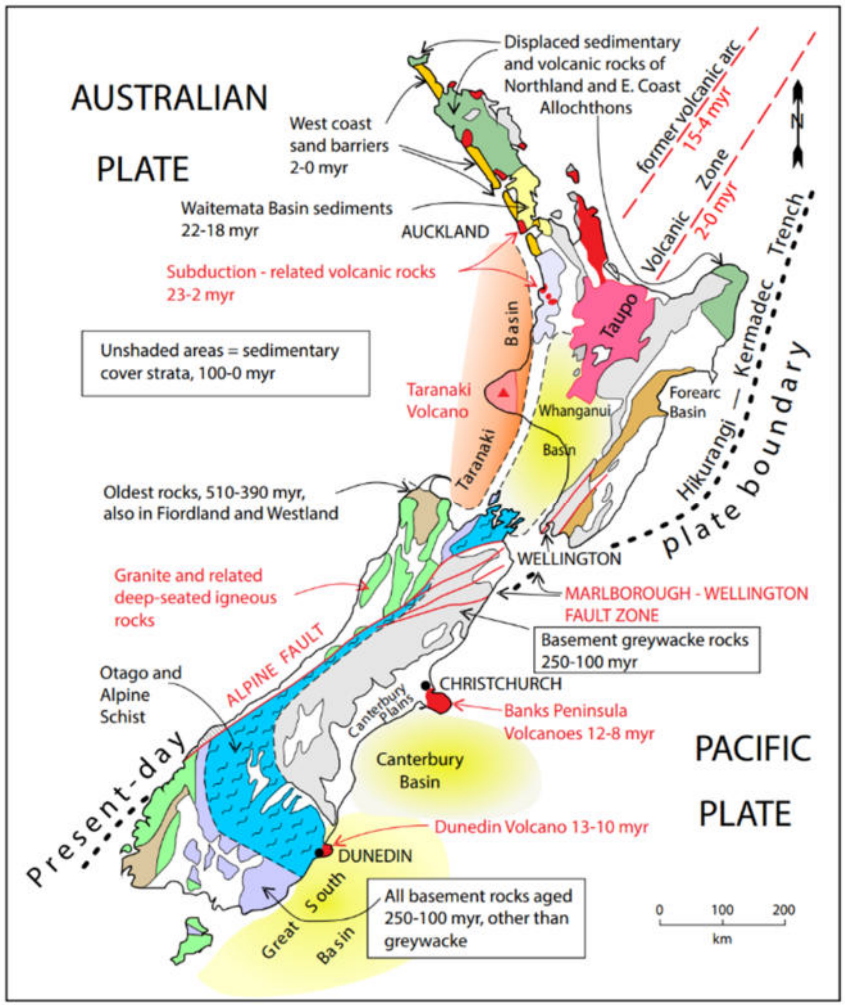


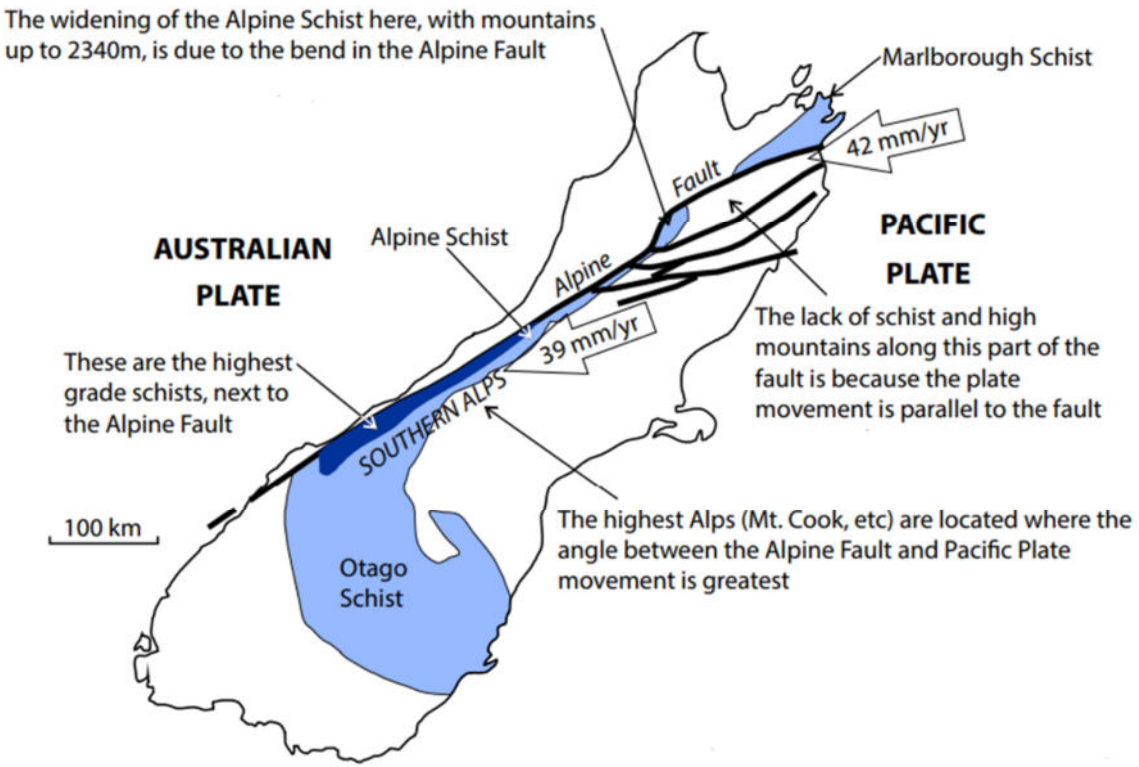
(After Robert et. al., 2007)

Sediment Hosted Gold



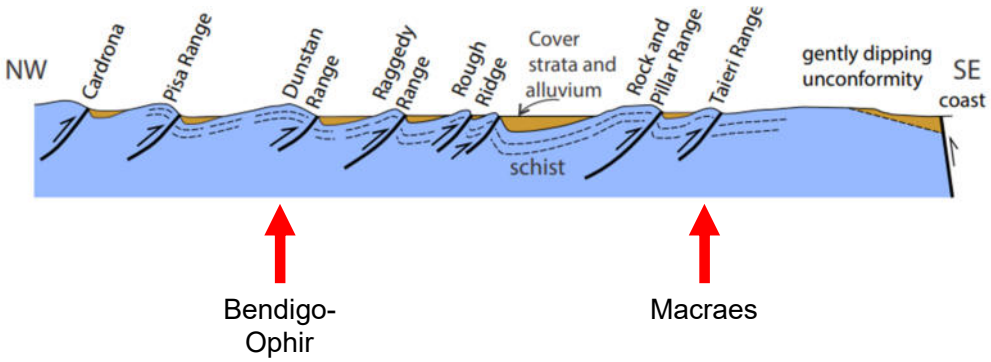
Regional Geology



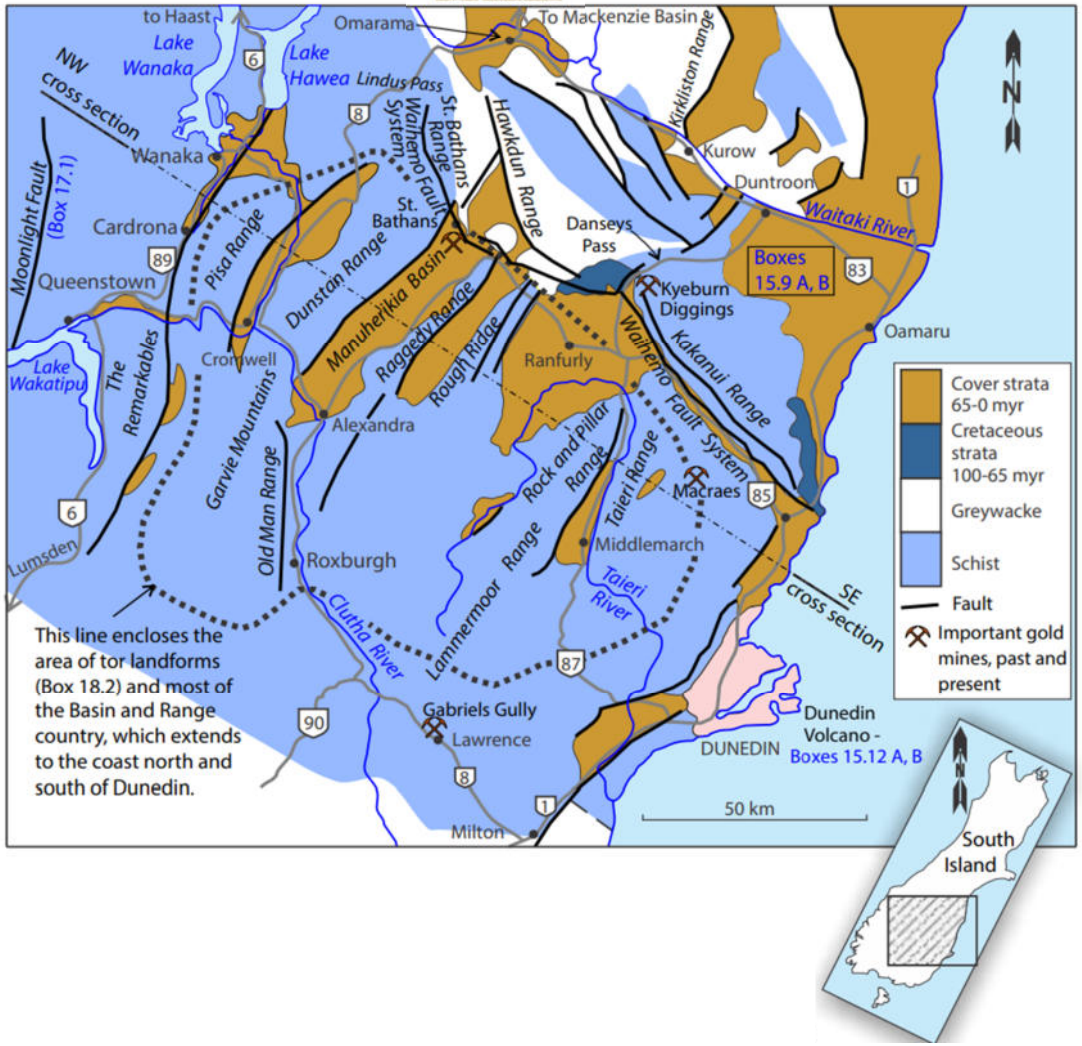


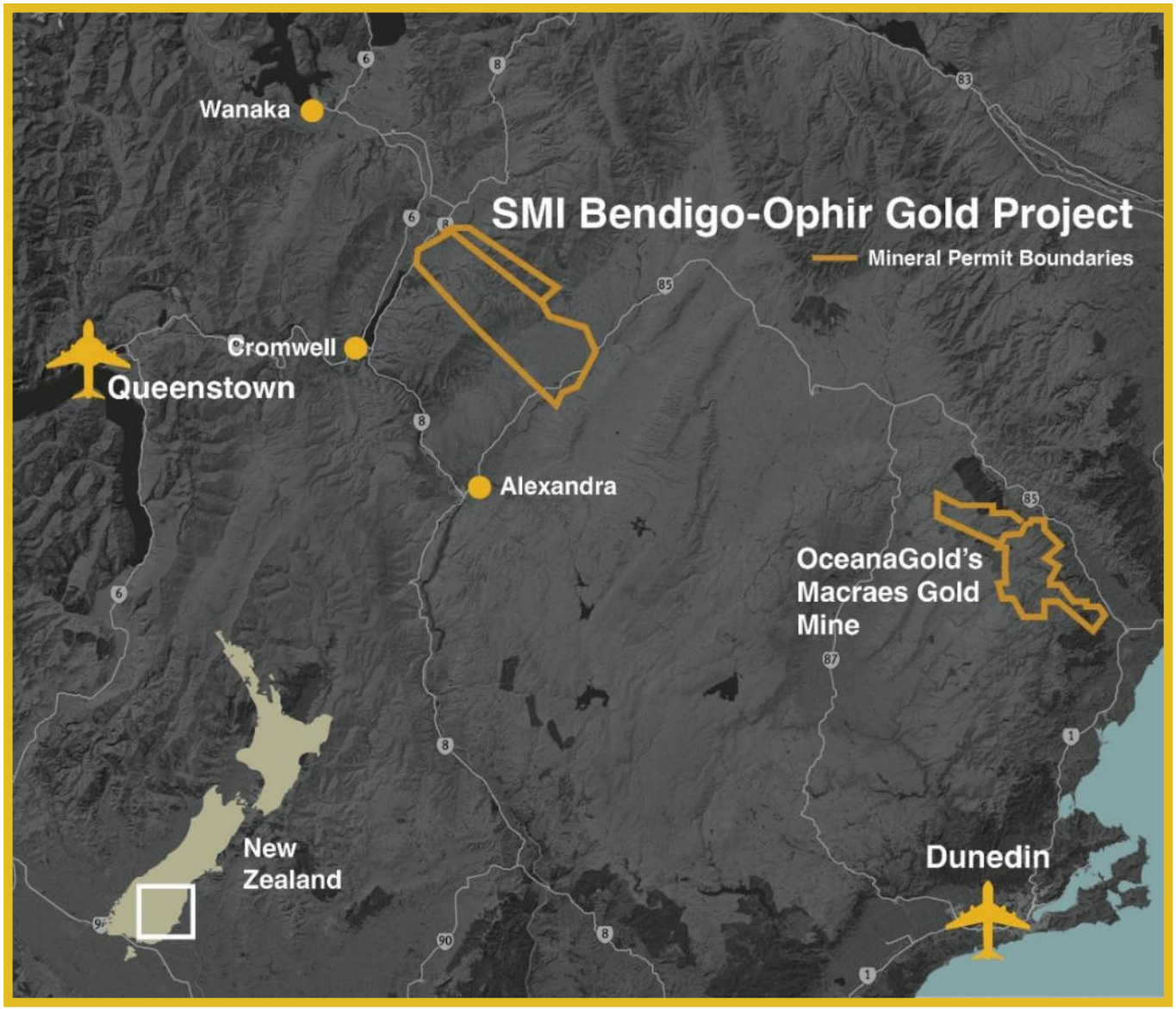
After Balance (2009)

Regional Geology



After Balance (2009)





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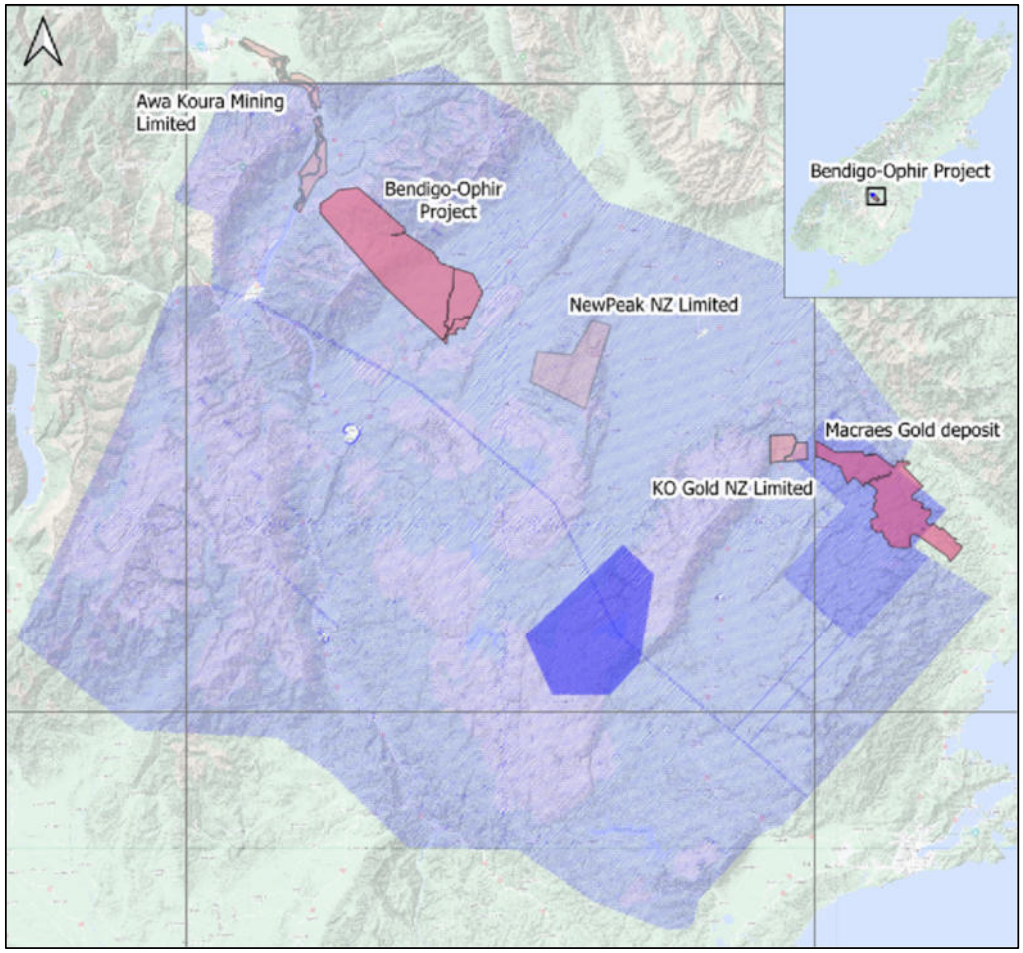
Project Location

- One hour east of Queenstown
- Central Otago region of the South island
- 90km West of OceanaGold's Macraes gold mine
- 15min drive from Cromwell with 8,000 people
- In the semi-arid Central Otago
- Private farmland, with agreements to mine in place

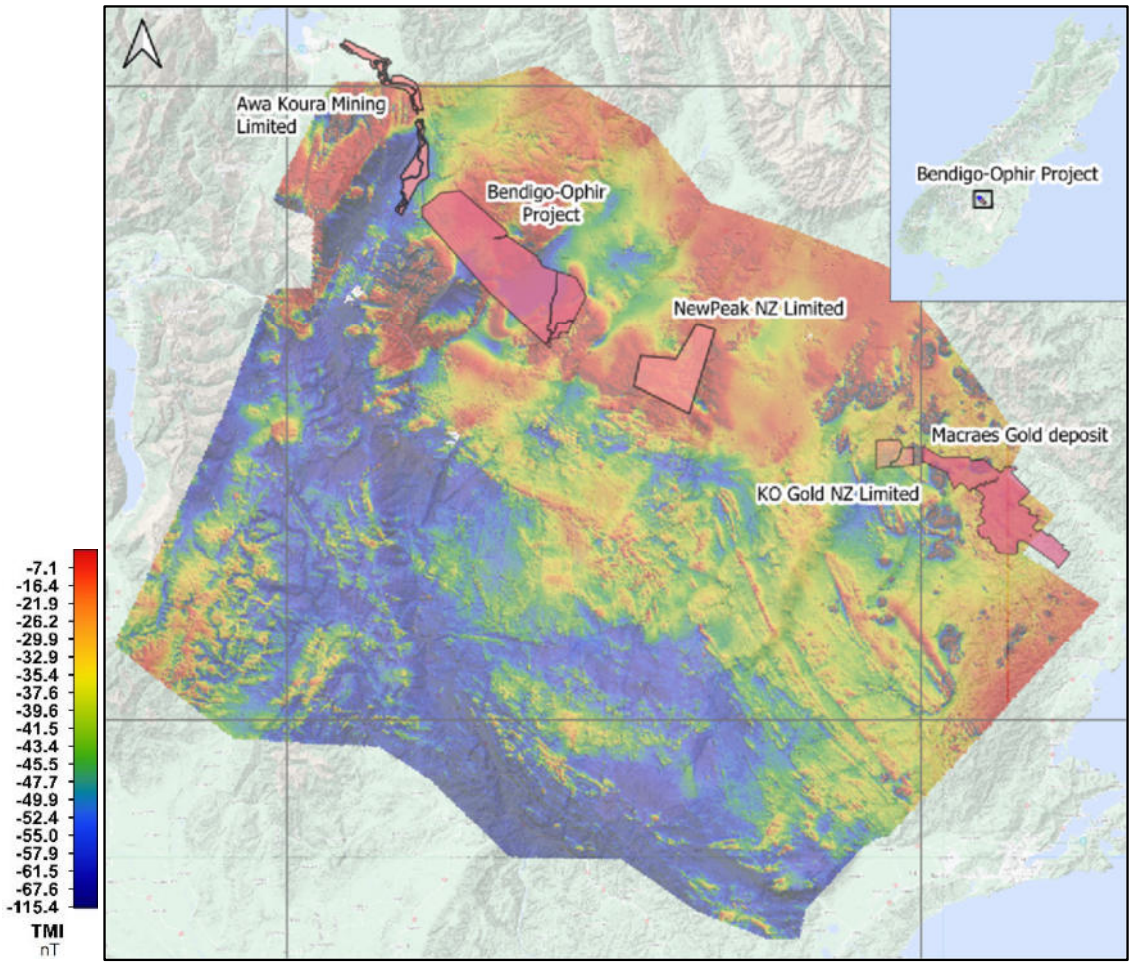
Regional Geophysics

- Bendigo-Ophir Project Airborne Geophysical data acquisition 2007
  - RESLOVE EM and MAG data were collected
  - Total: 13000km^2 at Central Otago
  - Azimuth: 045
  - Line spacing: 300m
  - Tie lines spacing: 3km
  - HGL: 60m approximately
  - Instrument Height: 30 +/- 10m
  - Magnetometer: Scintrex CS-2 / Geometrics G822 caesium
  - Data recorded: 0.1 sec.
  - Project: NZGD49 / New Zealand Map Grid



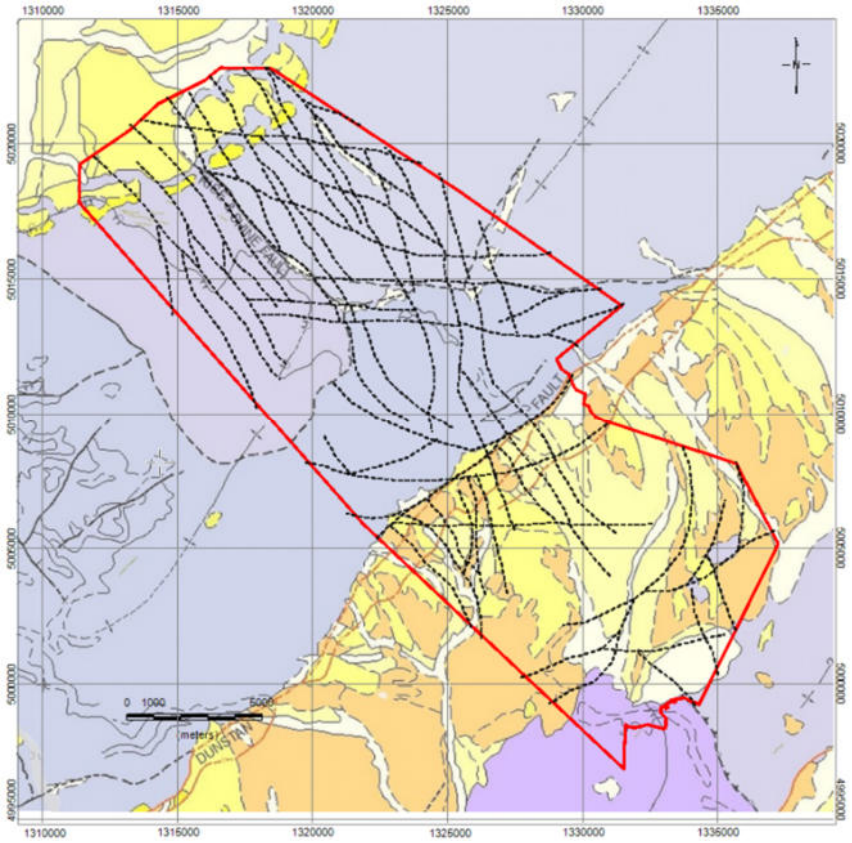
Airborne Magnetic Data

- Airborne magnetic data:
- Raw data available !
  - Can be re-processed
  - The magnetic data can be model to construct the standard susceptibility and the Magnetic Vector Inversion
  - Sections and map plans at depth were produced

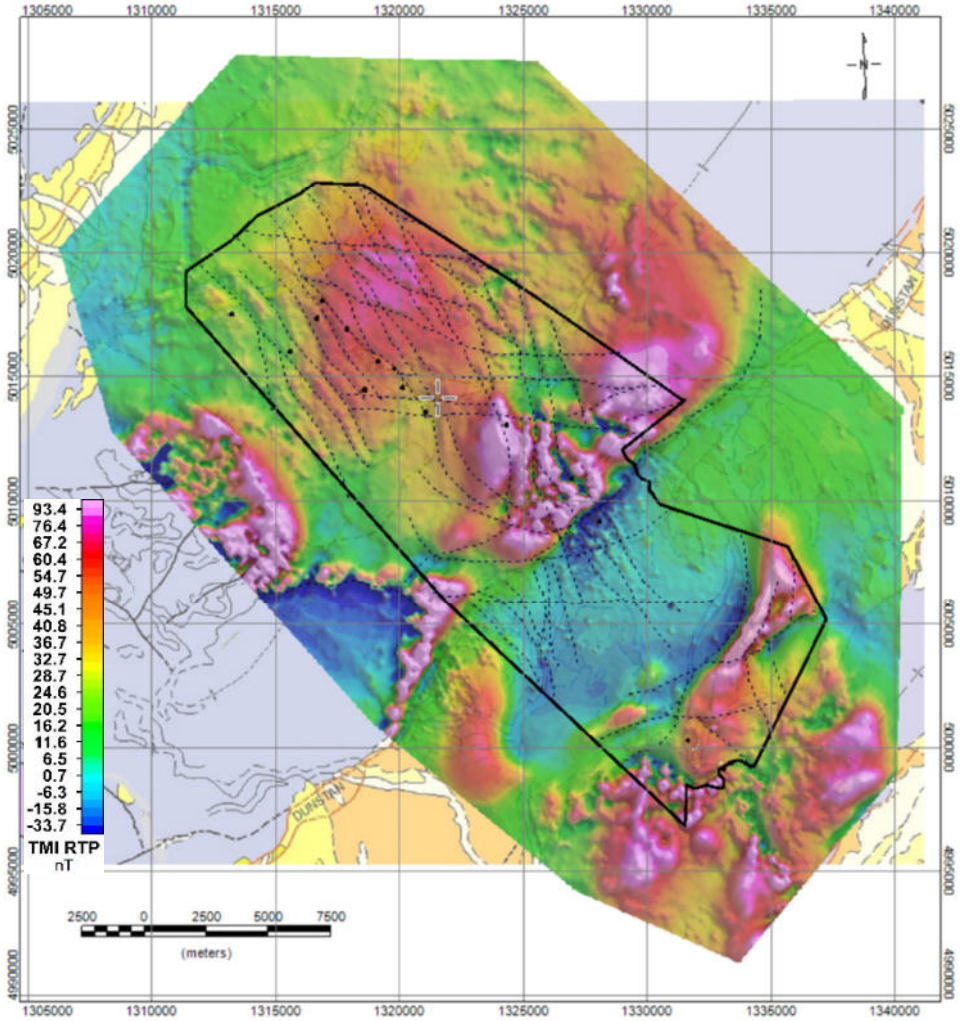


Total Magnetic Intensity

Magnetics - Interpretation

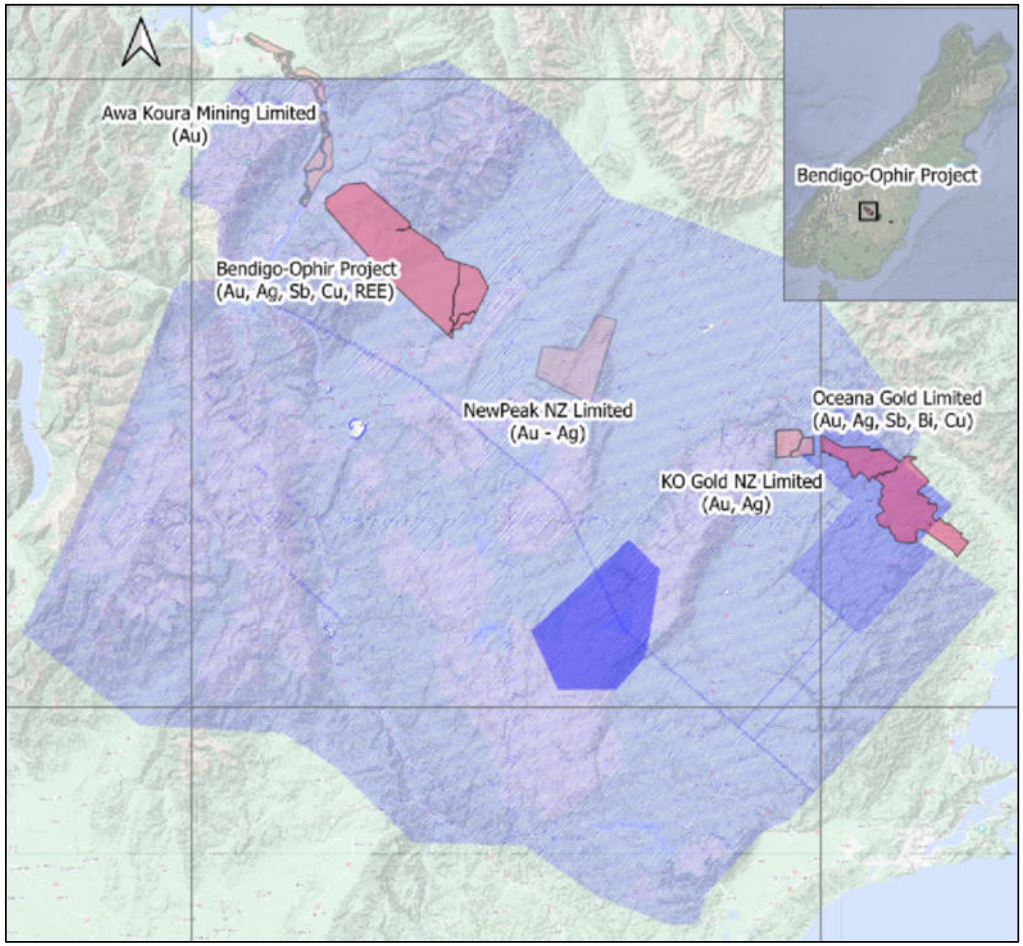


Linear structures interpretation. Delineating geological structures (faults or contacts) between different rock units. Shaded reduced to pole image on right



RESOLVE Frequency Domain EM

- The ***RESOLVE*** frequency domain EM system was used to record the response of the ground to propagation of EM fields, returning a measure of the apparent resistivity
  - Five co-planar (horizontal) frequencies (400, 1800, 8200, 40 000 and 140 000 Hz)
  - One co-axial (vertical) frequency (3300 Hz)
  - Depth of penetration:
    - 5 to 80-120m in schist rocks, and
    - 3-50 metres in alluvial basins
- In-fill lines around the ***Macraes Gold Deposits*** at 150 m spacing (dark blue lines).
- Spikes due to powerlines signals are difficult to remove so are still present in the data.



RESOLVE Frequency Domain EM

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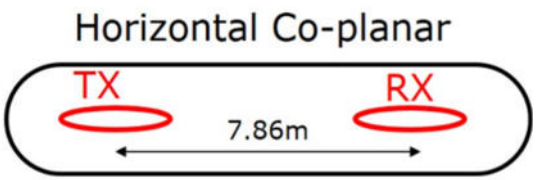
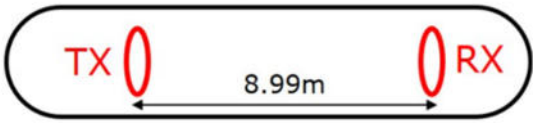
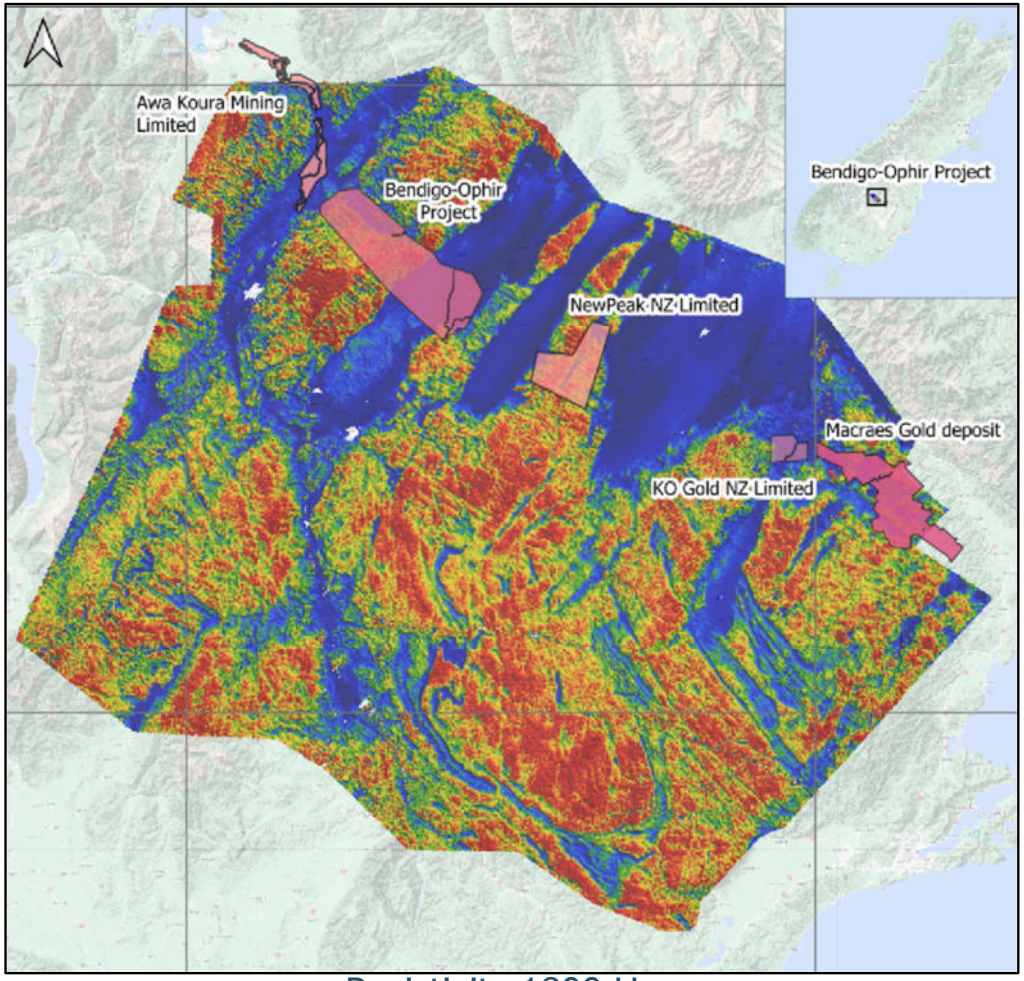
- The RESOLVE TM frequency domain
- Raw data available !
  - Software availability to model in 3rd dimensionality, and
  - CDI images can be produced.

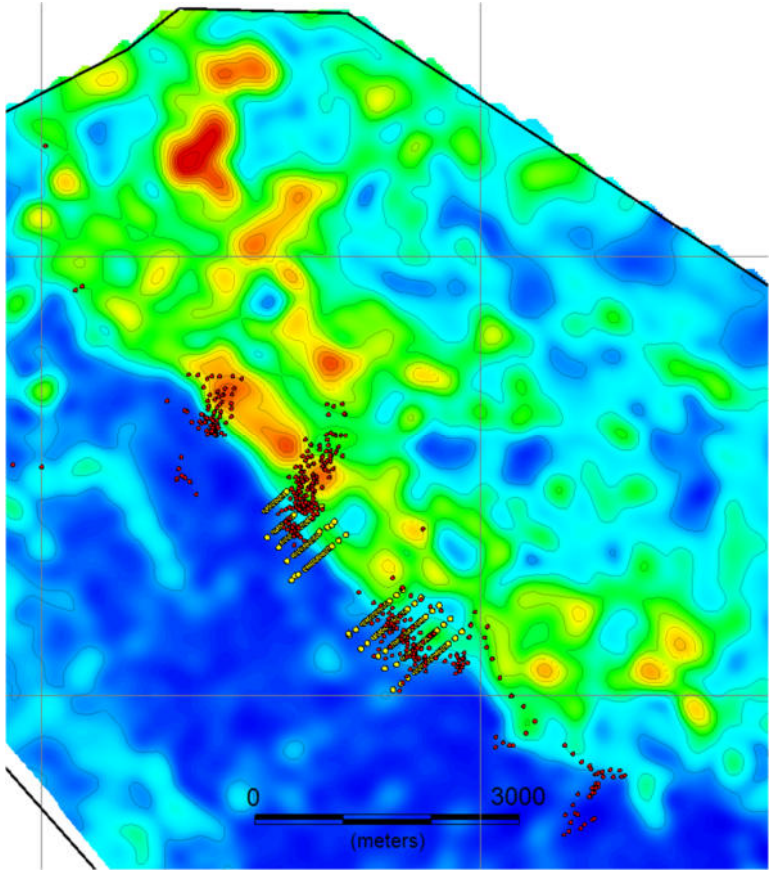




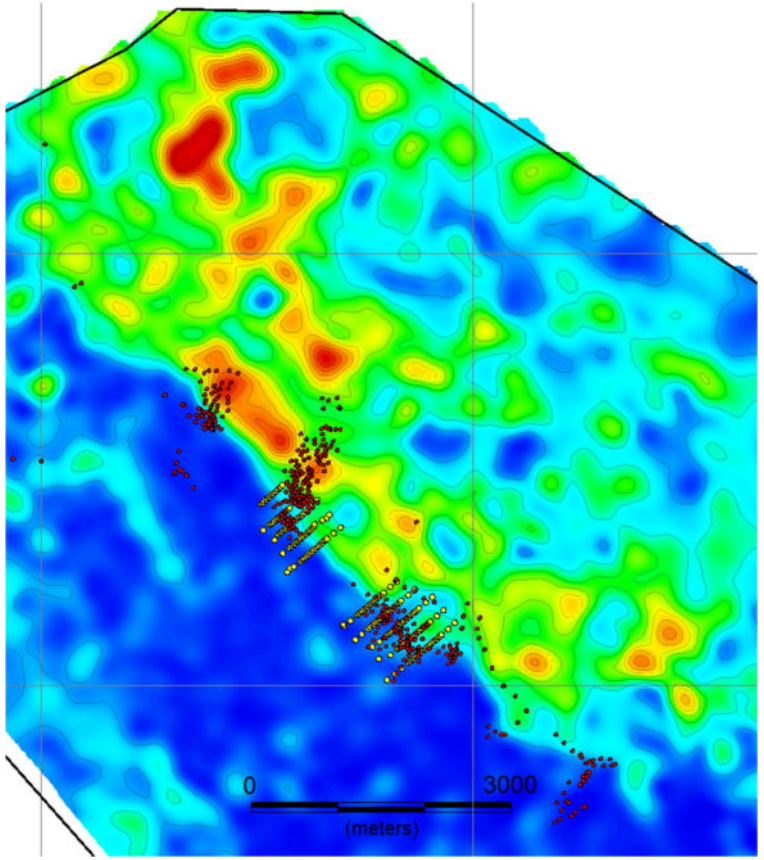


Resistivity 1800 Hz

AEM Inversion Model



Plan Map Conductivity @ 75m depth
Drill Hole location in red colour
IP location in yellow colour



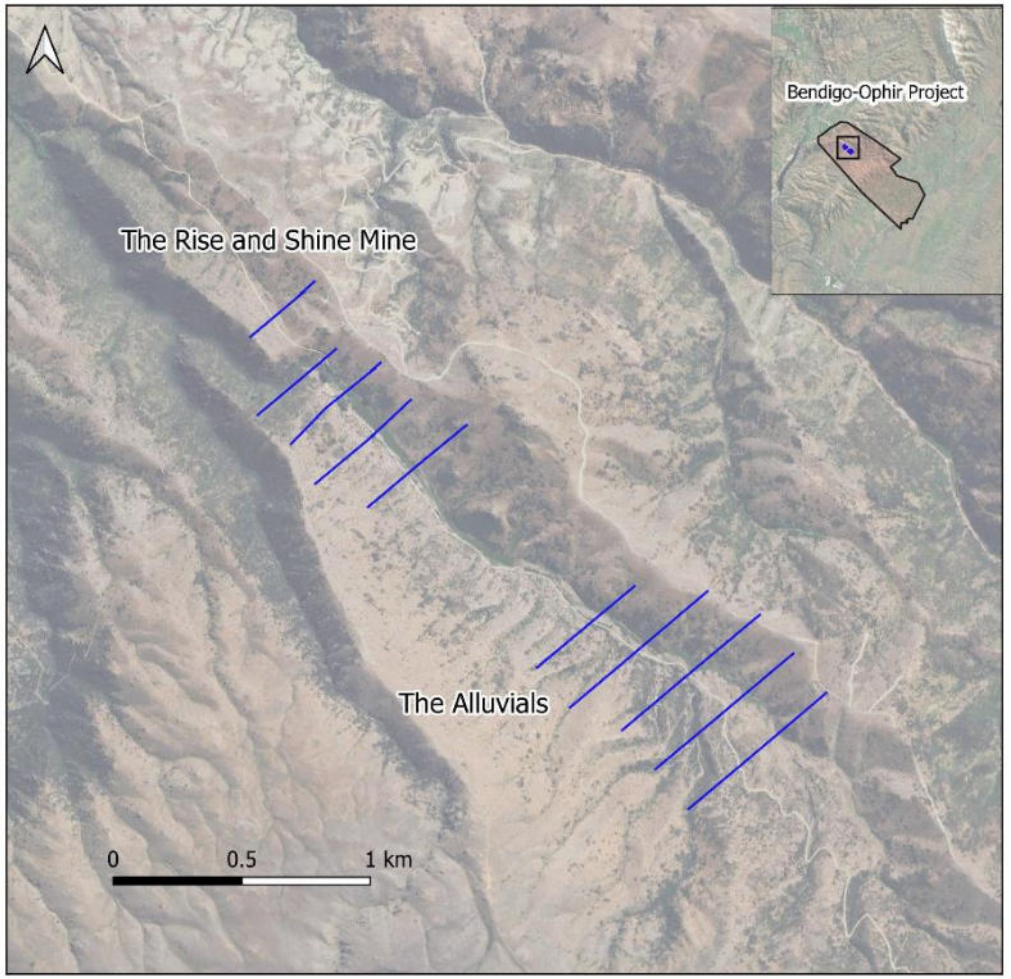
Plan Map Conductivity @ 100m depth
Drill Hole location in red colour
IP location in yellow colour

Induced Polarisation

- Configuration array: pole-dipole 2D-IP
- Dipole: from 8 to 12 dipoles
- Separation: 25m, 50m, 100m
- Receiver: SJ Geophysics' full waveform
- Transmitter: 3.6 kW GDD
- Azimuth: N50E
- Line spacing: 200-250m
- Date: 2006
- Project: NZGD49 / New Zealand Map Grid

- ***The Rise and Shine Mine***
  - Line length: 400m

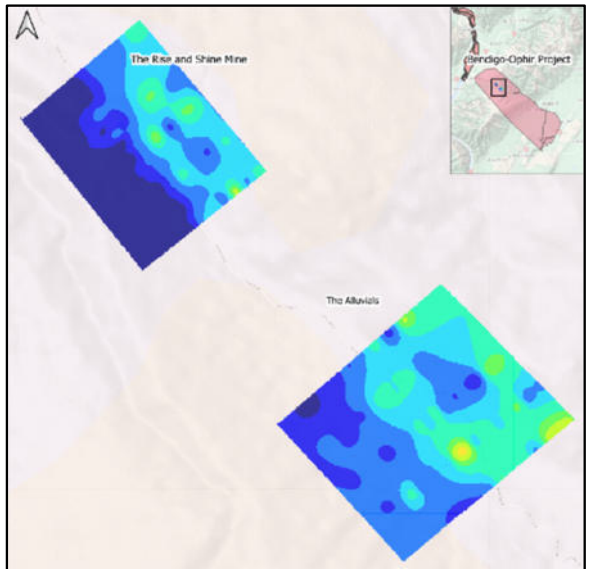
- ***The Alluvials***
  - Line length: 550 - 700m



Induced Polarisation

- 2D Induced Polarisation 2006
- Raw data available !
- Array: pole-dipole
- The 2D IP data was modelled to construct the standard 2D sections
- Sections and map plans at depth were produced

L30600:0	P2_N	P2_Z	Sp	I	Vp	Ra	Mx	IP_ave	SD	nstacks	decay_1	decay_2	decay_3
41.0	5578998.00	710.94	35.86	650.0	-184.06	531.17	22.09		0.195690	8	47.300	43.551	40.370
42.0	5579034.00	725.17	-14.89	650.0	-249.30	624.11	25.67		0.222920	8	54.580	50.326	46.699
43.0	5578866.50	723.67	0.18	800.0	304.01	490.23	16.31		0.080180	8	35.326	32.443	30.013
44.0	5578882.00	714.22	-33.87	800.0	598.18	808.72	13.85		0.067056	8	29.858	27.446	25.413
45.0	5578898.00	705.86	10.75	800.0	1764.36	814.32	8.97		0.041663	8	19.452	17.872	16.540
46.0	5578965.00	704.66	40.82	800.0	-1247.21	354.61	12.65		0.055587	8	27.780	25.484	23.550
47.0	5578998.00	710.94	-40.84	800.0	-539.26	691.05	18.62		0.084412	8	40.236	36.988	34.243
48.0	5579034.00	725.17	-16.88	800.0	-271.47	704.60	25.74		0.115287	8	54.748	50.477	46.834
49.0	5578866.50	723.67	0.60	500.0	898.45	1168.95	11.00		0.031034	8	23.857	21.911	20.277
50.0	5578882.00	714.22	-33.70	500.0	2609.78	1745.72	8.00		0.018535	8	17.290	15.892	14.716
51.0	5578930.50	704.51	-15.08	500.0	-1269.85	989.16	8.29		0.023796	8	18.057	16.576	15.329
52.0	5578965.00	704.66	33.18	500.0	-388.66	474.28	16.39		0.048488	8	35.555	32.663	30.215
53.0	5578998.00	710.94	-35.98	500.0	-235.76	733.53	20.12		0.085857	8	42.827	39.469	36.624
54.0	5579034.00	725.17	-18.06	500.0	-141.88	742.62	25.70		0.109104	8	54.008	49.875	46.349
55.0	5578866.50	723.67	0.85	500.0	-3180.22	1533.19	6.28		0.021075	8	13.774	12.620	11.656
56.0	5578916.00	698.25	42.83	500.0	4119.92	2608.44	8.01		0.029571	8	17.646	16.169	14.932
57.0	5578930.50	704.51	-10.89	500.0	460.24	1052.39	12.44		0.044183	8	26.594	24.457	22.656
58.0	5578965.00	704.66	28.94	500.0	225.42	497.07	18.56		0.069257	8	40.208	36.960	34.211
59.0	5578998.00	710.94	-32.10	500.0	172.06	718.46	21.15		0.117159	8	45.485	41.861	38.790
60.0	5579034.00	725.17	-19.19	500.0	119.30	737.56	25.66		0.146914	8	54.601	50.363	46.748
61.0	5578848.50	735.73	14.03	450.0	-1891.97	1615.74	4.89		0.022076	8	10.892	9.963	9.190
62.0	5578898.00	705.86	3.49	450.0	3030.75	2167.13	5.94		0.021397	8	13.097	11.993	11.072
63.0	5578916.00	698.25	33.13	450.0	1424.71	2895.14	11.32		0.041238	8	24.579	22.568	20.876
64.0	5578930.50	704.51	-5.67	450.0	212.98	1056.81	13.99		0.058959	8	30.013	27.607	25.574
65.0	5578965.00	704.66	24.83	450.0	132.67	497.10	19.51		0.118947	8	42.196	38.840	35.993
66.0	5579034.00	725.17	-41.07	450.0	209.99	701.31	23.32		0.118370	8	49.822	45.900	42.567

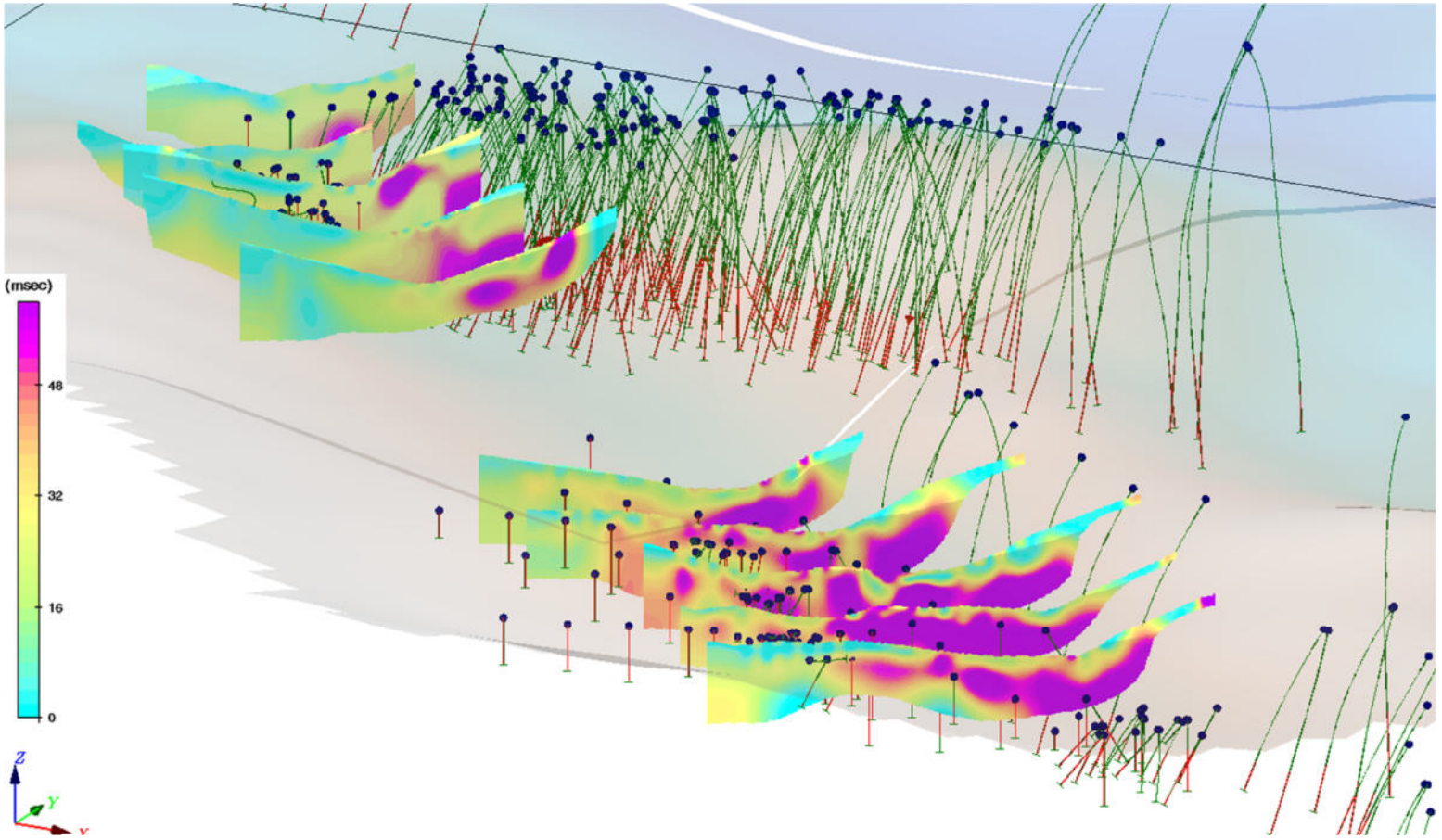


Chargeability 20m depth

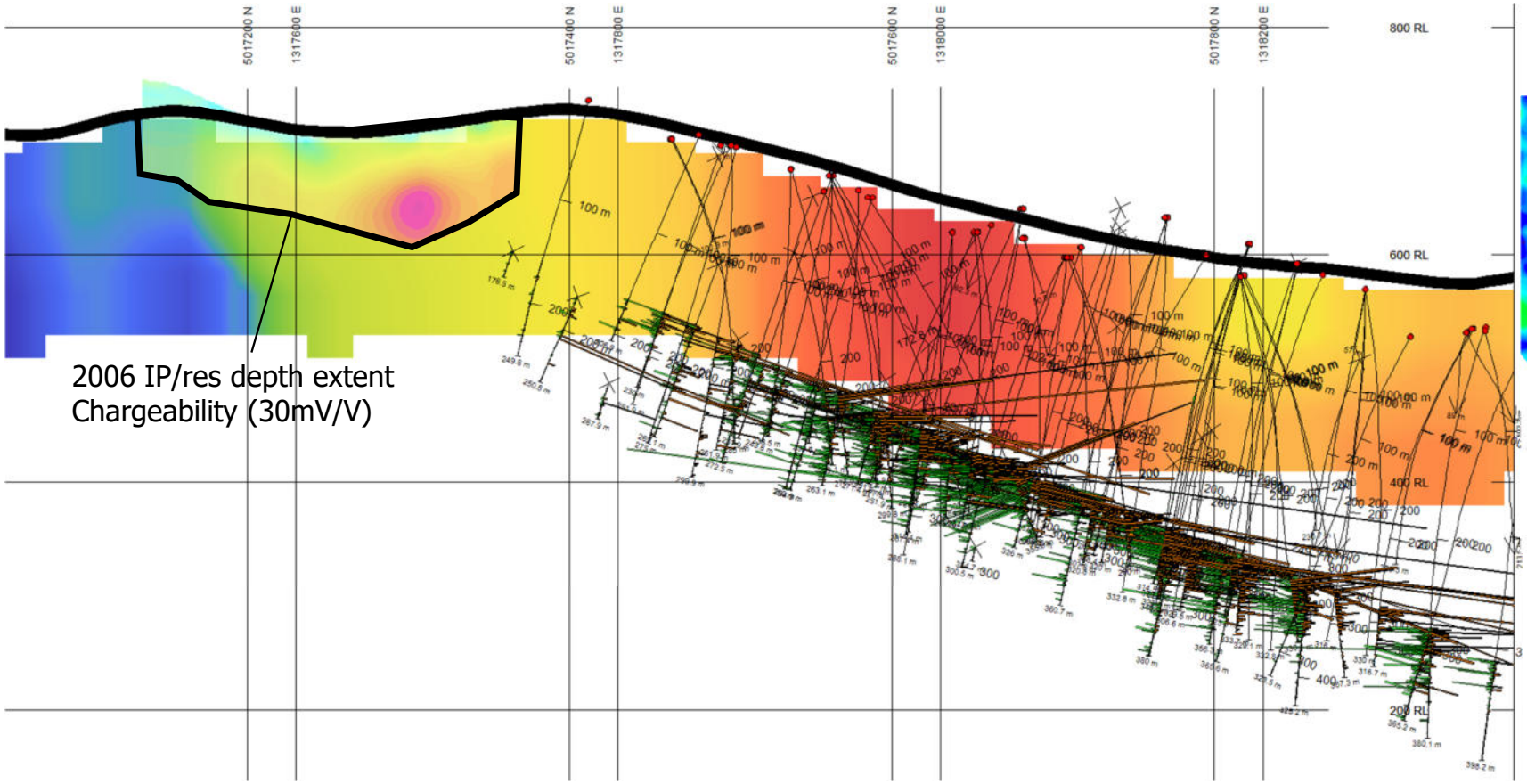
Induced Polarisation – 2D

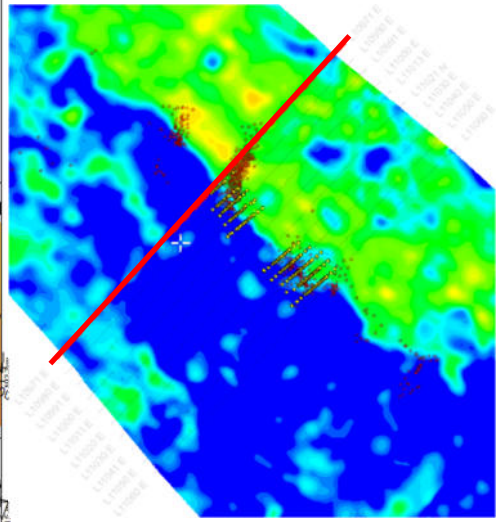
Stacked 2D IP sections

2D Smooth-Model Inversion
Pole-dipole Resistivity/IP Data
Drill hole



AEM Inversion Cross Section





Au ppm

As ppm

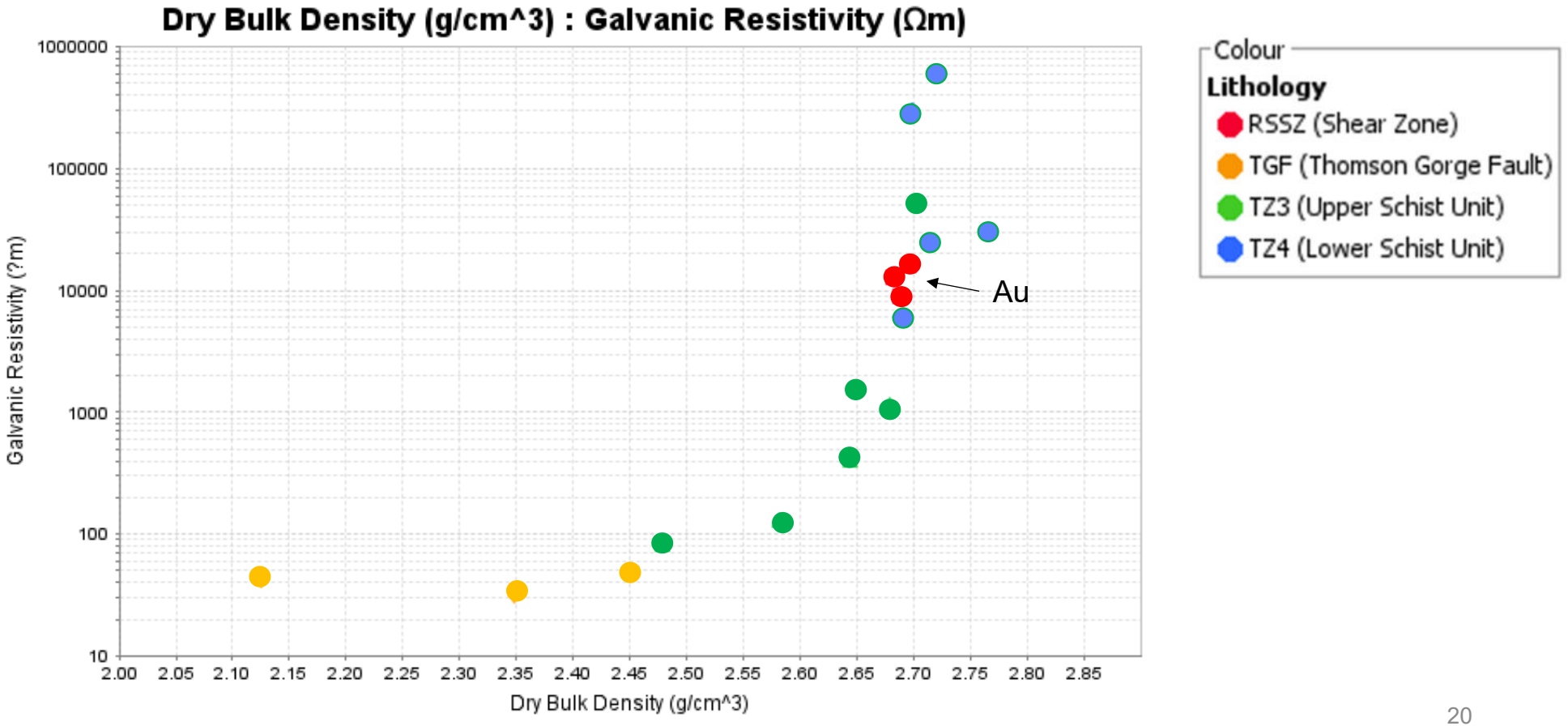
Chargeability inversion model overlap the Frequency inversion model
Drill hole representation with Au and As in ppm

Petrophysics

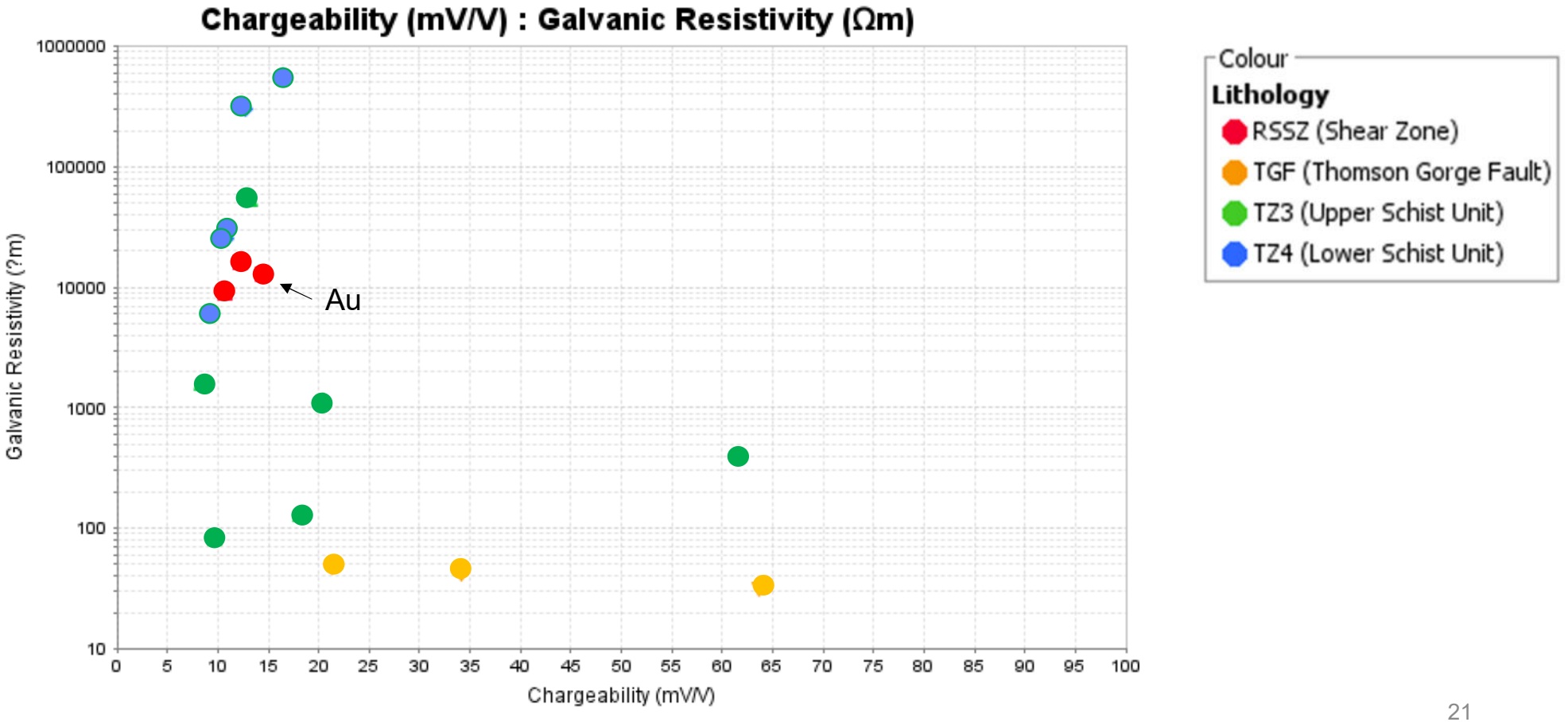
- 17 core samples
- December 2023
- Terra Petrophysics; Technical Report No. 23_077
- Full suite of petrophysical measurements

Sample Information						Magnetic Properties		Mass Properties			Seismic Properties		Electrical Properties			Gamma Ray		
TR Sample ID	Client Sample ID	Drillhole ID	From	To	Lithology	Magnetic Susceptibility	Koenigsberger Ratio (Q)	Dry Bulk Density	Apparent Porosity	Grain Density	P-Wave Velocity	Acoustic Impedance	Galvanic Resistivity	Chargeability	Inductive Conductivity	K	U	Th
			(m)	(m)		(×10^-3 SI)		(g/cm^3)	(%)	(g/cm^3)	(m/s)	(g/cm^3)*(m/s)	(Ωm)	(mV/V)	(S/m)	(%)	(ppm)	(ppm)
23TR4592	N/A	MDD012	151.60	151.75	TZ3	0.302		2.65	0.17%	2.65	N/A	N/A	1598	8.4	0.0	1.90	1.51	16.59
23TR4593	N/A	MDD012	159.70	159.85	TGF	0.152	2.72	2.35	5.13%	2.47	N/A	N/A	31	63.6	0.0	3.52	5.15	33.08
23TR4594	N/A	MDD012	160.40	160.55	RSSZ	0.205		2.70	0.53%	2.71	4550	12268.0	15870	12.2	0.0	2.56	2.85	22.43
23TR4595	N/A	MDD112	173.00	173.15	TZ3	0.296		2.70	0.18%	2.71	4640	12538.3	53385	13.3	0.0	3.29	3.14	15.66
23TR4596	N/A	MDD016	194.00	194.17	RSSZ	0.133		2.69	0.48%	2.70	3460	9299.0	9037	10.7	0.0	3.61	4.76	22.00
23TR4597	N/A	MDD070	157.80	158.05	TZ3	0.679	1.53	2.64	1.21%	2.68	N/A	N/A	406	61.5	0.0	7.76	8.79	25.65
23TR4598	N/A	MDD070	173.00	173.17	TZ4	0.175		2.69	0.55%	2.70	2380	6398.4	5994	9.0	0.0	3.08	12.13	14.65
23TR4599	N/A	MDD070	261.40	261.55	TZ4	0.198		2.72	0.08%	2.72	5050	13743.5	585488	16.4	0.0	3.78	11.17	10.29
23TR4600	N/A	MDD110	N/A	N/A	TGF	0.261	1.80	2.13	8.58%	2.32	N/A	N/A	41	34.1	0.0	2.28	-0.90	26.54
23TR4601	N/A	MDD110	139.50	139.65	TZ3	0.737		2.68	0.29%	2.69	N/A	N/A	1140	20.5	0.0	10.22	11.08	43.05
23TR4602	N/A	MDD110	145.40	145.55	TZ4	0.378		2.77	0.34%	2.78	3010	8324.2	30845	11.0	0.0	7.07	5.68	25.53
23TR4603	N/A	MDD110	157.40	157.55	TZ4	0.457		2.70	0.15%	2.70	5070	13686.0	304484	12.7	0.0	2.74	10.09	14.15
23TR4604	N/A	MDD153	238.51	238.66	RSSZ	0.041		2.68	0.45%	2.69	3650	9790.3	12924	14.3	0.0	4.15	2.36	15.41
23TR4605	N/A	MDD157	193.56	193.73	TZ4	0.380		2.71	0.21%	2.72	N/A	N/A	25590	10.8	0.0	5.47	5.63	32.79
23TR4606	N/A	MDD158	363.11	363.26	TGF	0.217		2.45	5.50%	2.59	N/A	N/A	47	21.3	0.0	4.02	4.46	30.24
23TR4607	N/A	MDD269	242.80	242.98	TZ3	0.286		2.48	3.61%	2.57	1670	4139.5	83	9.7	0.0	3.37	6.56	30.84
23TR4608	N/A	MDD269	247.42	247.56	TZ3	0.236		2.58	2.53%	2.65	N/A	N/A	130	18.2	0.0	5.13	-0.90	53.42

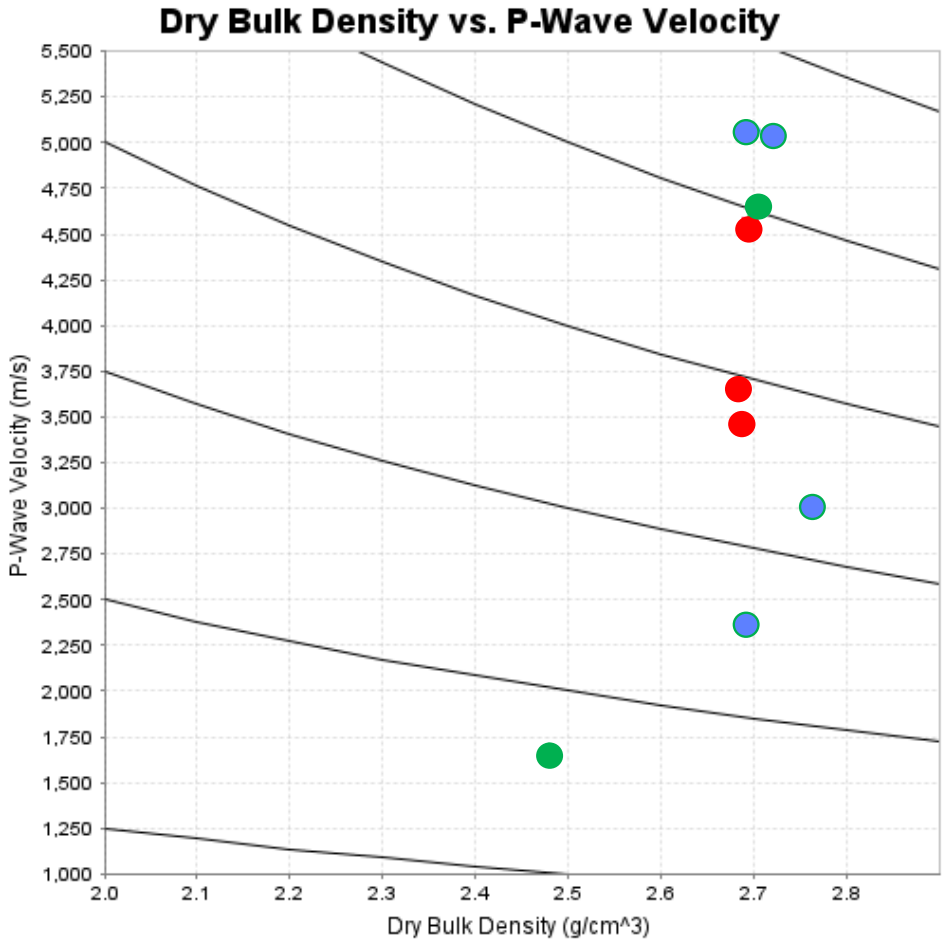
Petrophysics



Petrophysics



Petrophysics



Colour

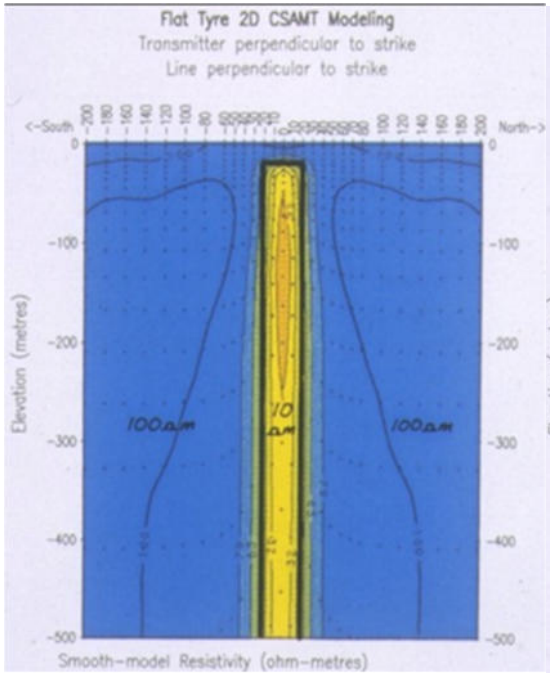
Lithology

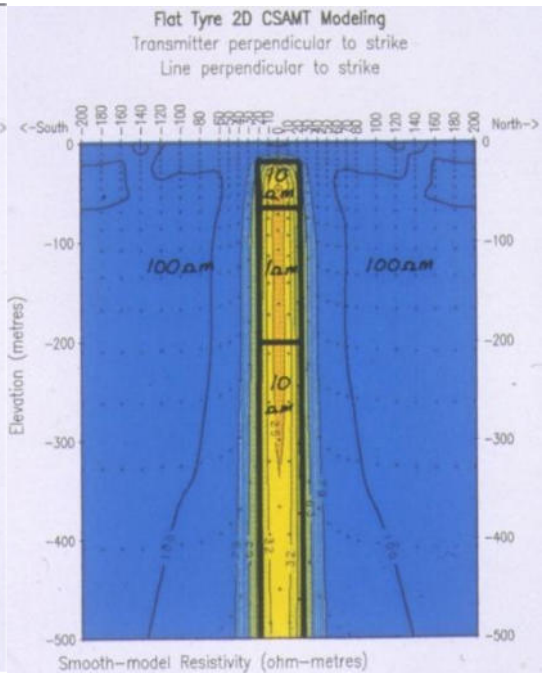
- RSSZ (Shear Zone)
- TGF (Thomson Gorge Fault)
- TZ3 (Upper Schist Unit)
- TZ4 (Lower Schist Unit)

Impedance Contrast

CSAMT Trial

Conventional

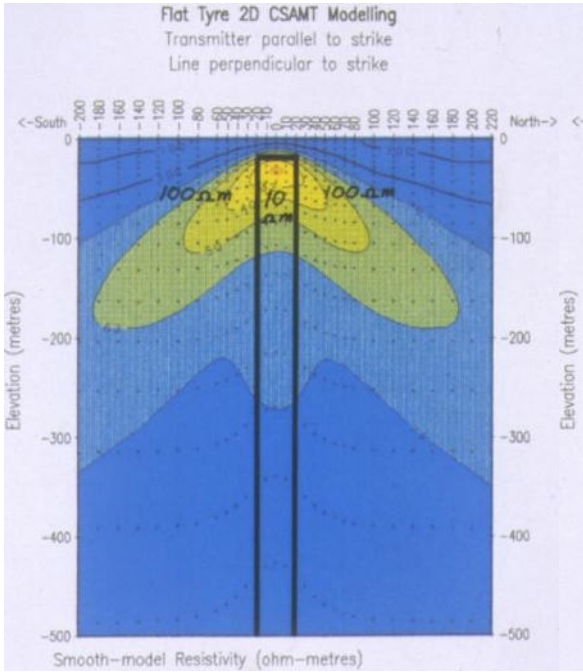


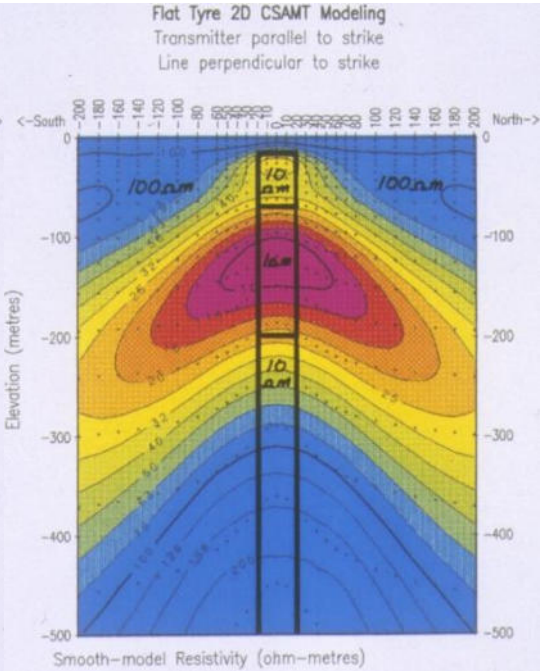


Configurations:
- E-field perpendicular to strike
- Tx perpendicular to strike
- Traverse perpendicular to strike

Observations:
- Sharp anomalies
- Good edge detection
- Insensitive to ore body

Non-conventional



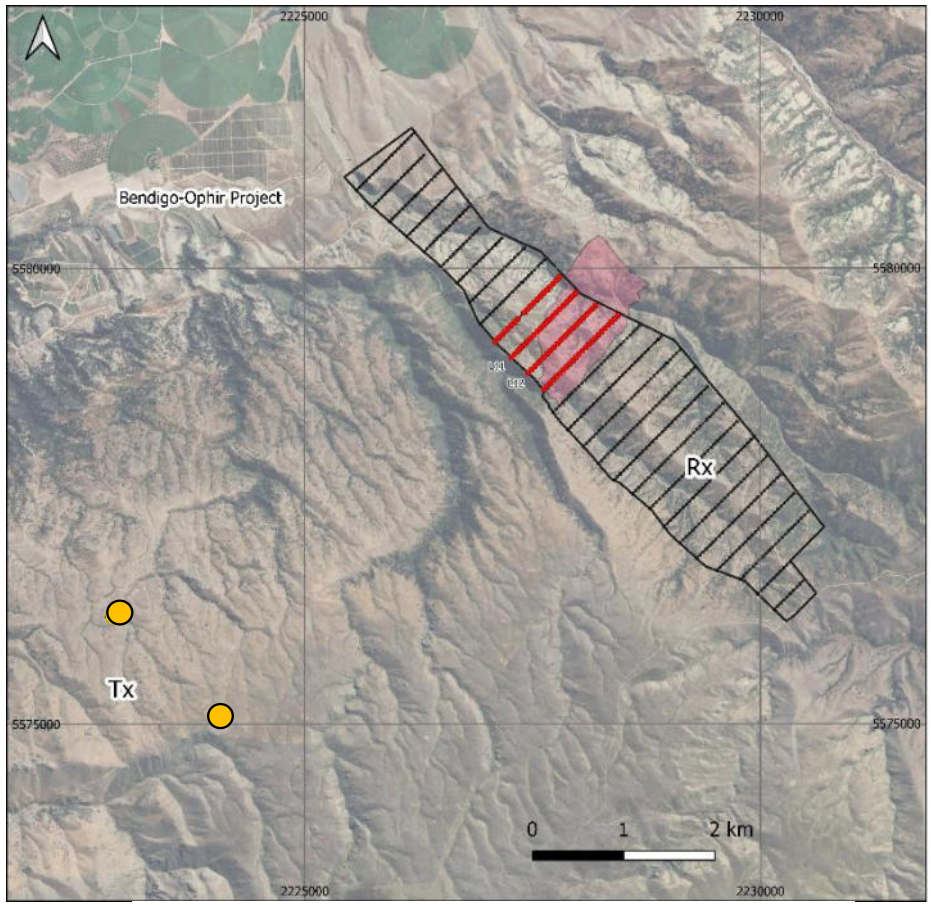


Configurations:
- E-field parallel to strike
- Tx parallel to strike
- Traverse perpendicular to strike

Observations:
- Depth to top clear
- Location of edges poor
- Sensitive to ore body

CSAMT / IP

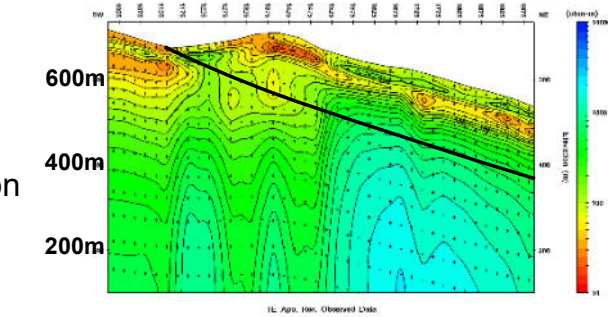
- The Controlled Source Audio-Magnetotelluric (CSAMT) survey was designed along the TGF structure
- Four CSAMT lines (Line 10 to Line 13) were acquired and displayed in 2D inversion models. 50m dipoles perpendicular to line
- Dipole-Dipole Induced Polarization in the frequency domain (DDIP) was acquired along three lines, with a 100m dipoles for both the transmitter and the receiver dipole
- CSAMT and DDIP transmitted fields were generated using a Zonge GGT10 transmitter with a Kohler 10KVA and GDAS receivers



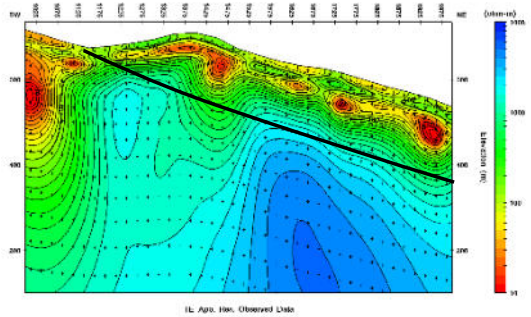
CSAMT lines acquired in red colour
CSATM lines proposed in black colour

CSAMT Data – Line 11N

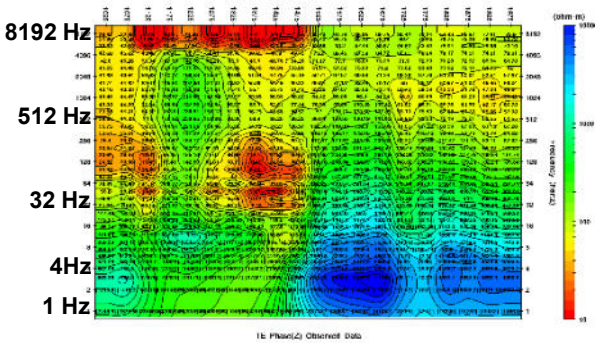
1D Inversion



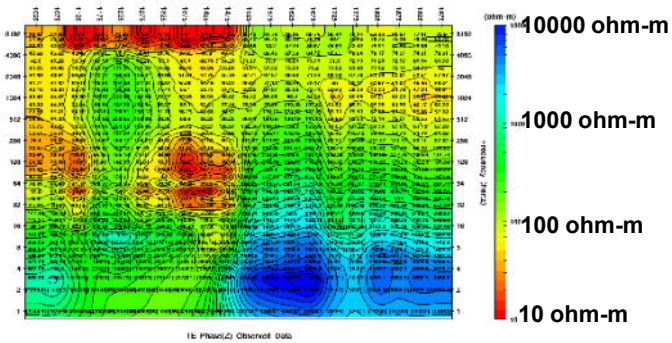
Resistivity

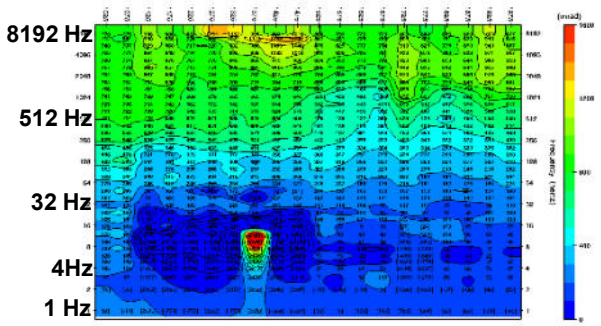


2D Inversion

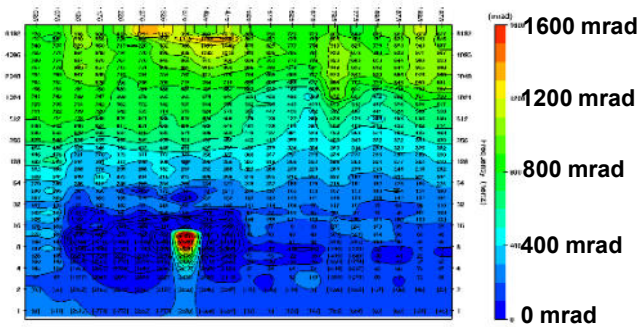


Apparent Resistivity





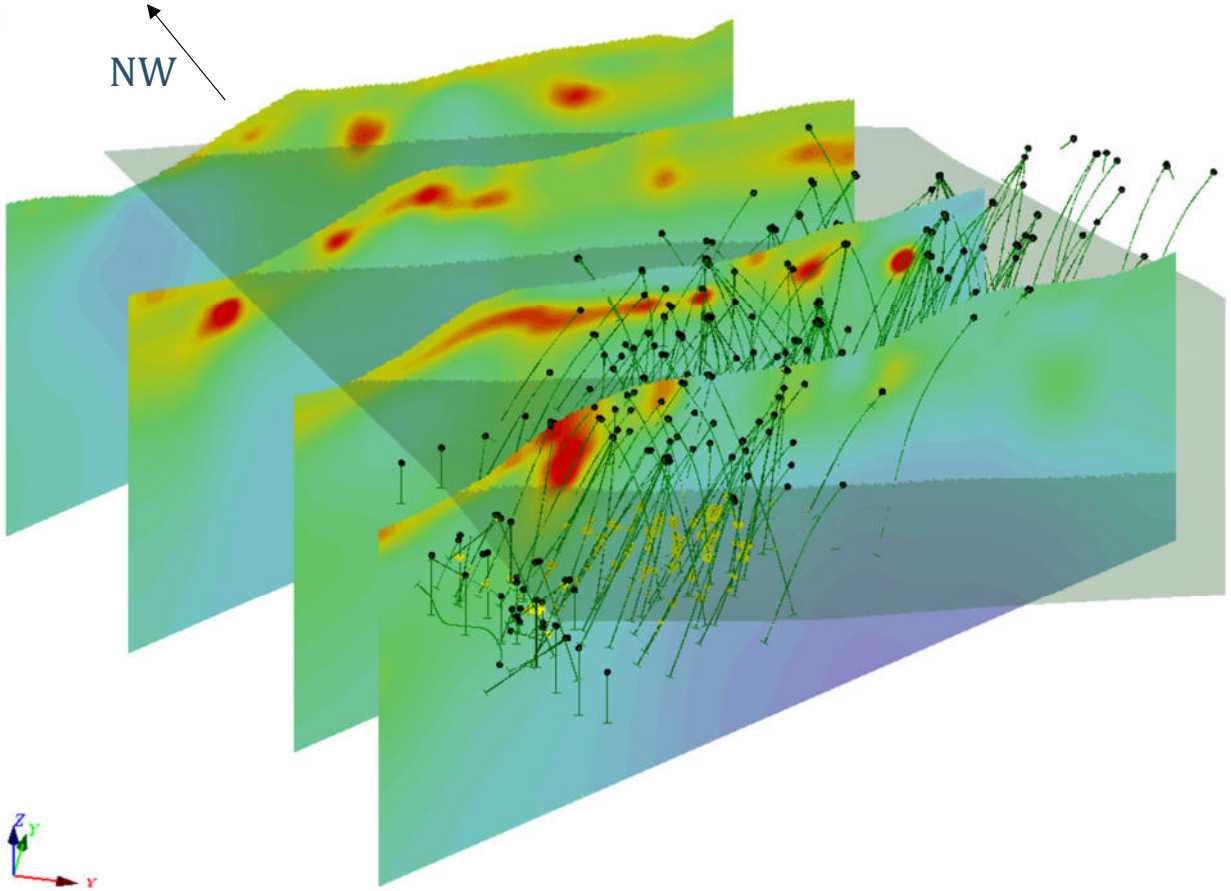
Phase

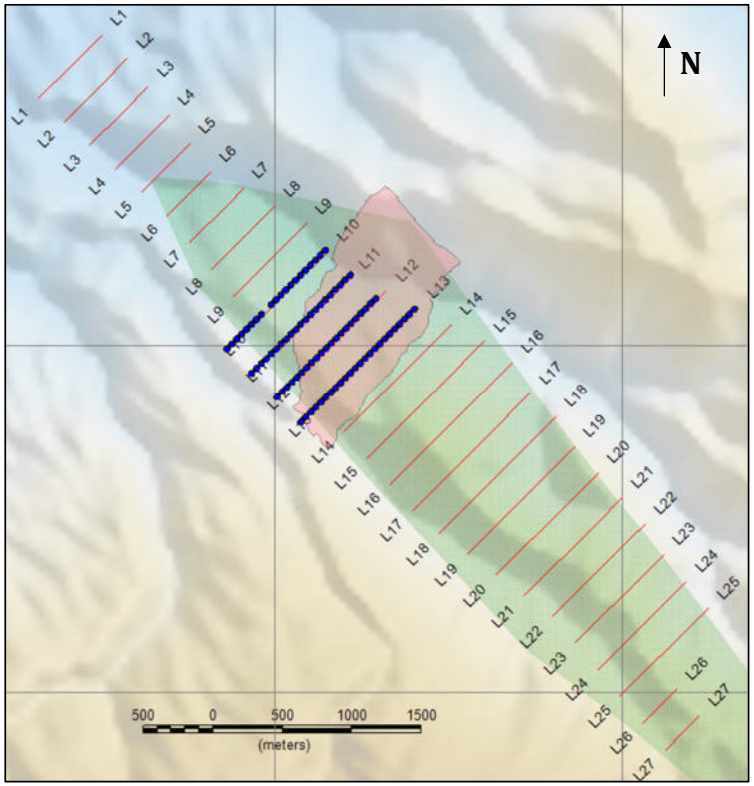


Static corrected

Survey Parameters:
Bipole Source Scalar AMT data
Tx length = 1536 m, azimuth = 147
Tx center easting=372486, northing=5017624
Tx length = 1500 m, azimuth = 0
Tx center easting=0, northing=0
Rx dipole length = 49 m

3D View - CSAMT Inversion





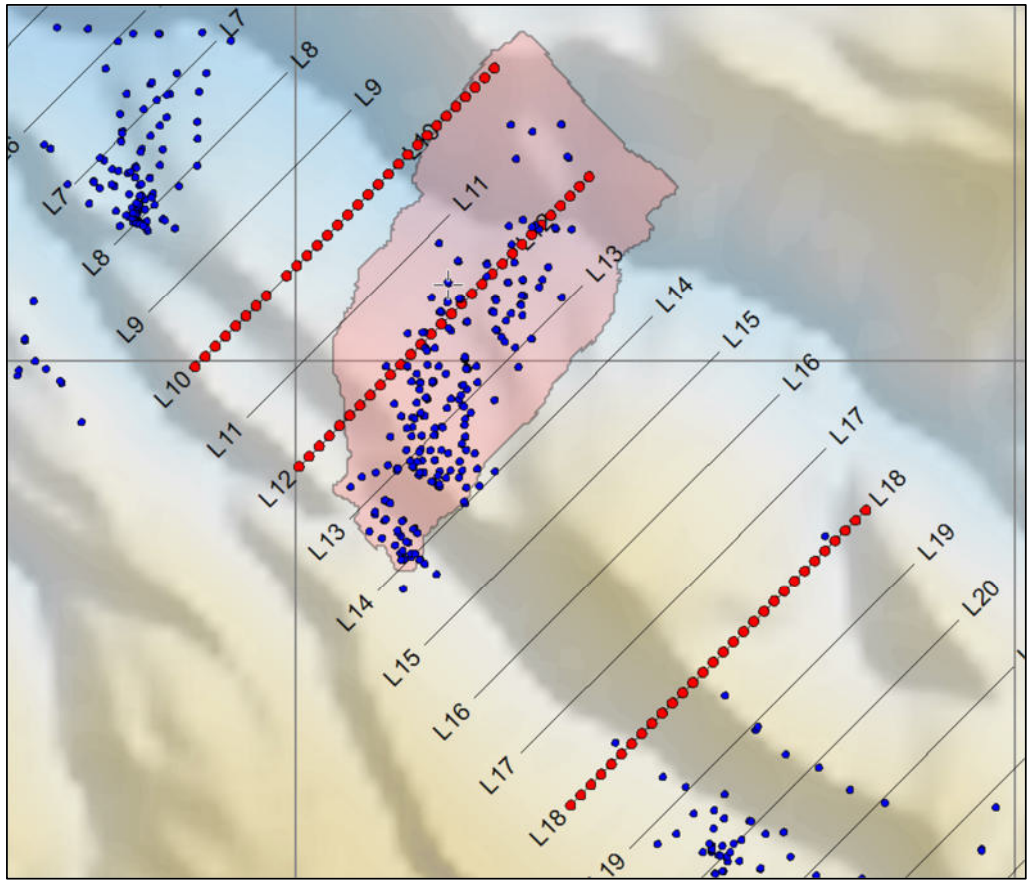
3D view Resistivity (Ohm*m)

2D inversion Model (static corrected)

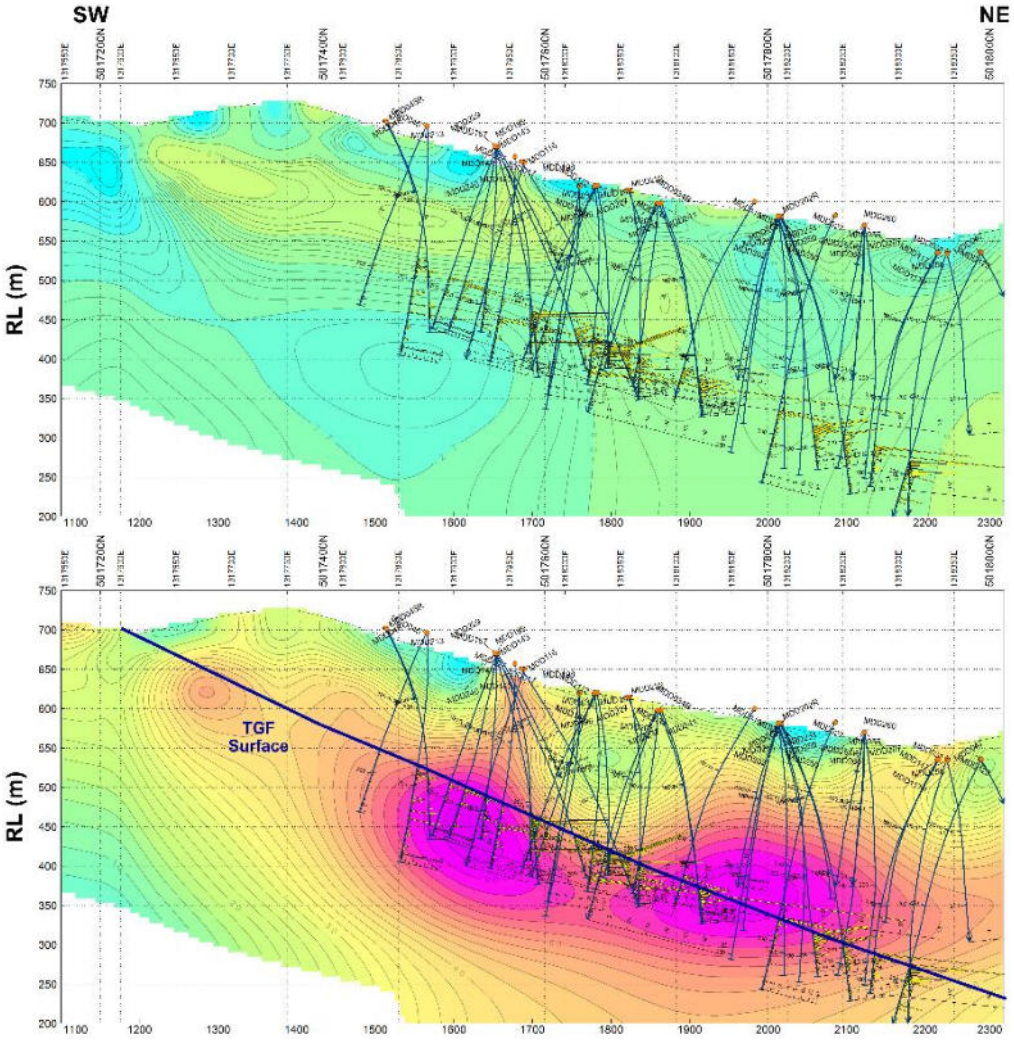
TGF surface (grey)

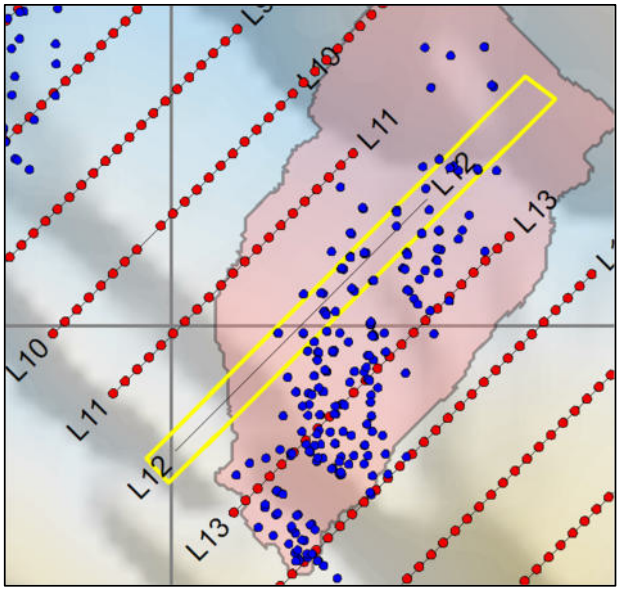
IP - Frequency Domain

- IP/ resistivity frequency domain test was proposed and acquired in the Bendigo area
- Three lines with 100m dipole in a roll-along configuration was carried out (n=16 max)
- Dipole- dipole IP/resitivity data was collected at 0.125Hz 100% duty cycle
- Multiple tests were conducted to verify data quality



IP Inversion Modelling – Line 12





- 2D inversion model
- Top: Resistivity in Ohm*m
- Bottom: Chargeability in mrad
- Drill Hole Au assay

Summary

- Regional geophysics have been effective in mapping structure in the Otago Schist Belt hosting the Bendigo-Ophir gold deposits
- Petrophysics showed that the Thompson Gorge Fault (TGF) was more conductive than the TZ3 (upper) and TZ4 (lower) schist units. Chargeability was elevated in both the TGF and TZ3
- A broadside CSAMT survey was trialled to try and define gold mineralisation/alteration along the TGF
- A trial frequency domain IP/resistivity survey followed the CSAMT survey using the same equipment. There is an IP response associated with the TGF/TZ3 and alteration associated with gold mineralisation

Acknowledgements

Geophysics of the Bendigo-Ophir Gold Deposit, Central Otago Region, New Zealand

Barry Bourne and Ronald Yupa

Terra Resources Pty Ltd

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