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Review of Iron Mask Area Geophysics

Prepared for

BMR

by

Geoscience North

(Alan King, P.Geo., M.Sc.)

Nov 2019

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1 Introduction

This review of Iron Mask Area geophysics is part of a regional exploration program for Five-Element type Co-Ag deposits in the Proterozoic Cobalt Embayment in east central Ontario. Battery Mineral Resources (BMR) acquired a district-scale land package of 1,100 km2 in the Ontario Cobalt Belt (BMR 2019).

The Co-Ag deposits are located in or near rocks of the Proterozoic Cobalt Embayment or outliers thereof and are often associated with Nippissing Diabase Intrusives.

BMR's Canadian land package is located west of the historic silver mining town of Cobalt and north of the Sudbury Basin. Exploration in this area has been primarily focused on silver and BMR believes that the area is underexplored for Cobalt.

The land package consists of 11 separate properties:

	Area (km2)
Elk Lake	147.8
Fabré	18.1
Gowganda	152
Iron Mask & Cobra	103.4
Island 27	21.9
McCara	229.1
Shining Tree	24.6
White Lake	86.2
White Reserve	134.2
Wilder	122.3
Yarrow	4.3
Total	**1,100**

Most of the properties were covered by surveys flown by Precision Geosurveys Inc. (Precision Geophysics 2016 and 2018) for BMR with a new high-resolution, helicopter magnetic-spectrometry surveys to assist in geological mapping and initial targeting.

In addition, a number of government and private Airborne Electromagnetic (AEM) surveys were available over, and around, some of the BMR properties.

The AEM data is considered useful for mapping basement (Archean) sulphide occurrence and deposits that may provide some control on associated Co-Ag deposits and could directly locate larger bodies of Co-Ag- Arsenide-Sulphides, although this is considered less likely.

AEM/Magnetic surveys over the BMR Iron Mask properties included:

2008 AeroTEM
2011 VTEM Plus

2013 VTEM Max

Following reviews of the airborne surveys and interpretation together with geology, targets of interest were selected and some ground geophysical surveys were conducted. These included:
Iron Mask North Project:

Q2372b-IP, Max-Min and Magnetics

Q2555-CobaltShaft-3DIP

Iron Mask-Cobra Project:

Q2372b-Iron Mask-IP-Mag-MaxMin

Q2406b-Cobra-Mag

Q2465-Cobra-IP-Mag-GPS

2 Location and Geology Iron Mask Area

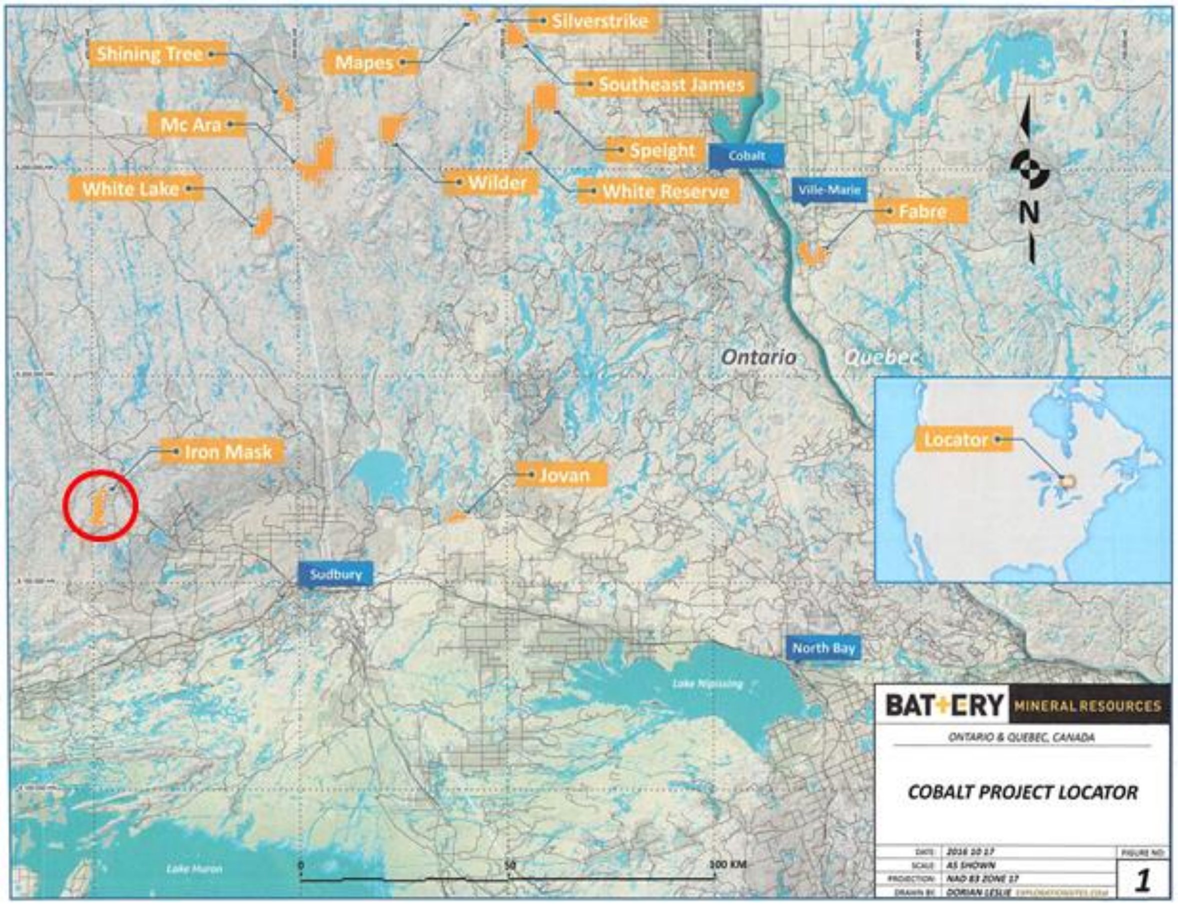

Figure 1. Location of the Iron Mask Property from BMR website.

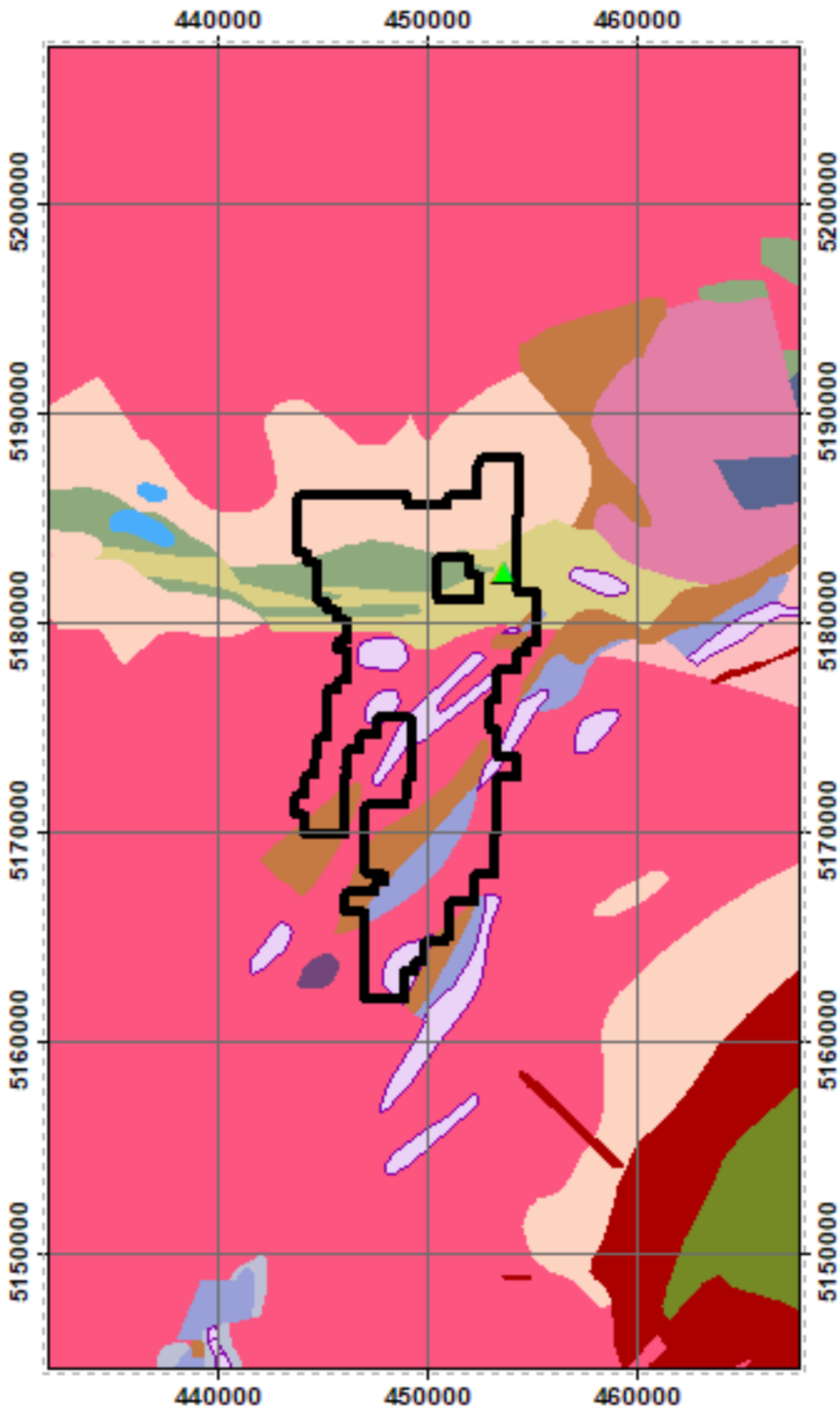
440000
450000
460000
5200000
5190000
5180000
5170000
5160000
5150000

Figure 2. BMR Iron Mask North and South properties targeted on inliers of Huronian group rocks in the Archean North West of Sudbury (OGS Regional Geology Map). Nippissing Diabase Intrusives

3

Available geophysical surveys in the Iron Mask area included:

Precision Geophysics 2016 and 2018 - new high-resolution, fixed wing magnetic-spectrometry surveys flown for BMR

AEM/Magnetic surveys over the BMR Iron Mask properties included:

2008 AeroTEM

2011 VTEM Plus

2013 VTEM Max

Following reviews of the airborne surveys and interpretation together with geology targets of interest were selected and some ground geophysical surveys were conducted. These included:

Iron Mask North Project:

Q2372b-IP, Max-Min and Magnetics

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Iron Mask-Cobra Project:

Q2406b-Cobra-Mag

Q2465-Cobra-IP-Mag-GPS

3.1 Precision Mag/Spec Airborne surveys

In 2016 and 2018 Precision GeoSurveys Inc. flew Helicopter Mag/Spec Airborne surveys on the Iron Mask property, Survey blocks were Labelled 2016 North and South and 2018 Block as shown in Figure 4.

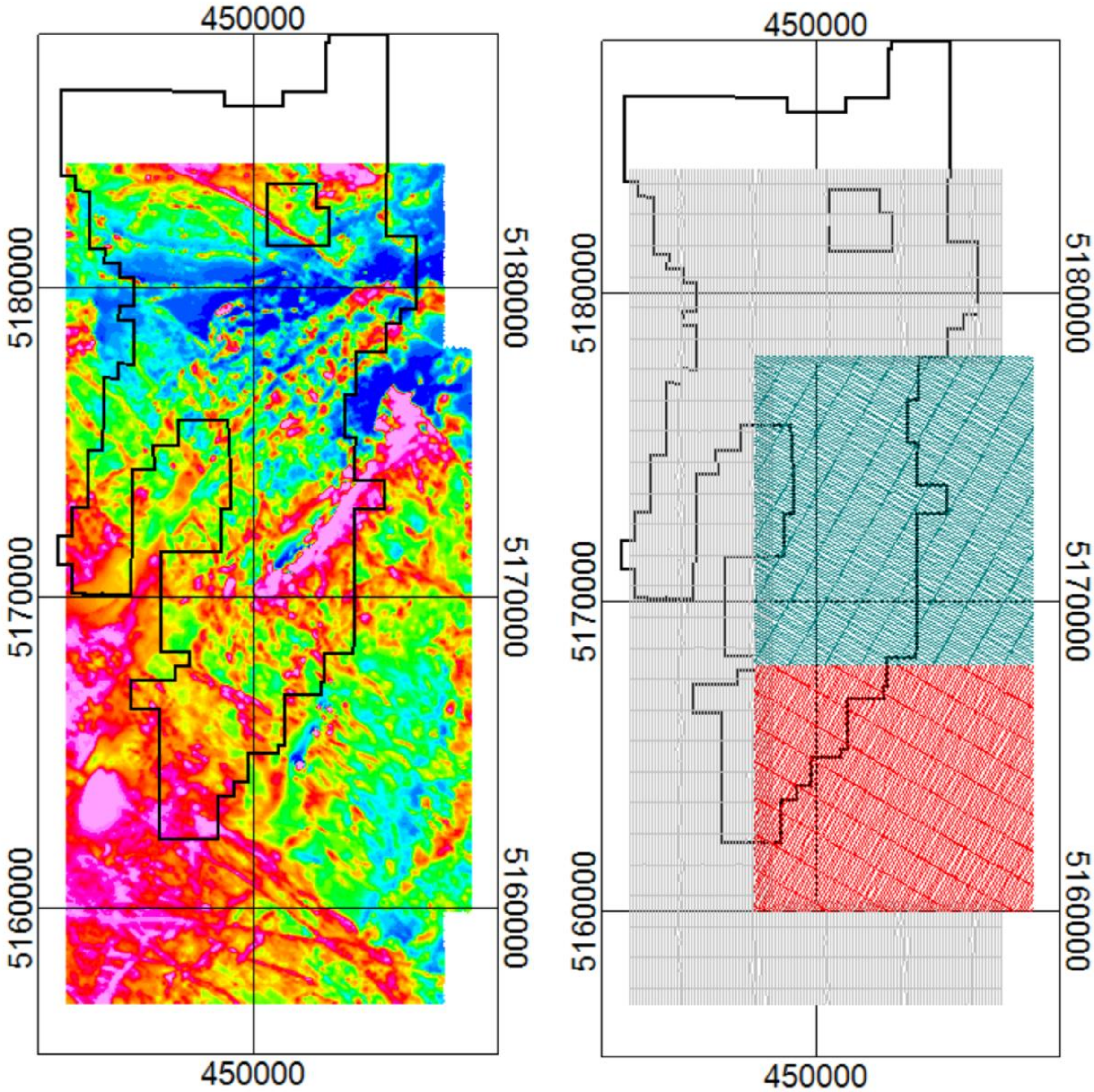


Figure 4 Claim block outline with combined 2016 and 2018 Precision Mag TMI - Left and Survey Blocks – Right

Airborne Survey Specifications were as follows:

IRON MASK - **NORTH AND SOUTH SURVEY BLOCKS SPECIFICATIONS**

Aircraft Type Eurocopter AS350

Magnetic and Radiometric Survey airborne survey systems:

Magnetometer Sensor: Configuration:

Scintrex CS-3 Cesium

Stinger with 3 axis compensation 10 Hz

Sample Rate: Sensitivity: 0.0006 nT vHz rms

Gamma Ray Spectrometer:

Downward-Looking Crystals: Upward-Looking Crystals: Sample Rate: 1 Hz

Pico Envirotec GRS-10 Gamma Spectrometer

16.8 litres of Nal(TI) crystals

4.2 litres of Nal(TI) crystals

North Block

Survey Line Spacing: Survey Line Direction: 100 meters 120°/300°

Tie Line Spacing: Tie Line Direction: 1000 meters 030°/210°

Mean Flight Height: 40.82meters

Total Kilometers – 990.0 km

South Block

Survey Line Spacing: Survey Line Direction: 100 meters 030°/210°

Tie Line Spacing: Tie Line Direction:

1000 meters 120°/300°

Mean Flight Height: 39.15 meters

Total Kilometers – 791.6 km

2018 Block

Survey Line Spacing: Survey Line Direction: 100 meters 000°/180°

Tie Line Spacing: Tie Line Direction: 1000 meters 090°/270°

Mean Flight Height: 36 meters

Total Kilometers – 2176

Interpretation and modeling focussed on the 2016 Airborne surveys of Iron Mask North and South Blocks. This included some preliminary interpretation by T. Weis 2017 and new 3D inversion/modeling work by A. King. Previous Upward Continuation/Vertical Integral etc. magnetic products by Weis to highlight deep features have largely been replaced by 3D magnetic inversions which provides 3D images of both shallow and deep magnetic features in one view.

3.1.1 2016 Iron Mask North Precision Mag/Spec Survey

With some Preliminary Magnetic Maps and Geophysical Interpretations by T. Weis, April 2017

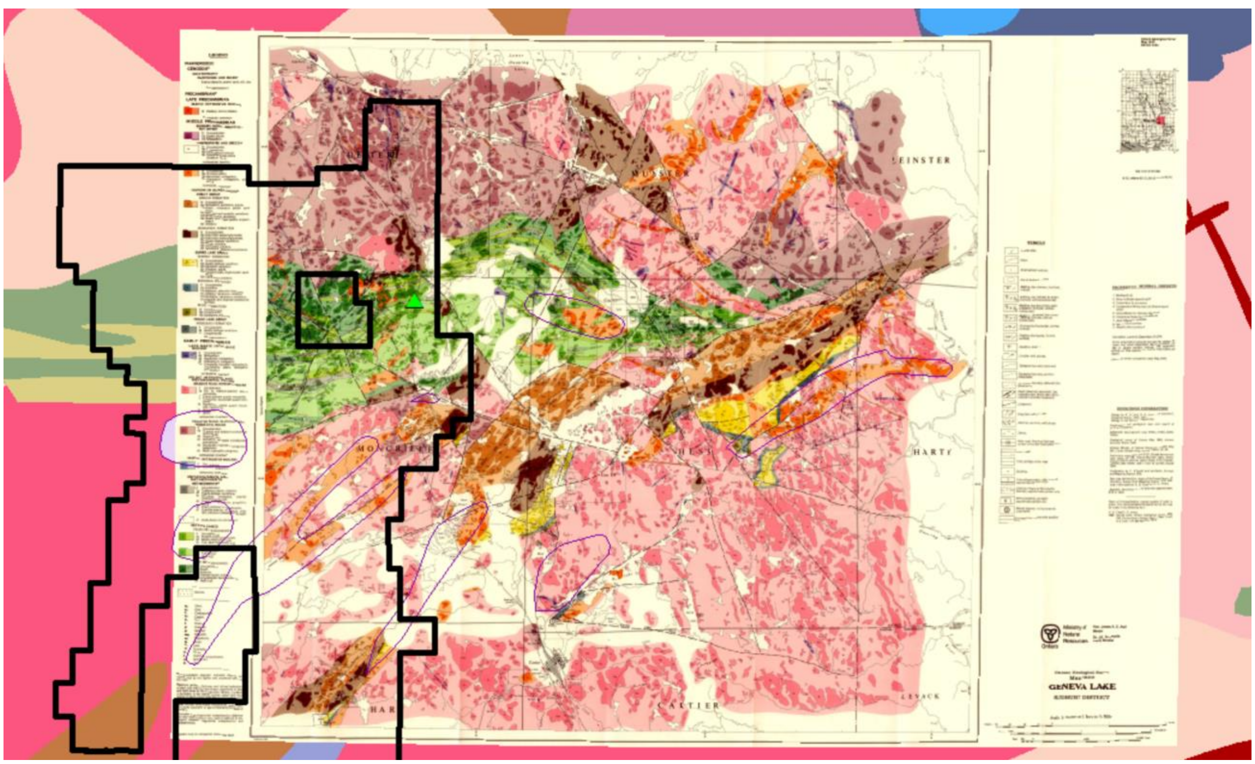
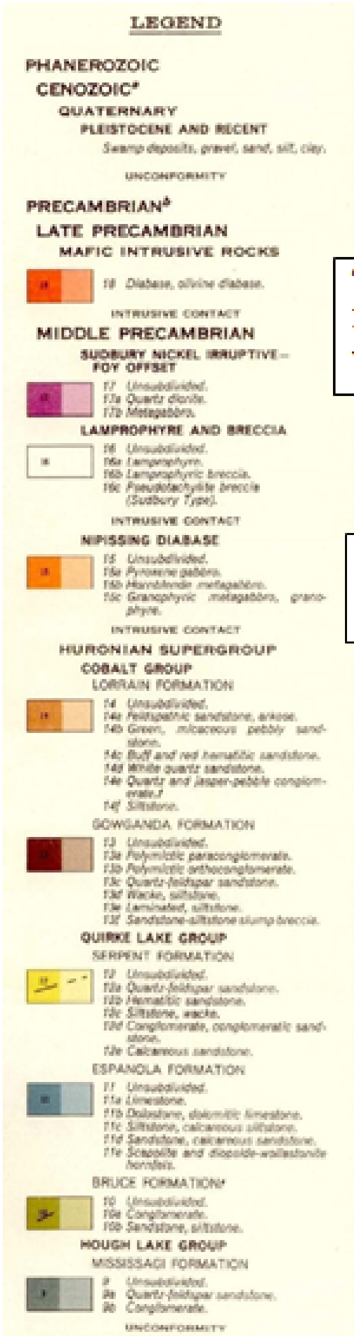


Figure 3. Only available detailed public OGS geology map 2435: Geneva Lake over Regional OGS Geology. There is only partial detailed geological coverage of the Iron Mask property



The younger post mineral(?) diabase dikes occur at the end of the Proterozoic or younger. These dikes are magnetic and a noise source when mapping Nipissing sills and dikes.

Nipissing diabase sills and dikes of Proterozoic age are generally the host lithology for the cobalt mineralization. They are magnetic.

The Gowgonda formation and the Lorrain formation sediments are the country rocks into which the Nipissing diabase sills and dikes are intruded. They are primarily sandstones and conglomerates, are non-magnetic and have moderate radiometric responses.

The Quirke Lake siltstone/sandstone/conglomerate unit occurs in the Iron Mask North area. The Espanola limestone also occurs in the Iron Mask North area and interestingly near the Cobalt Shaft on the southern limb of the syncline.

Figure 4. OGS Geneva Lake Map legend.

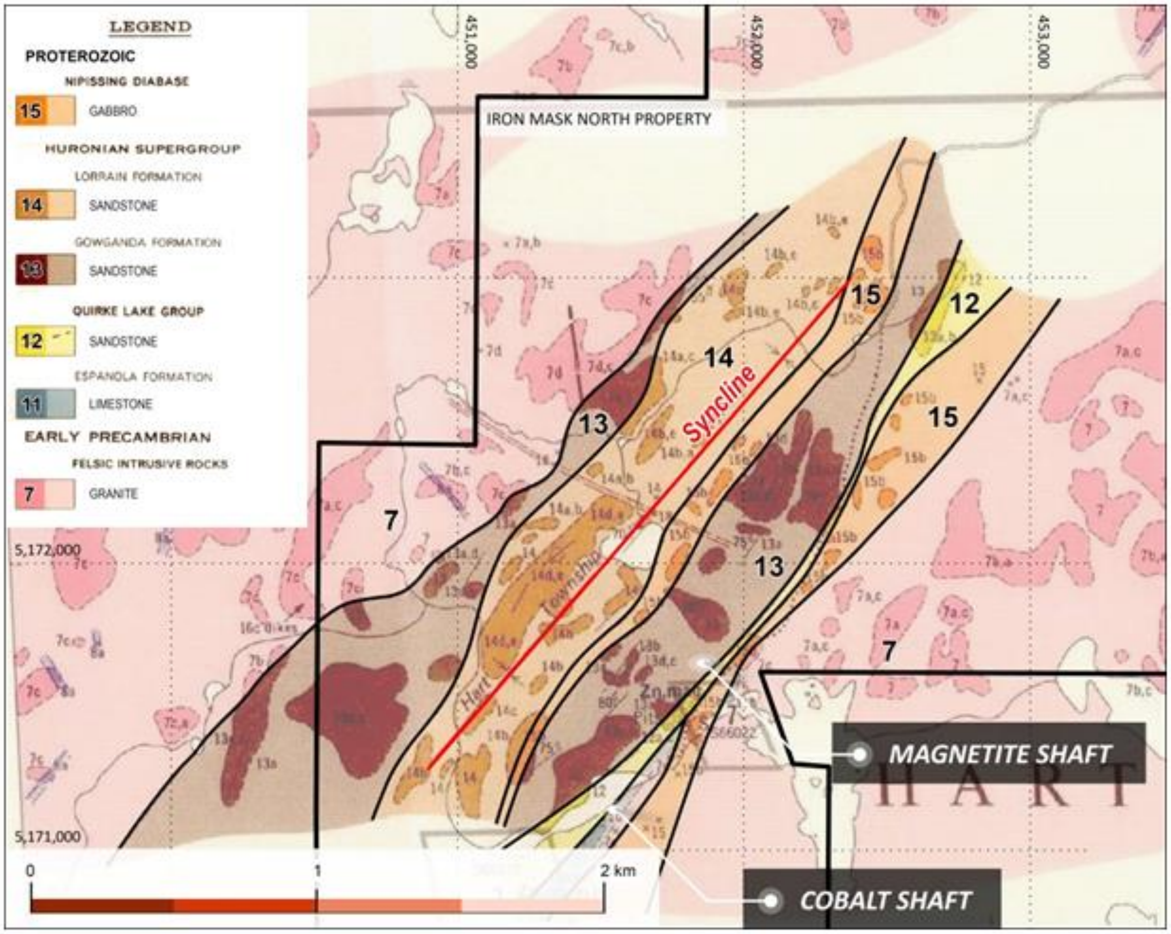


Figure 5. Zoom to SW corner of OGS geology map 2435: Geneva Lake showing mapped geology over a portion of the Iron Mask North property with old BMR IM property outline.

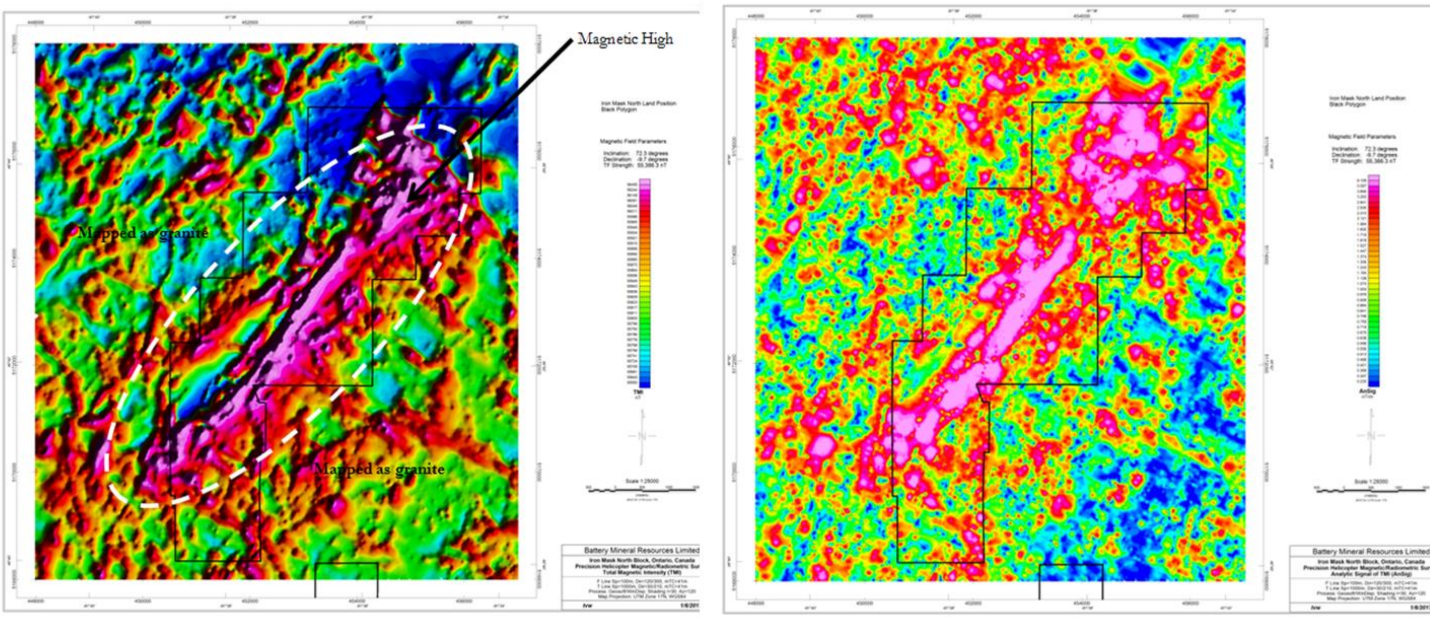


Figure 6. Iron Mask North Block. Left: TMI, Right: Mag Analytic Signal with old BMR IM property outline.

In the first phase of processing of the magnetic data the Analytical Signal (AS) of the magnetic data was calculated. The Mag AS processing compensates for all variations in magnetization direction such as variations due to latitude and remanent magnetization. However, it also emphasizes shallow magnetic features at the expense of deeper features. The AS data is often used to check if there was strong remanent magnetic effects in any of the rocks.

Since the Mag AS values are positive (red-pink) for any direction of magnetization, any areas where there are strong mag lows (blue) in the TMI mag, and highs (pink) in the Mag AS are indicators of possible strong reversed mag remanence, or zones with a mag remanence direction strongly divergent from the current direction of the earth's magnetic field. There can be strong positive mag remanence as well but this will add to the induced magnetic signal and show up as a higher mag susceptibly and has less negative effects on subsequent processing. Remanent magnetism can be a useful indicator of particular rock units, but strong remanence can also make some mag processing, such as reduction to the pole and the usual mag susceptibility 3D inversion methods, problematic unless it is taken into account explicitly.

In this case ,for the Iron Mask North Block, the main AS peaks are similar to the TMI peaks. This indicates that magnetic remanence not dominant in most rocks in the survey area. The Nipissing Diabase (ND) intrusives are known to have some magnetic remanence but this is not obvious in the data, perhaps due to the small volume of the ND sills.

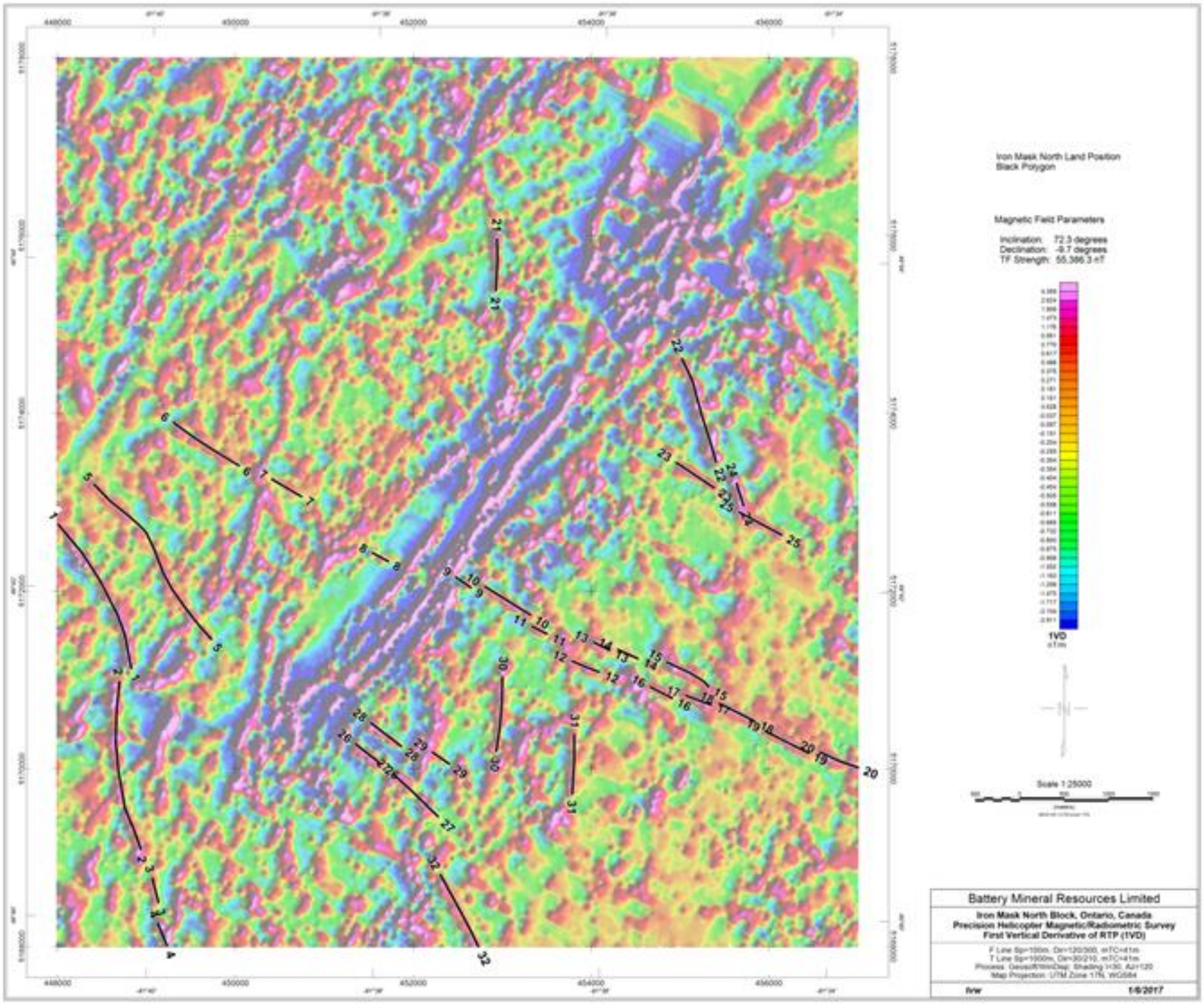


Figure 7. Iron Mask North - 1VD showing NW-SE daibase dykes (linear structures).

Figure 9 shows the First Vertical derivative (1VD) of the total magnetic field (TMI) with NW-SE daibase dykes highlighted.

3.1.2 Iron Mask South Precision Mag/Spec Survey

With some Preliminary Magnetic Maps and Geophysical Interpretations by T. Weis, April 2017

There are no available detailed, public, Final OGS geology maps of the Iron Mask South area.

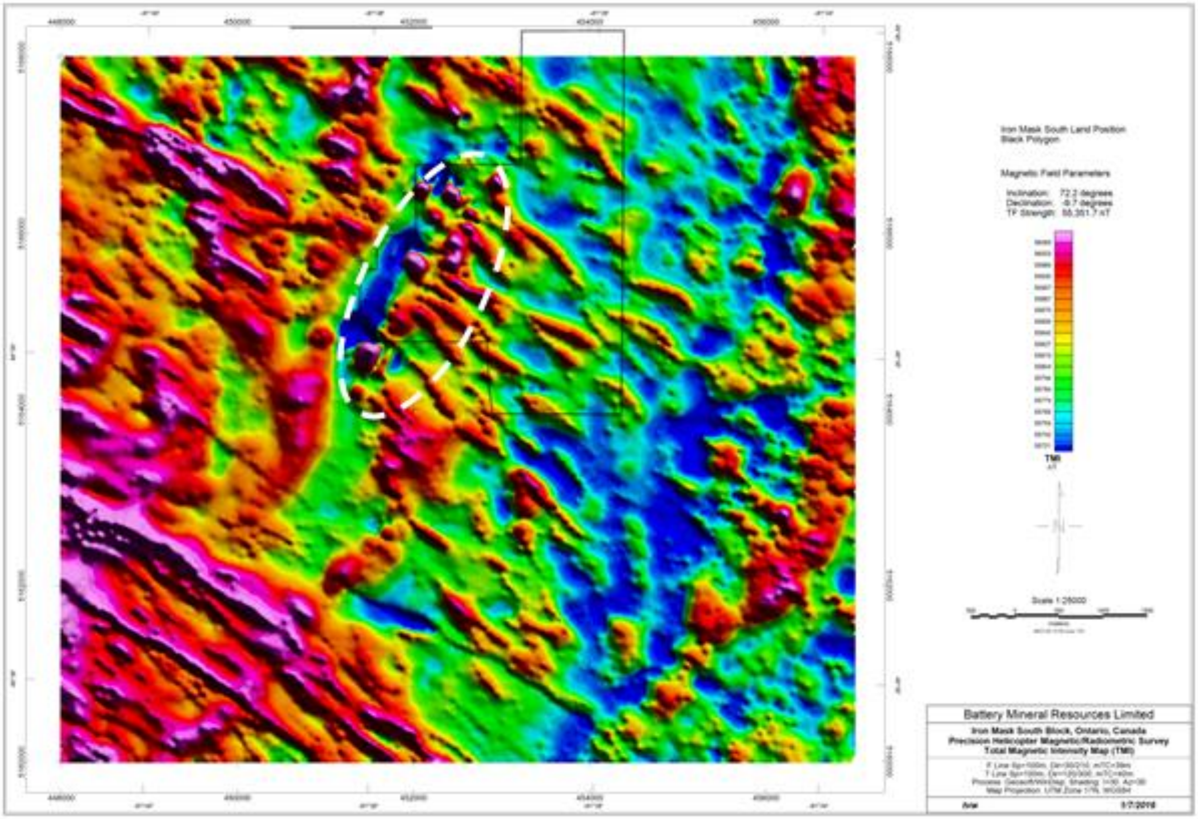


Figure 8. Iron Mask South – TMI map with property boundary and anomalous magnetic area indicated.

The anomalous magnetic area indicated in Figure 10 was selected by Weiss as indicative of ND intrusives and an area of interest for the follow-up with old BMR IM property outline.

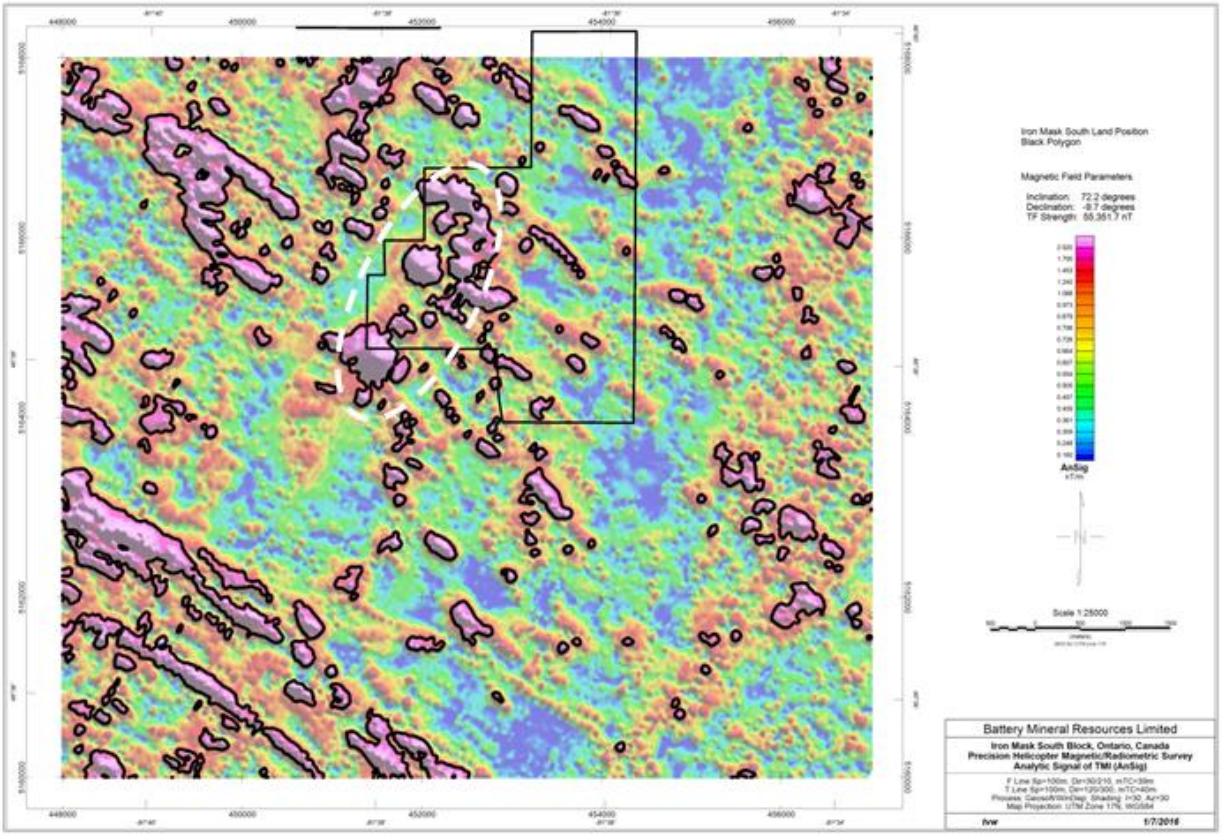


Figure 9. Iron Mask South – Analytic Signal of TMI.

As at Iron Mask North, the main AS peaks are similar to the TMI peaks and so we can conclude that magnetic remanence is not dominant in most rocks in the area with old BMR IM property outline.

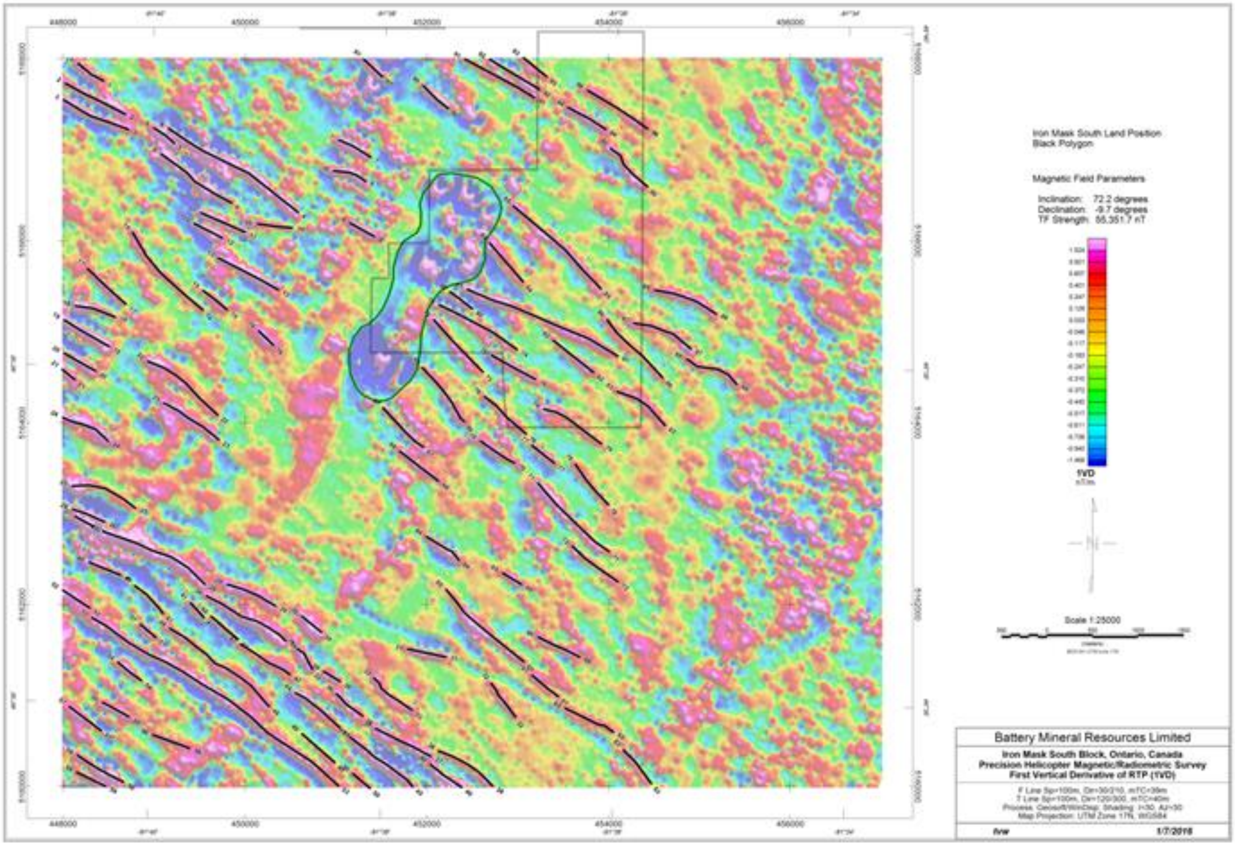


Figure 10. Iron Mask South – 1VD magnetics with NW-SE striking younger dykes and the area of probable ND intrusives highlighted with old BMR IM property outline.

As shown in Figure 14 Weiss did a more detailed interpretation of the probable location of ND intrusives using the 1VD Magnetic image.

3.1.3 *Magnetic Inversions of Precision Magnetic Airborne surveys - Iron Mask North and South by A. King*

Both conventional Mag Susc Inversions and MVI Inversions were done on the Iron Mask North and South magnetic data. These inversions were done using the Geosoft VOXI inversion package. The conventional Mag Susc Inversions assume that magnetic remanence is not a significant factor. Magnetic Vector Inversions (MVI) Inversions explicitly handle magnetic remanence and were done to see if any more subtle effects due to expected magnetic remanence in the ND intrusives could be highlighted and used to better map the ND intrusives in 3D.

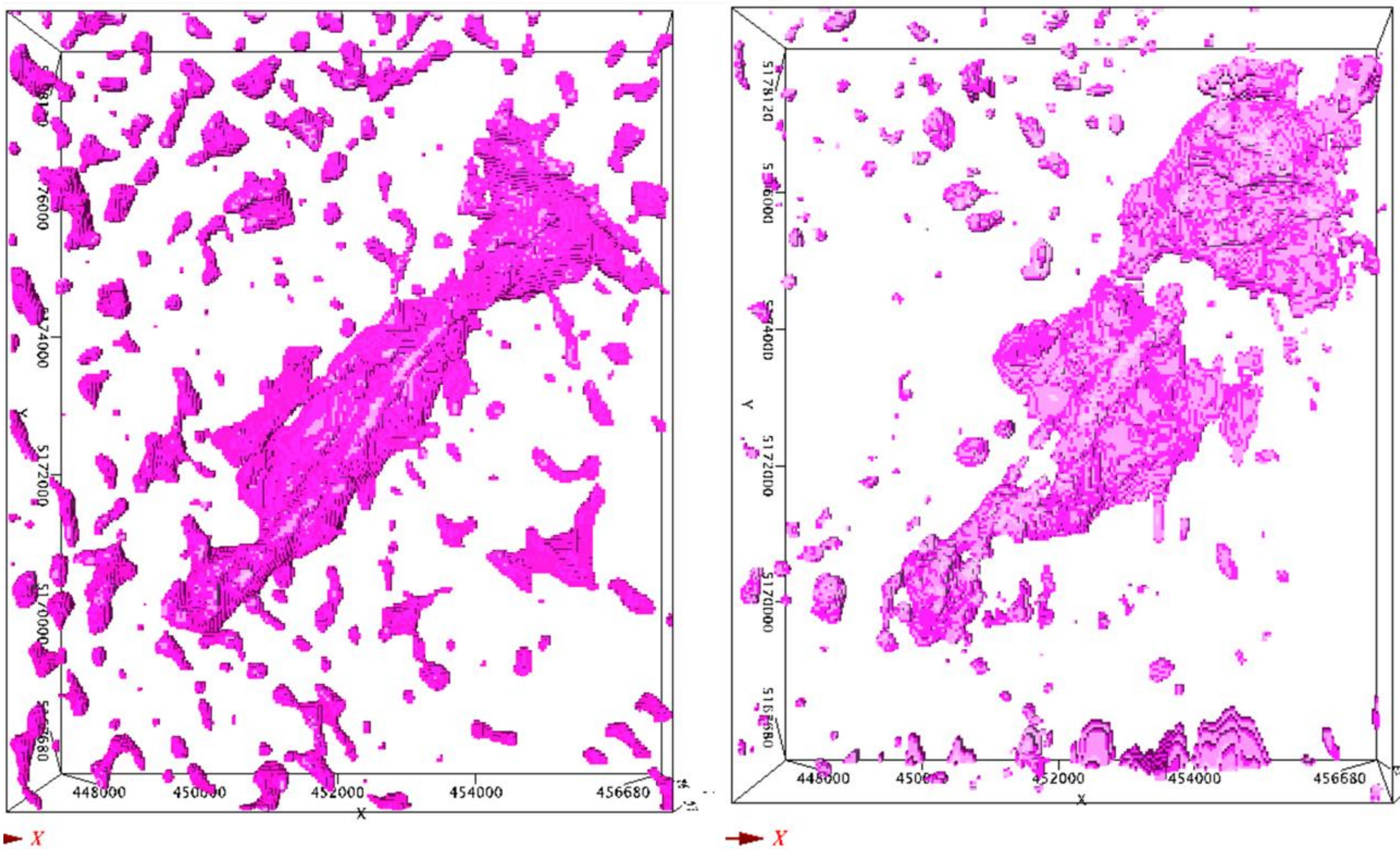


Figure 11. Mag Inversions Iron Mask North 35m cell size, Plan view. Left: Mag Susc Inversion with a 0.005 SI low cutoff isosurface. Right: MVI Inversion 0.015 Magnetization units low cutoff isosurface.

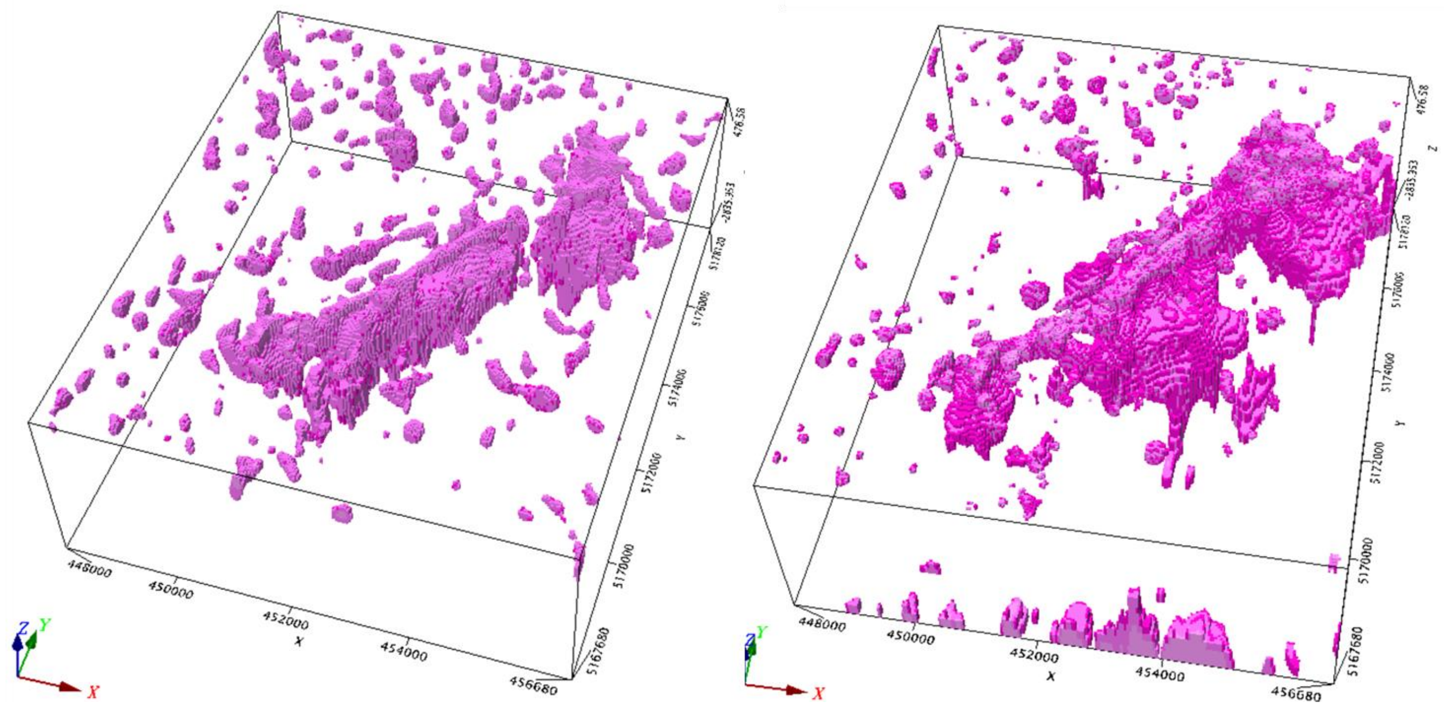


Figure 12. Mag Inversions Iron Mask North, 35m cell size viewed from the SE. Left: Mag Suc Inversion 0.005 SI low cutoff isosurface. Right: MVI Inversion 0.015 Magnetization units low cutoff isosurface.

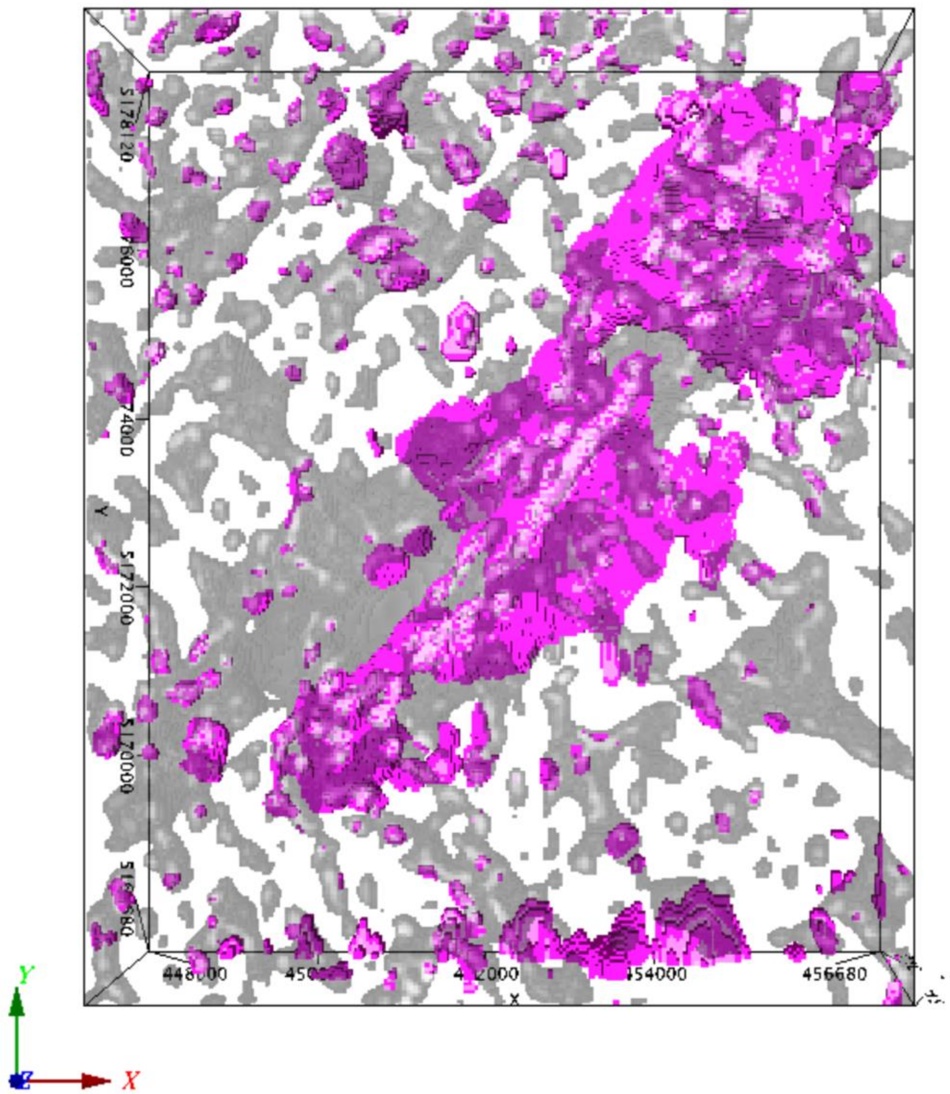


Figure 13. Mag Inversions Iron Mask North, 35m cell size Plan view. In greyscale is the Mag Susc Inversion using a 0.005 SI low cutoff isosurface in pink is the MVI Inversion 0.015 Magnetization units low cutoff isosurface.

As shown in Figures 15-18 large systematic differences in some areas suggest that magnetic remanence may be a significant factor. This is a more comprehensive test than the mag TMI to mag AS comparison and the MVI inversions are considered to be the most reliable.

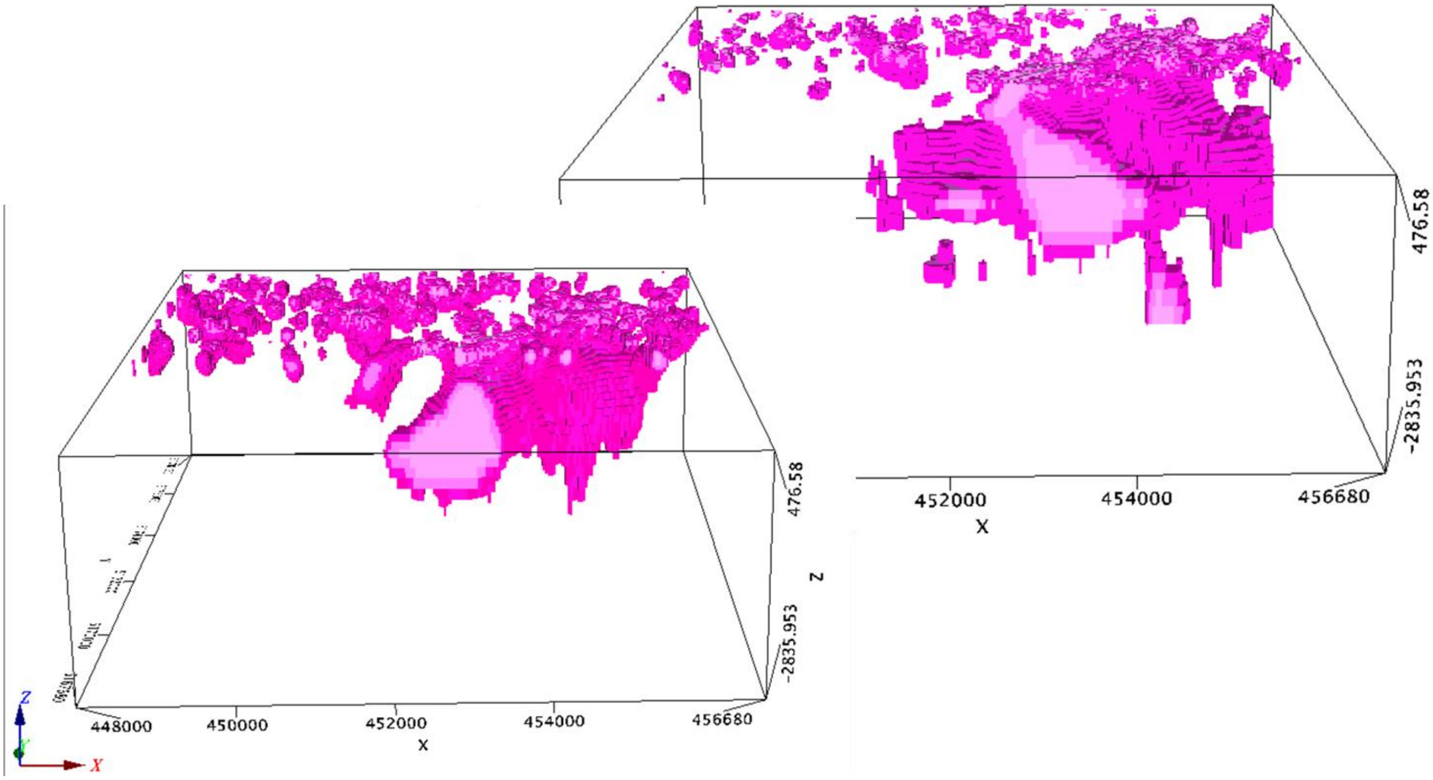


Figure 14. Mag Susc Inversions Iron Mask North, 35m cell size. View from S. Left: Mag Suc Inversion 0.005 SI low cutoff isosurface. Right: MVI Inversion 0.015 Magnetization unit's low cutoff isosurface.

Although the Mag Suc and the MVI Inversions differ in detail, including different large scale dip at depth, both inversion indicate that the magnetic/mafic system has deep roots and these may represent deep intrusions and feeders to the ND sills.

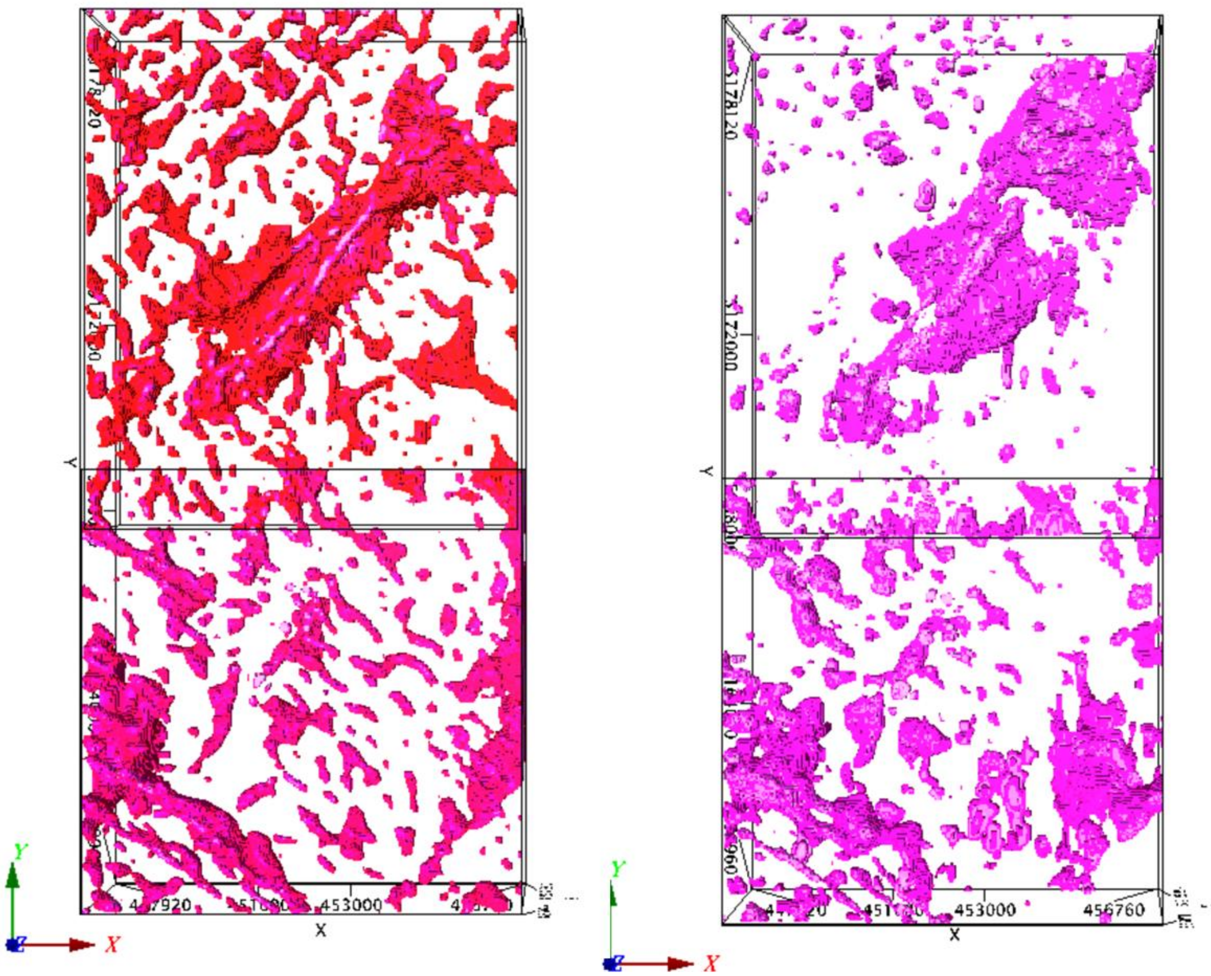


Figure 15. Iron Mask N and S with outline of Nippissing Diabase from the OGS regional geology in plan view. Left- Mag Susc Inversion 35m cell size for Mag Susc showing 0.005 SI low cutoff isosurfaces- . Right- MVI Inversions with 0.012 Magnetization units low cutoff in the North block and 0.005 Magnetization units low cutoff isosurface in the S block.

Nippissing Diabase sills are seen as sub-horizontal sheets and seem to be best defined in the MVI Inversions.

3.2 Iron Mask N and S blocks Spectrometry by Precision

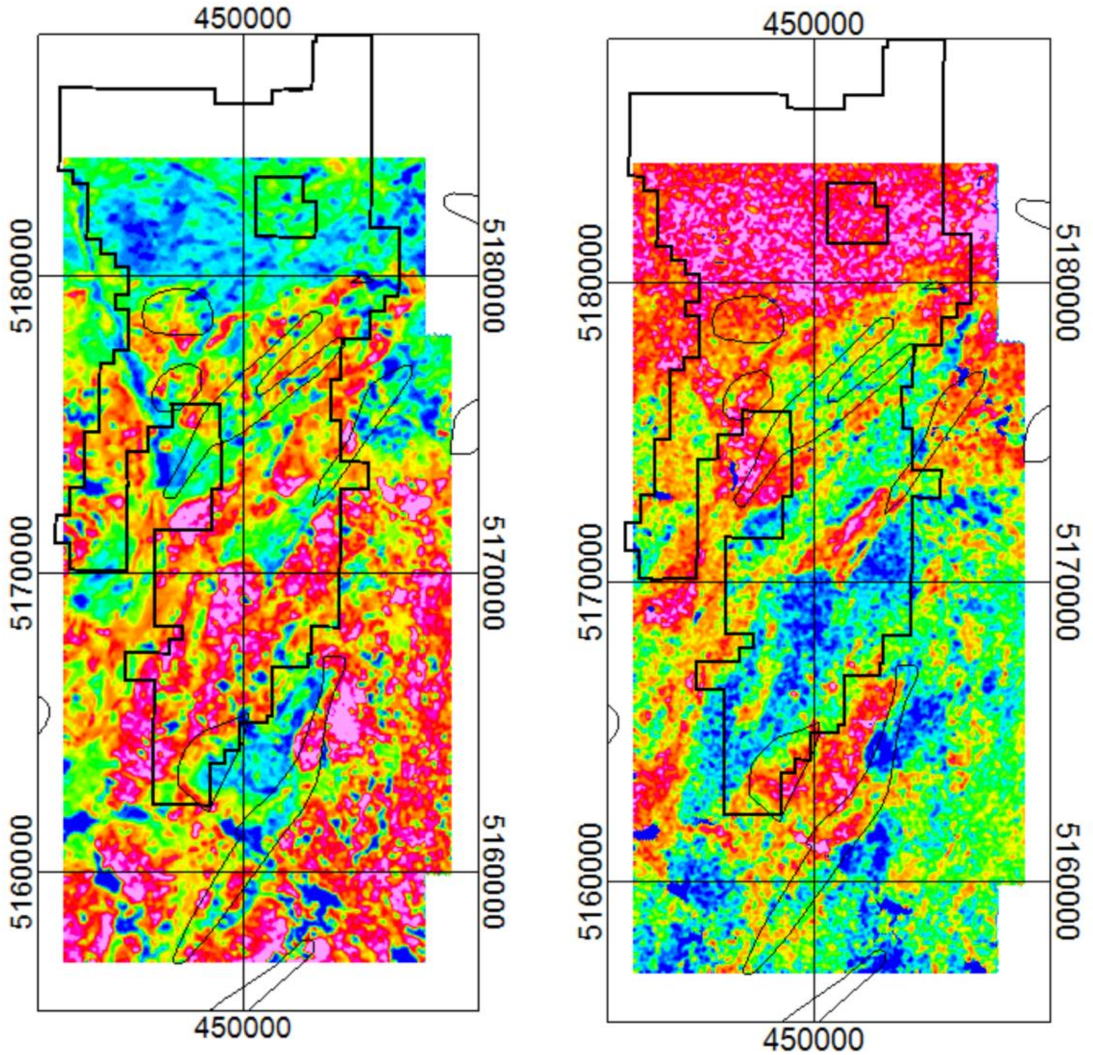


Figure 16. Iron Mask N and S blocks merged showing Radiometric data images and Nippissing sills from the OGS regional geology outlined in black. Left: Total Count (TC). Right: K/Th ratio.

As expected the Nippissing diabase's show generally lower TC response however this is strongly overprinted by topo and Hydrological features. Higher K/Th ratio can be an indicator of hydrothermal activity/alteration with K enrichment and Th as a relatively immobile element.

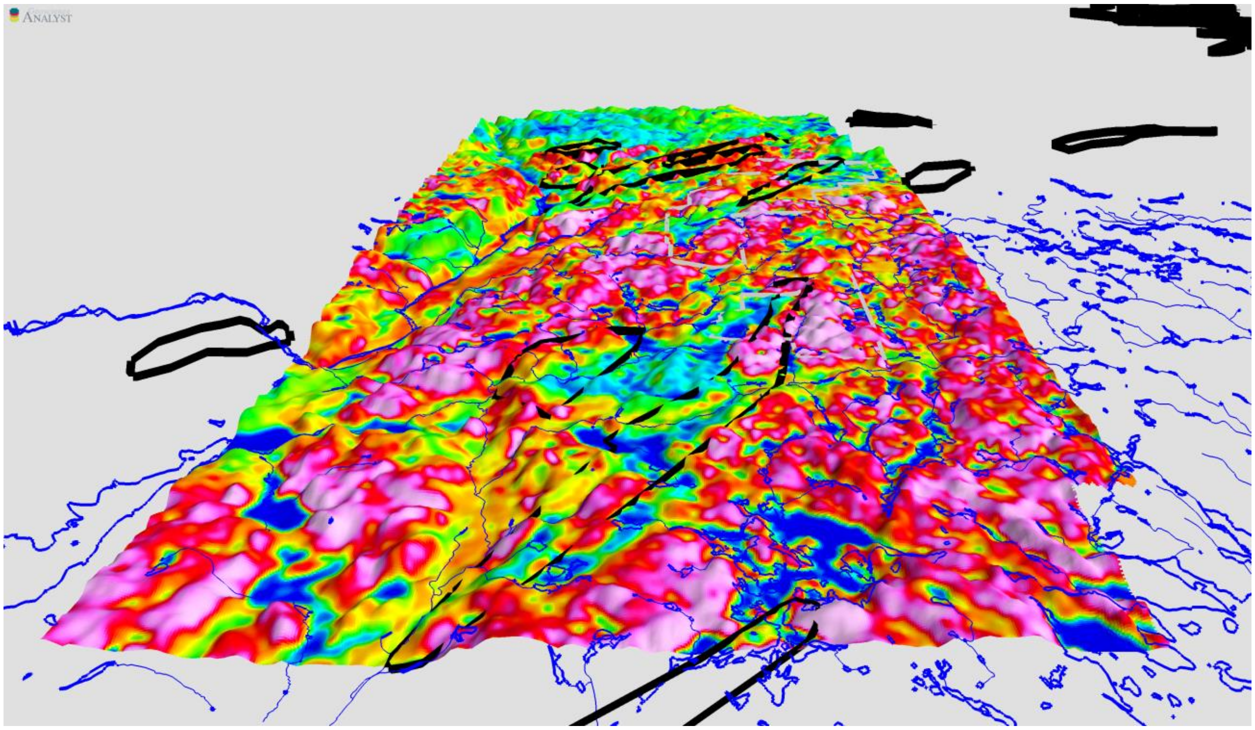


Figure 17. Total Count TC Draped on Topo with ND outline with 5x vertical exaggeration.

The gamma rays detected in radiometric surveys only penetrate to surface from about 0.5 m into the ground so radiometric surveys are sensitive to near surface conditions and topography. Gamma rays are also blocked by water and so wet areas show up as areas of low signal. In spite of these limitations radiometric surveys are very sensitive to surface lithology or soil type. As shown in Figure 21 the TC Radiometric data is strongly, but not only dependent on topography.

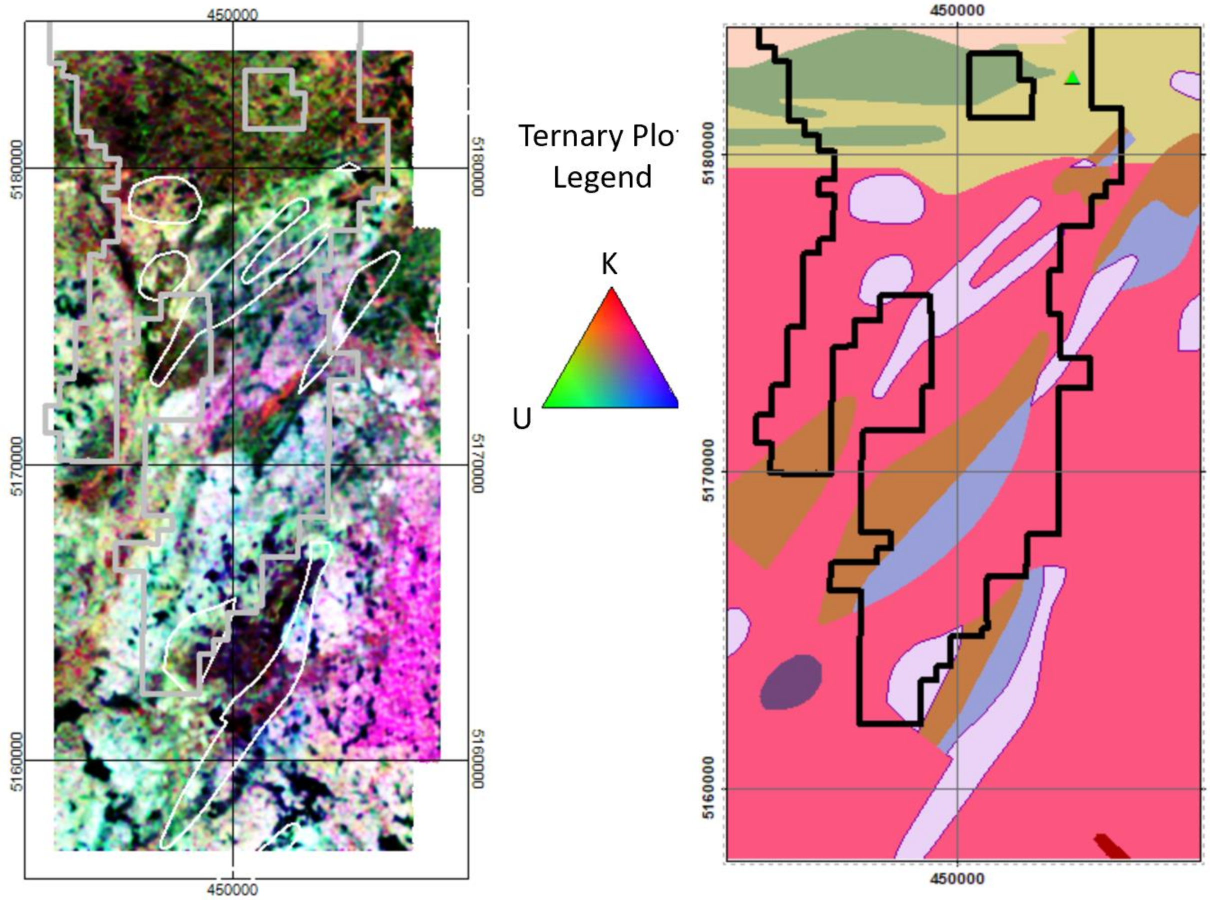


Figure 18. Iron Mask N and S blocks merged. Left: Radiometrics Ternary RGB = K-U-Th and Nippissing sills outlined in white. Right: OGS geology and property outlines.

White and pink areas in the Ternary image are likely to be granites and higher K granites, respectively. Green is likely to be metasediments with higher U content. Higher K (red) ratio can be an indicator of hydrothermal activity/alteration with K enrichment. Wet areas and M/UM rocks are black (no gamma ray response).

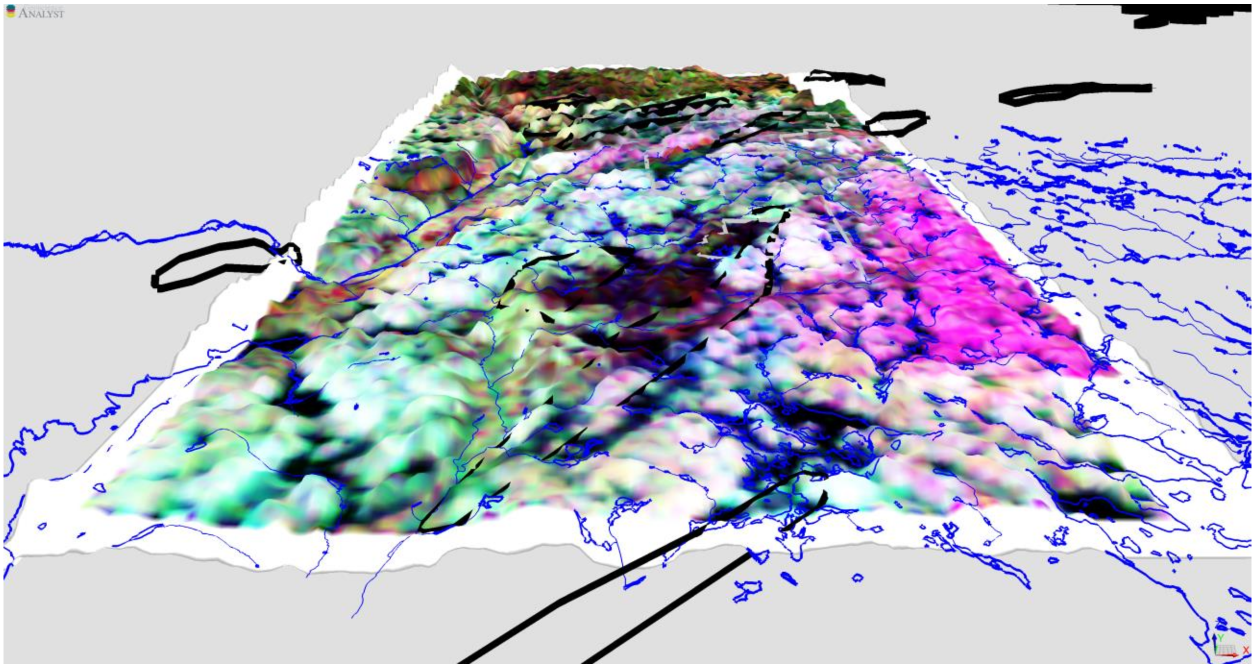


Figure 19. Radiometrics (Ternary RGB = K-U-Th) and Nippissing sills (in black) with lakes and streams in blue, draped on Topo.

3.3 Iron Mask Area AEM: Aerotem and VTEM data Review and Anomaly Picks

Iron Mask Area AEM survey were reviewed and results are summarized in Figure 19. The AEM survey data were received from Wallbridge Mining Company Ltd as part of a data exchange. There was no AEM coverage available over the North block.

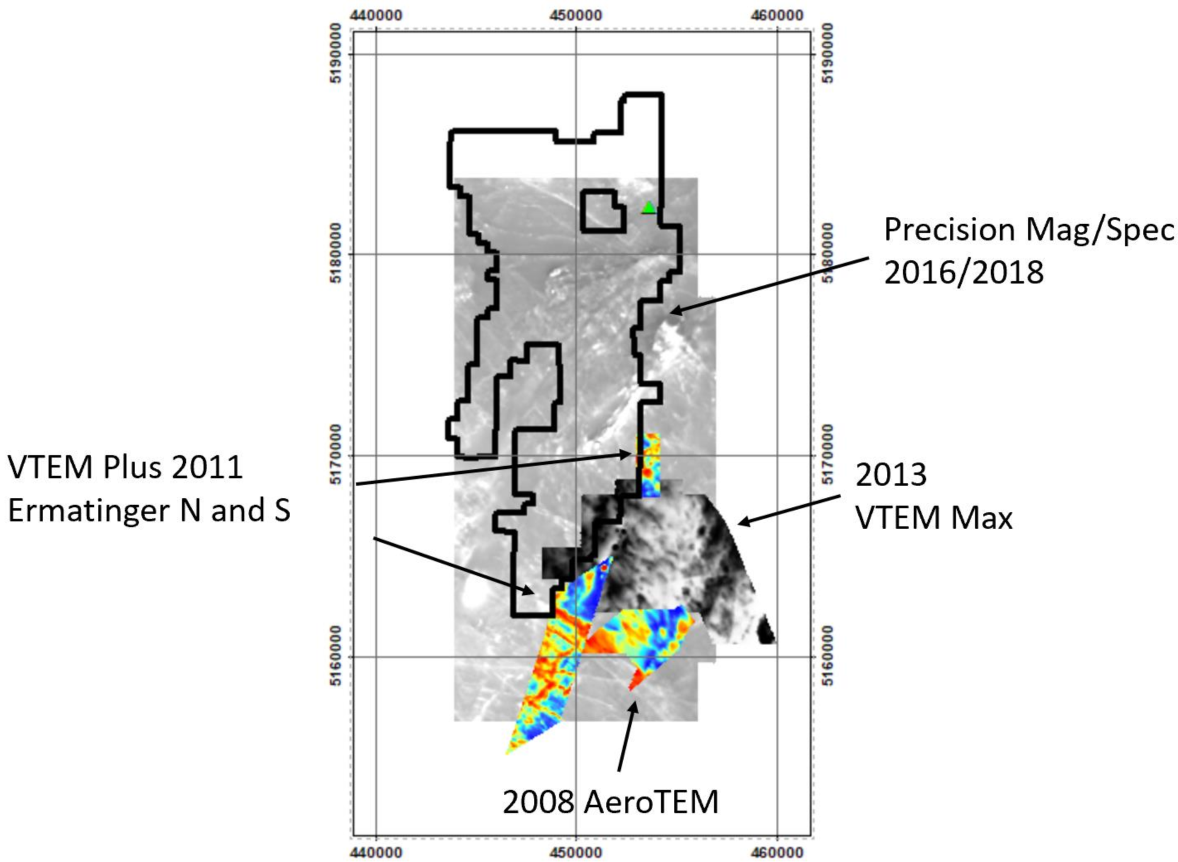


Figure 20. Wallbridge Iron mask area showing AEM survey areas as colour images

3.3.1 2013 VTEM Max

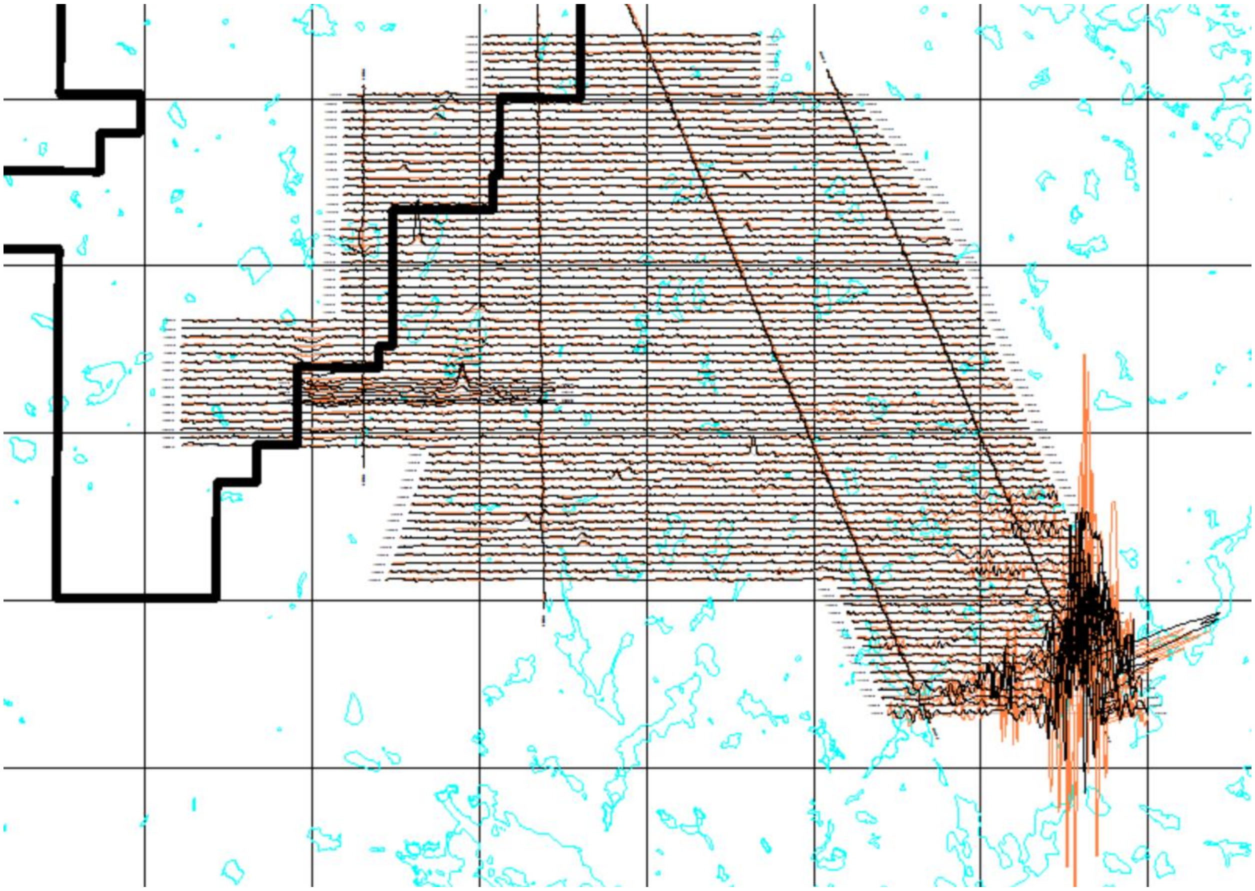


Figure 21. VTEM 2013 Mid to Late Time Channels SFz20 (black profile), SFz30 (orange) with lakes

As shown in Figure 25 there is strong cultural interference in the SE corner of the survey area and only a few discrete anomalies in these Mid to Late Time Channels.

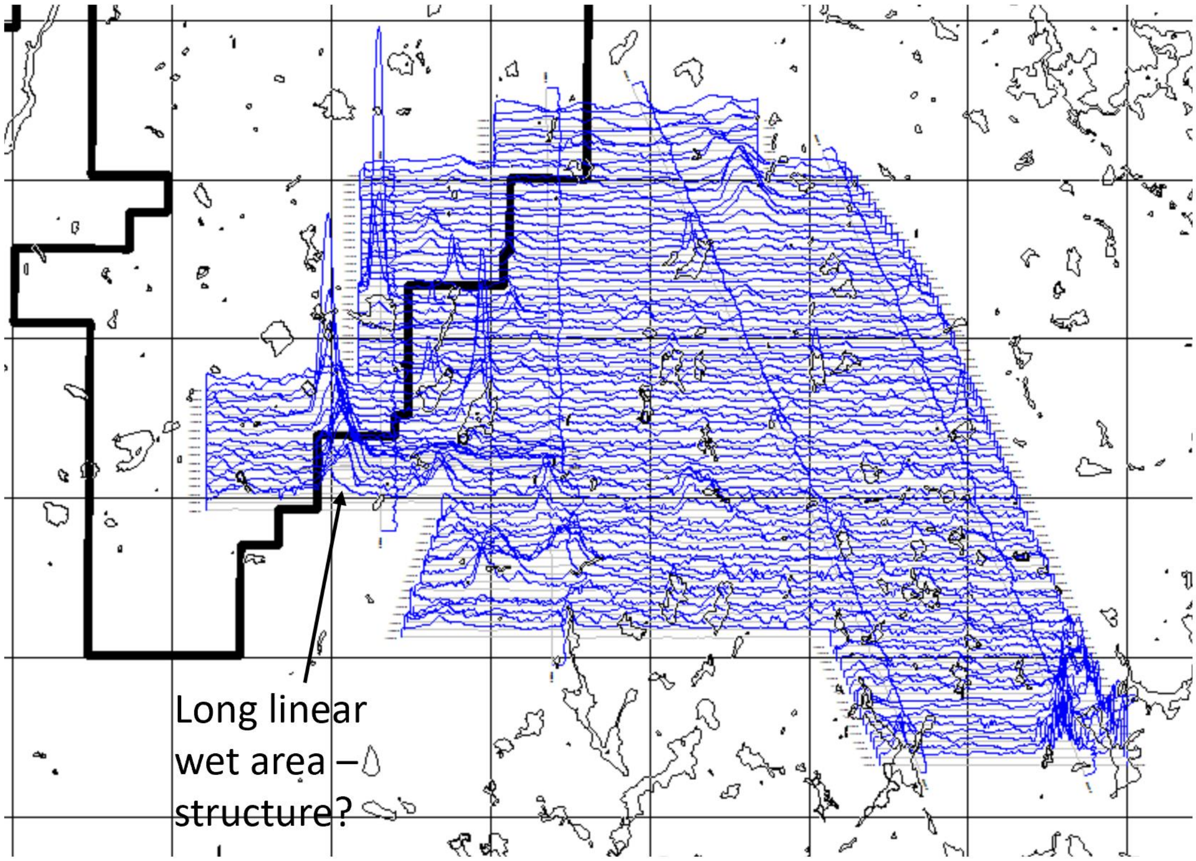


Figure 22. VTEM 2013 early time Channel SFz10 with lakes.

Strong early time SFz10 responses are mainly lakes and swamps

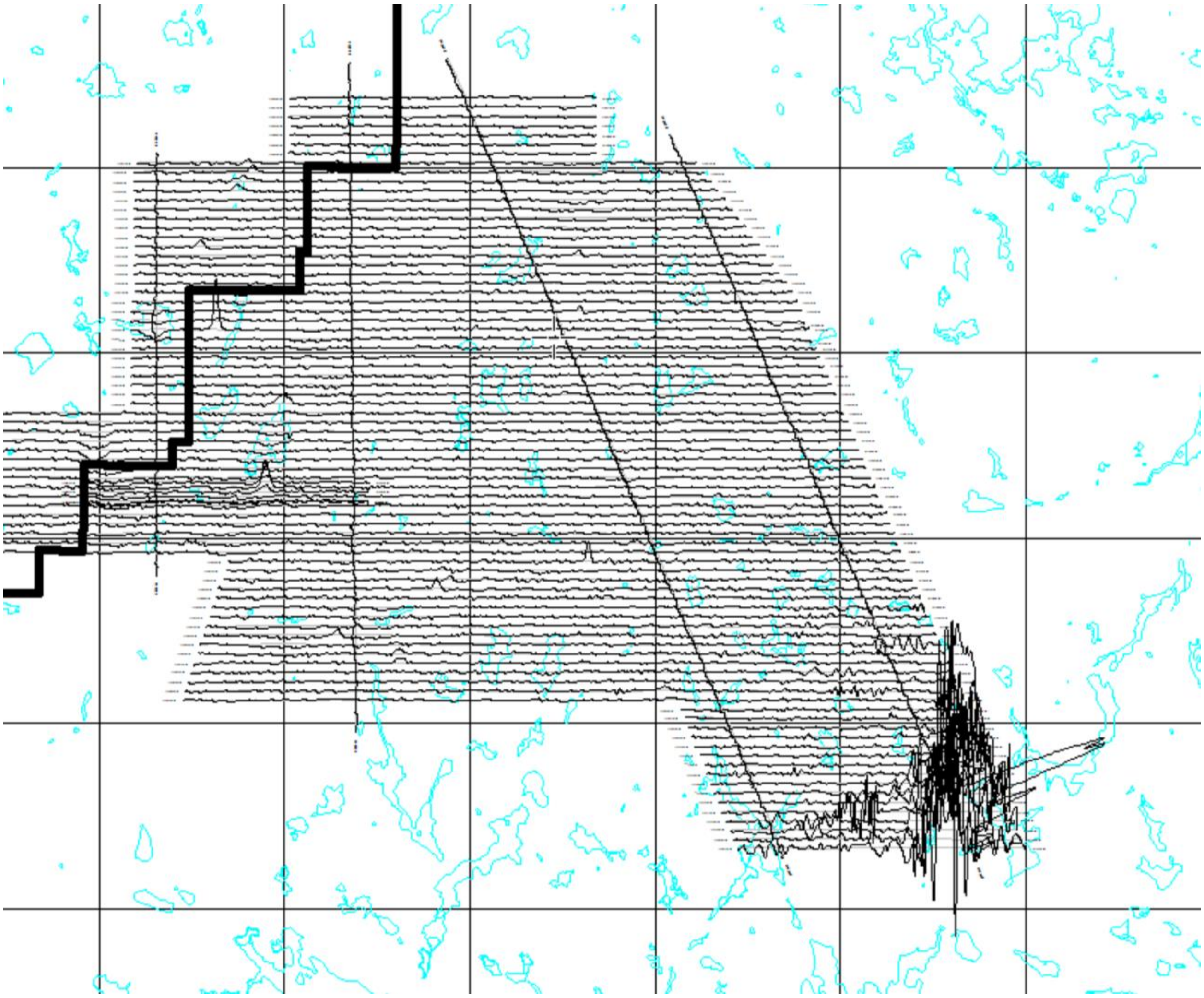


Figure 23. VTEM 2013 Intermediate time Channel SFz20 plotted with a larger vertical scale shows the few discrete anomalies more clearly.

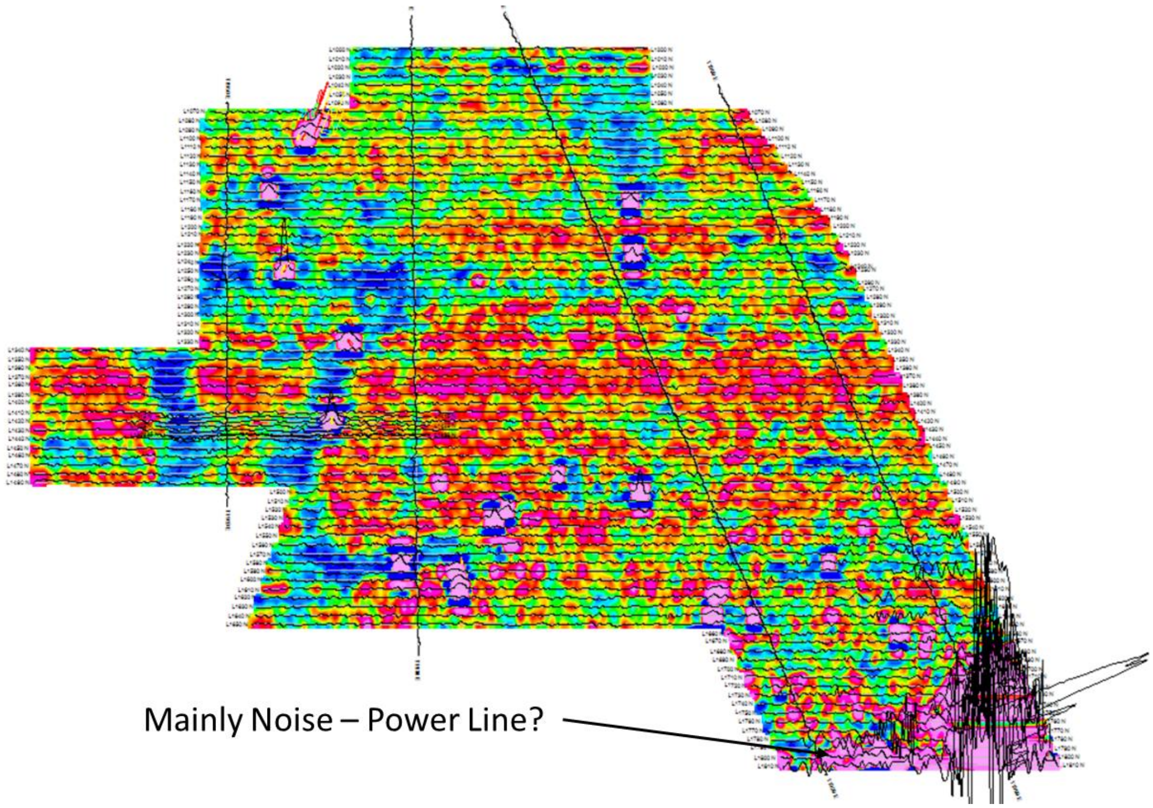


Figure 24. VTEM 2013 Channel SFz20 and previous Maxwell plates on Tau Sf. Areas of higher tau (pink) highlght discrete anomalies with higher conductance.

In Time Domain (TEM) or pulse type EM surveys, Tau is the rate of decay, in milliseconds, of the secondary EM signal and is inversely related to the quality (conductance) and size of a conductor. The Tau measured from the measured dB/dt data (Tau Sf) is the rate of decay of the EM signal at the receiver.

Tau is a measure of the time it takes for the secondary currents in the target conductor to decay. The slower the decay and the longer the tau the better the conductor. B field data can be understood as an integration of the observed dB/dt data over the measurement time window. B field data is designed to enhance very slowly decaying responses from very strong conductors and it also suppresses responses from weak anomalies typical of conductive overburden or weakly conductive host rocks.

The Tau parameter is independent of the measuring system and the depth to the conductive source. This is in contrast to the measured dB/dt data profile data. The amplitude of these data is proportional to the size and quality of a conductor but is much larger for shallow sources. Also many data channels have to be viewed at once to determine conductor quality. Because tau is independent of target depth and can be colour contoured as a single value it is very useful for quickly scanning TEM data sets for discrete conductors. It also can highlight deep large good conductors that may not be that obvious in the profile data due to their broad low amplitude responses in the profile data.

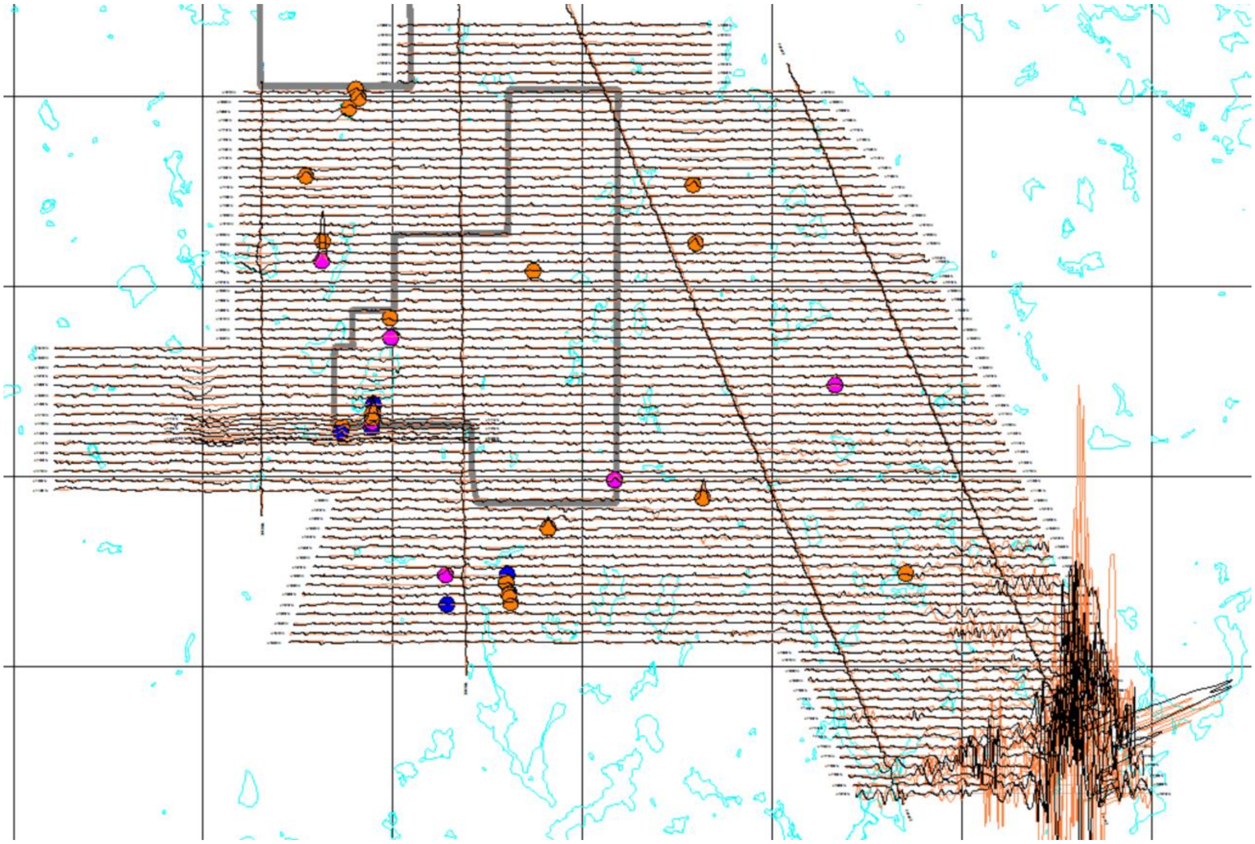


Figure 25. VTEM 2013 Mid to Late Time Channels SFz20 (black profile), SFz30 (orange) and current 2018 VTEM anomaly picks.

3.3.2 VTEM Plus 2011 Ermatinger N and S

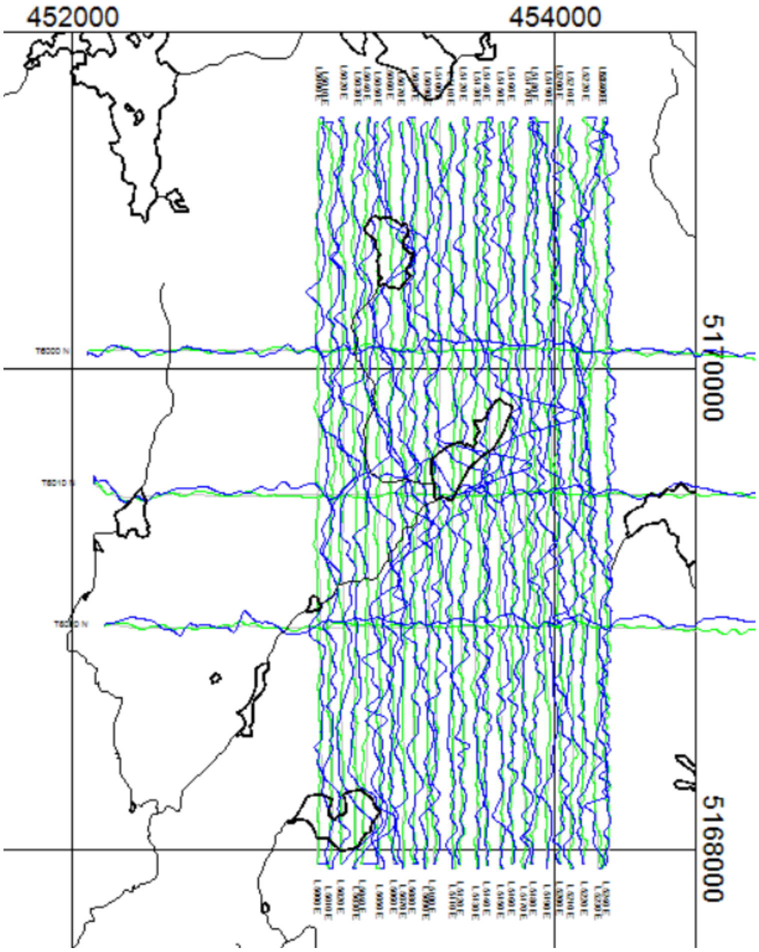


Figure 26. VTEM Plus Ermatinger N. SFz[15]-blue and SFz[25]-green with Lakes and drainages - black line in background.

No significant AEM anomalies were located in the VTEM Plus Ermatinger N AEM survey. All anomalies are weak, Ch15 only, and associated with lakes

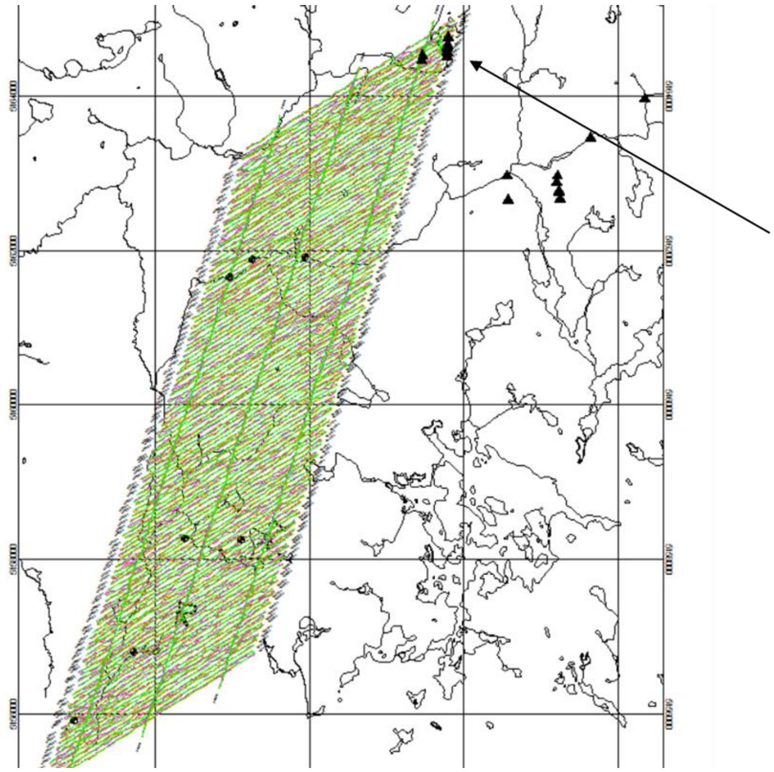


Figure 27. Int to Late time channels -SFz 25-green, 35-orange, 45-pink.

No well defined discrete good conductors are apparent in the VTEM Plus Ermatinger survey, except for anomalies previously picked from Iron Mask VTEM 2013 in NE corner . A few possible additional weak to moderate conductors were picked by Geotech in the southern part of the survery area, but these may be correlated noise.

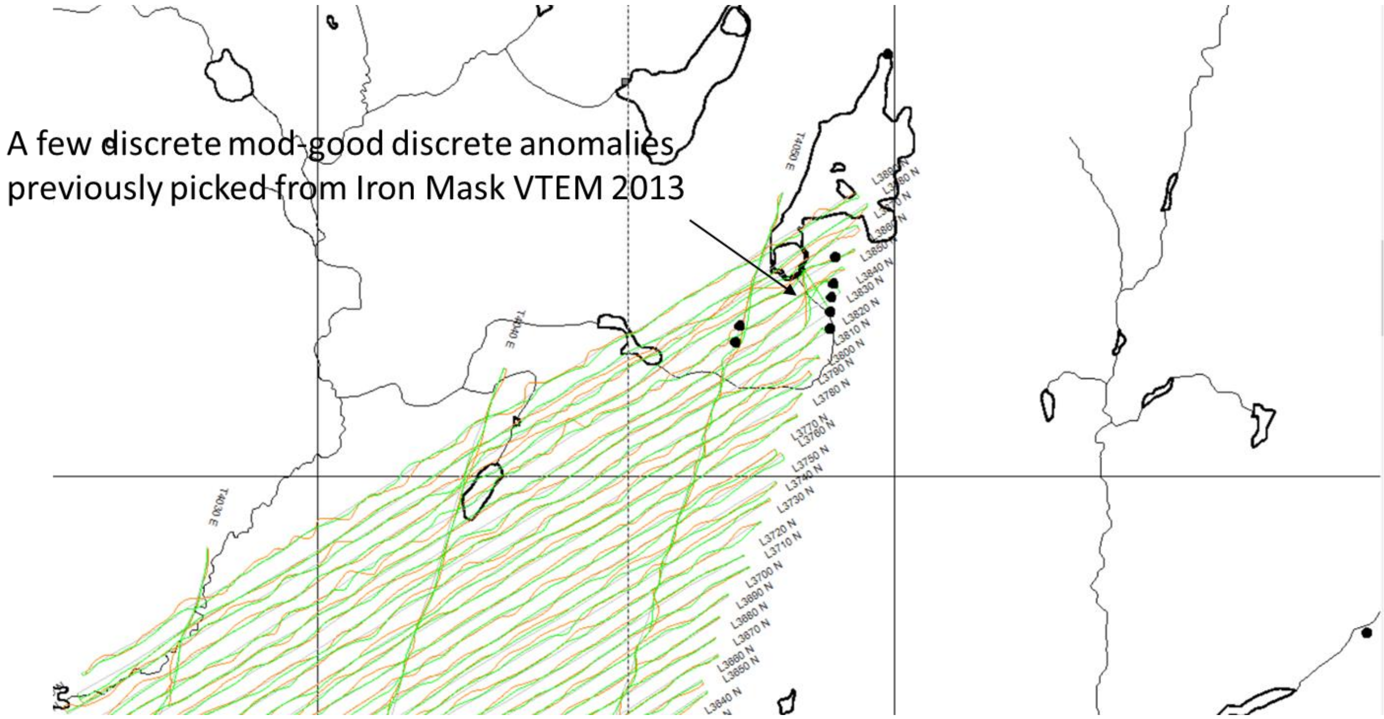


Figure 28. Zoom to NE corner VTEM Plus Ermatinger S. SFz profiles Chan 25-green, 35-orange.

There werw no new, well defined, discrete good conductors located in the VTEM Plus Ermatinger S survey. Anomalies previously picked from the Iron Mask VTEM 2013 which overlaps the NE corner of this survey are shown in Figure 34

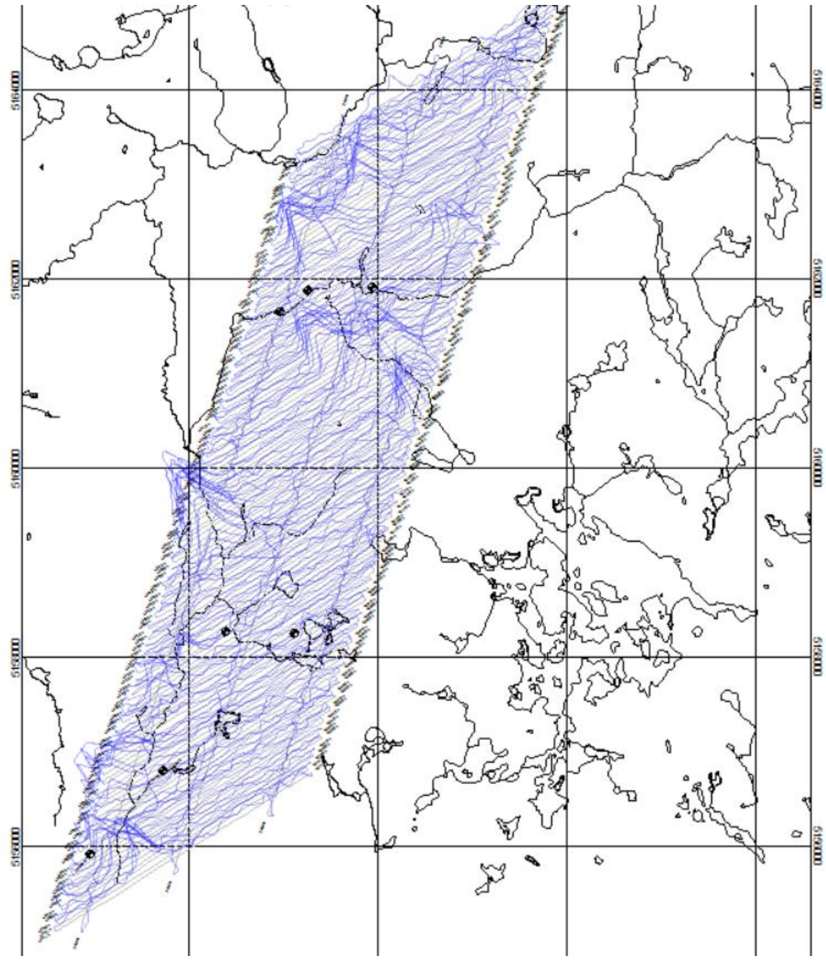


Figure 29. VTEM Plus Ermatinger S. Early Time SFz[15]-blue.

All large amplitude anomalies are weak, Ch15 only, and associated with lakes or swamps.

No new well defined discrete good conductors. A few possible weak to moderate conductors were picked by Geotech but these may be due to correlated noise.

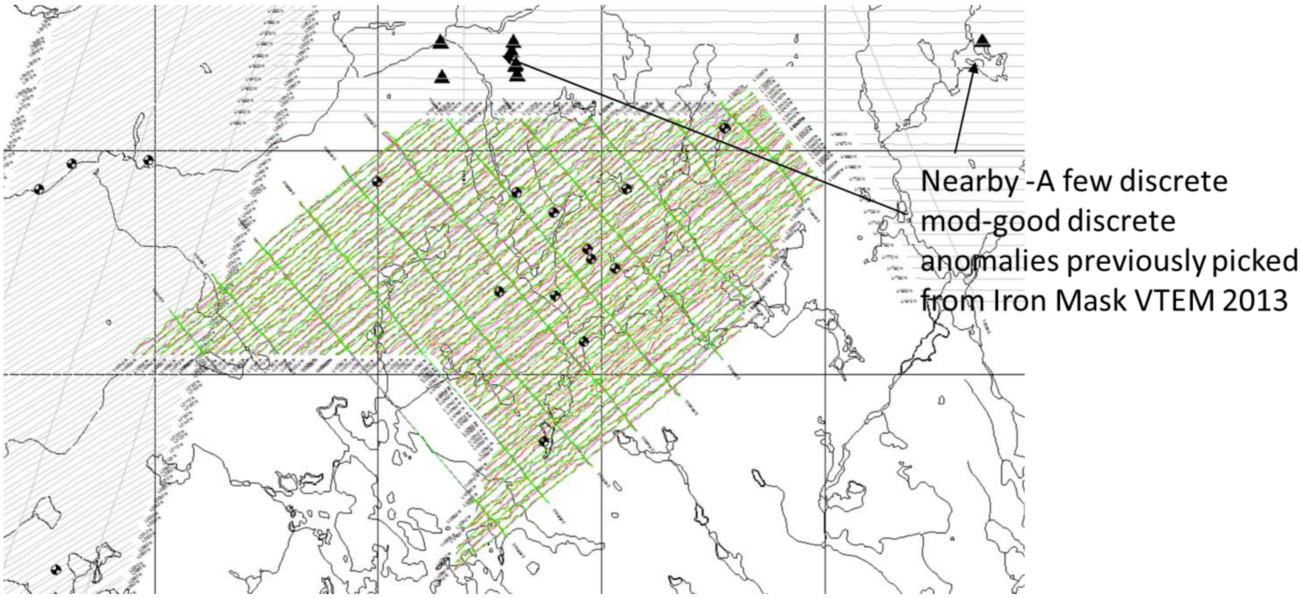


Figure 30. Aerotem 2008 Ermatinger, Channels Zoff 5 (Early Time)-green, Zoff10-orange, Zoff15 (Late Time)-pink.

There are no new well defined discrete good conductors in the AreoTEM 2008 Ermatinger AEM data as shown in Figure 38. A few possible weak to moderate conductors were picked by Aerotem but these may be due to correlated noise.

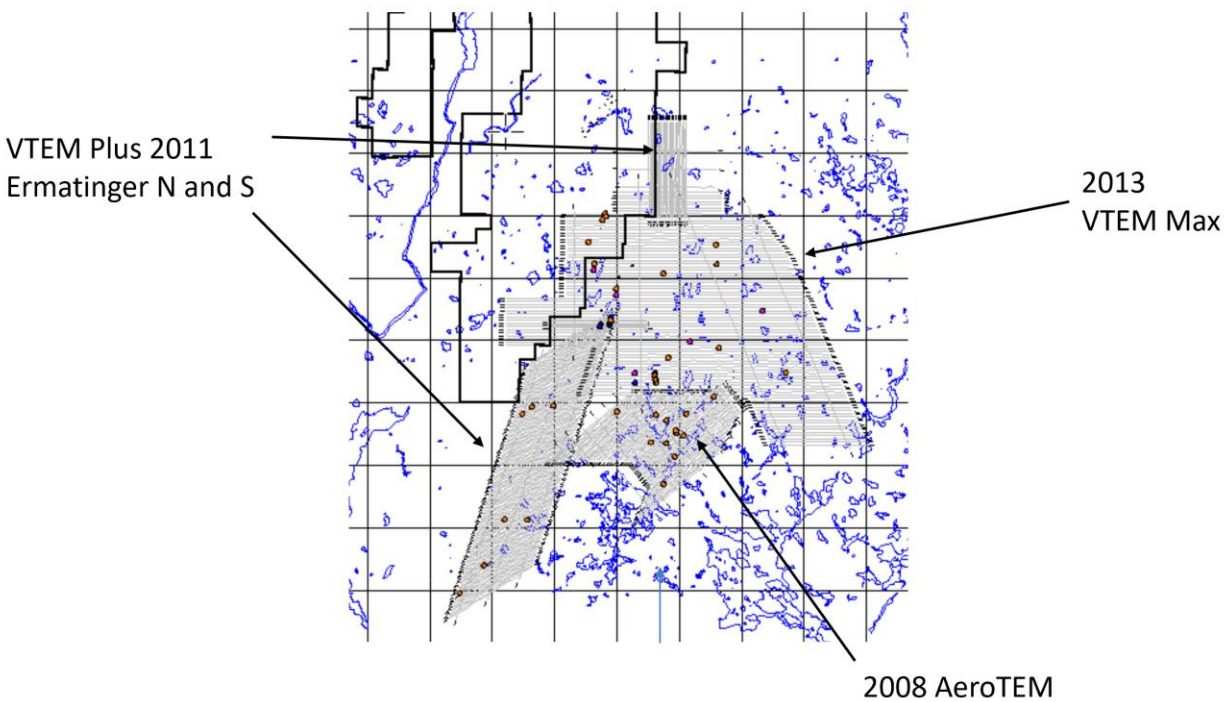


Figure 31. Iron Mask area. AEM surveys - Aerotem and VTEM with AK 2018 AEM Picks. Pink strong, Orange mod, blue weak conductance. Source: Ermatinger VTEM N&S+IM+Aerotem Compile.

Most AEM anomaly picks outside the 2013 VTEM area have low amplitude and poor reliability.

4 Follow-up work by BMR: Ground Geophysics and Drilling

Ground Geophysics

Iron Mask North

- Q2372b-IP
- Q2372b-MaxMin
- Q2555-CobaltShaft-3DIP

Iron Mask South

- Q2465-Cobra-IP-Mag-GPS

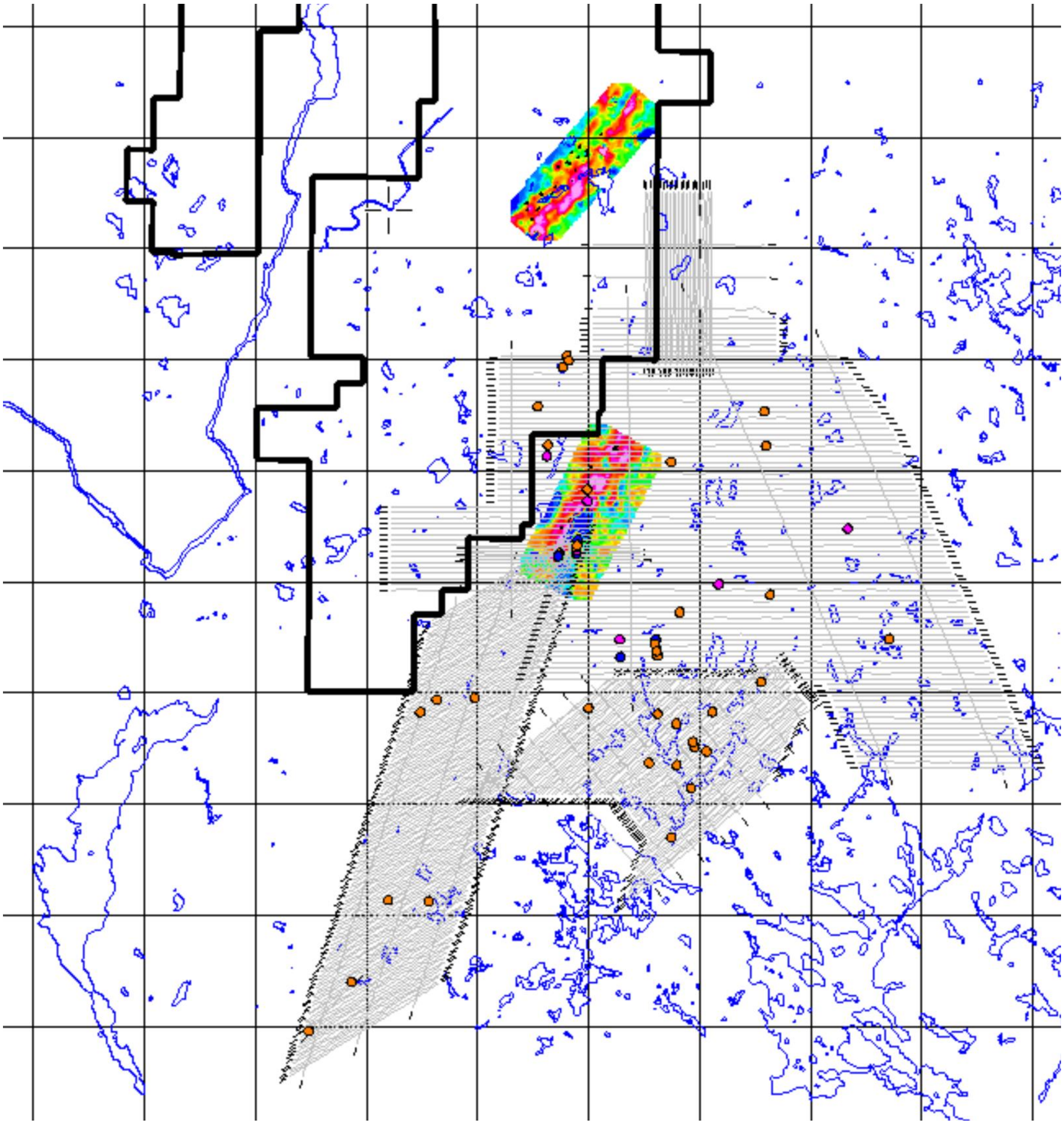


Figure 32. Location of IM Ground Geophysics on AEM compilation.

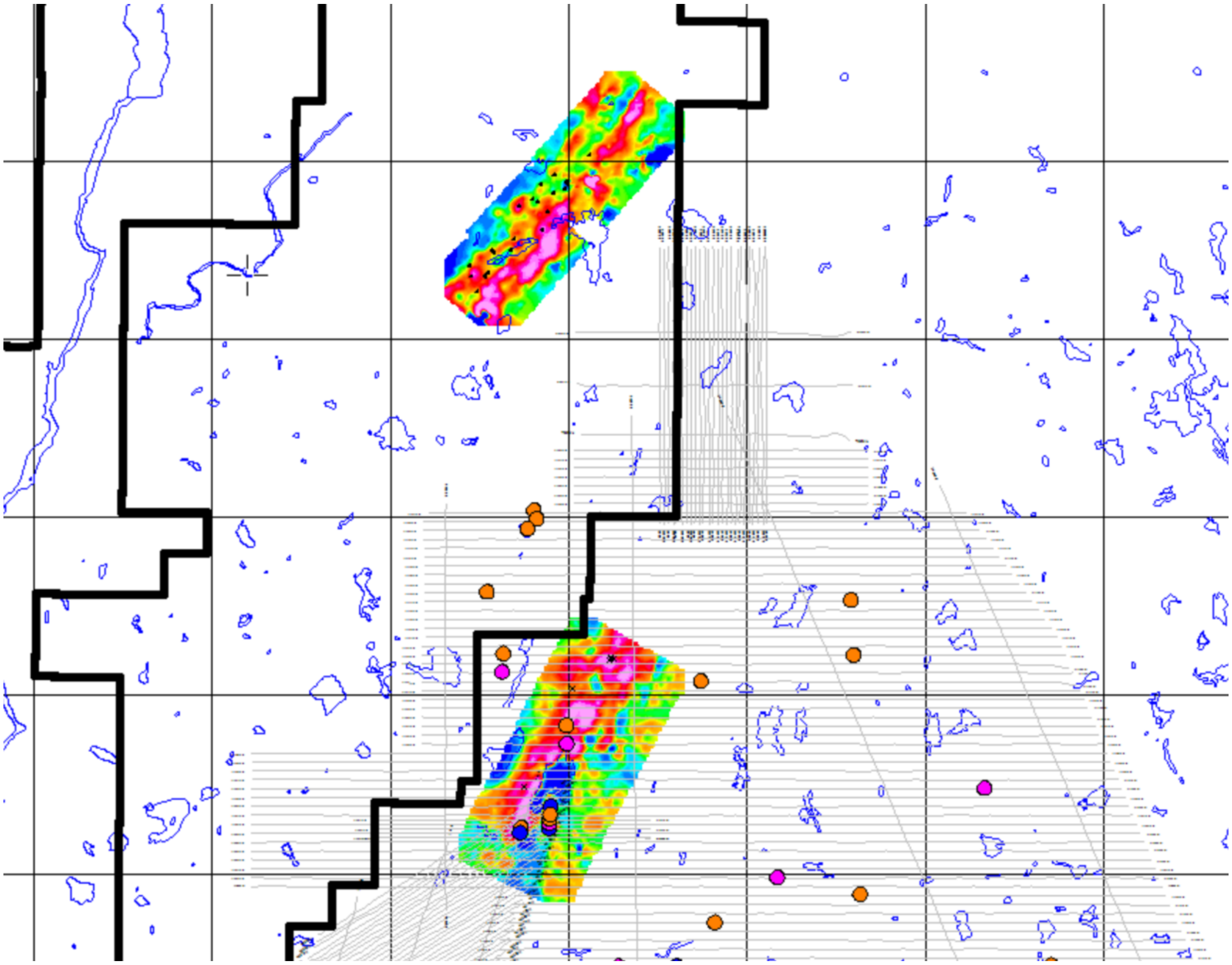
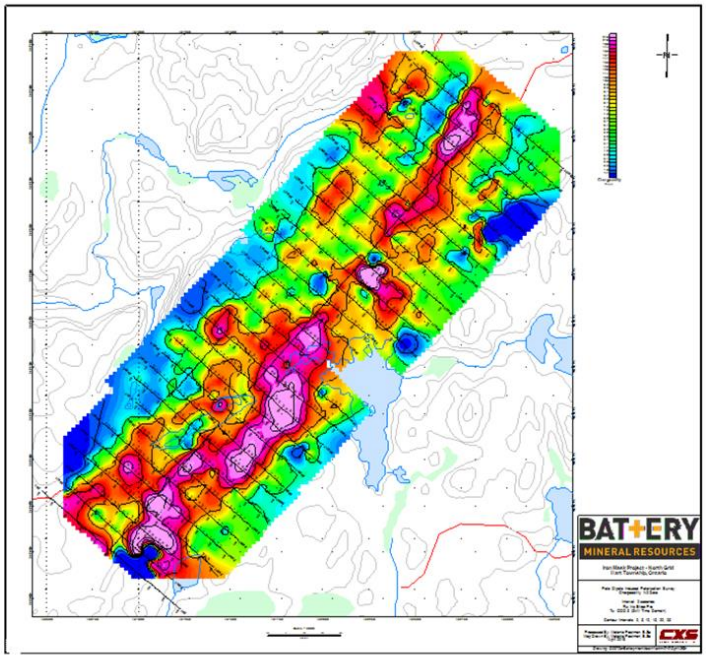


Figure 33. Zoom to Location of IM Ground Geophysics on AEM compilation.

Note that there is no AEM data over the N block.



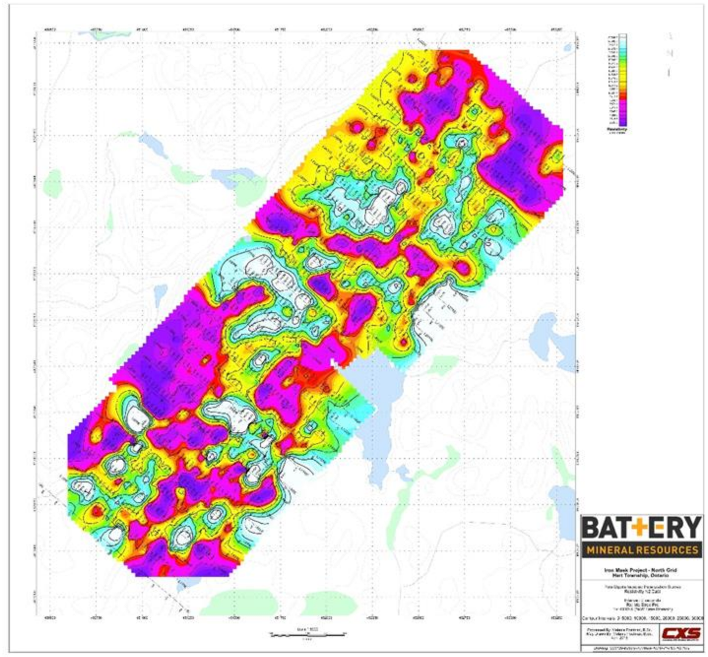


Figure 34. Iron Mask North IP Q2372b-Pole Dipole Left - IP N2, Right – Resistivity N2

Results from the Iron Mask North IP Q2372b-Pole Dipole data are shown in Figure 40. The figure shows IP and Resistivity results for N spacing N2. No inversions were done on the data. Inversions, which convert pseudosections to true depth are usually recommended for Pole Dipole array data but the location of raw data is OK for N1 and maybe N2.

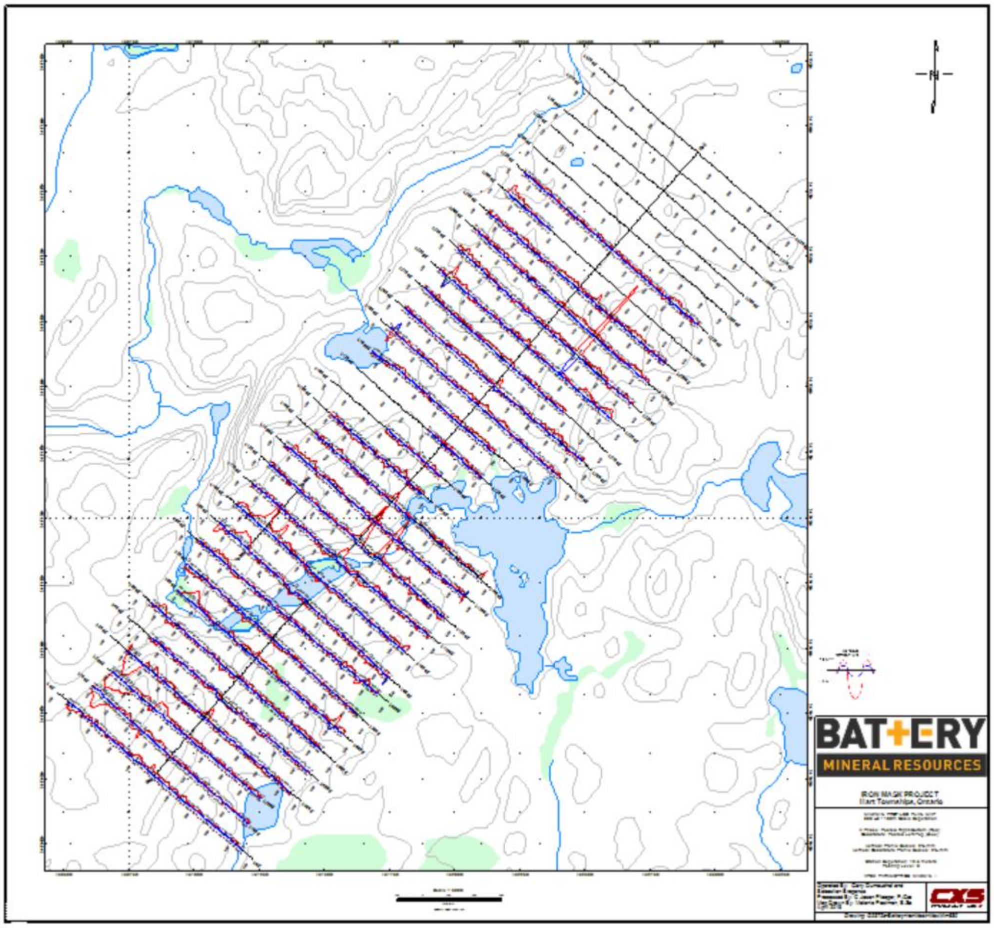


Figure 35. Iron Mask North Q2372b- HLEM MaxMin.

There were no significant HLEM (Horizontal Loop EM) anomalies in the Iron Mask North HLEM survey.

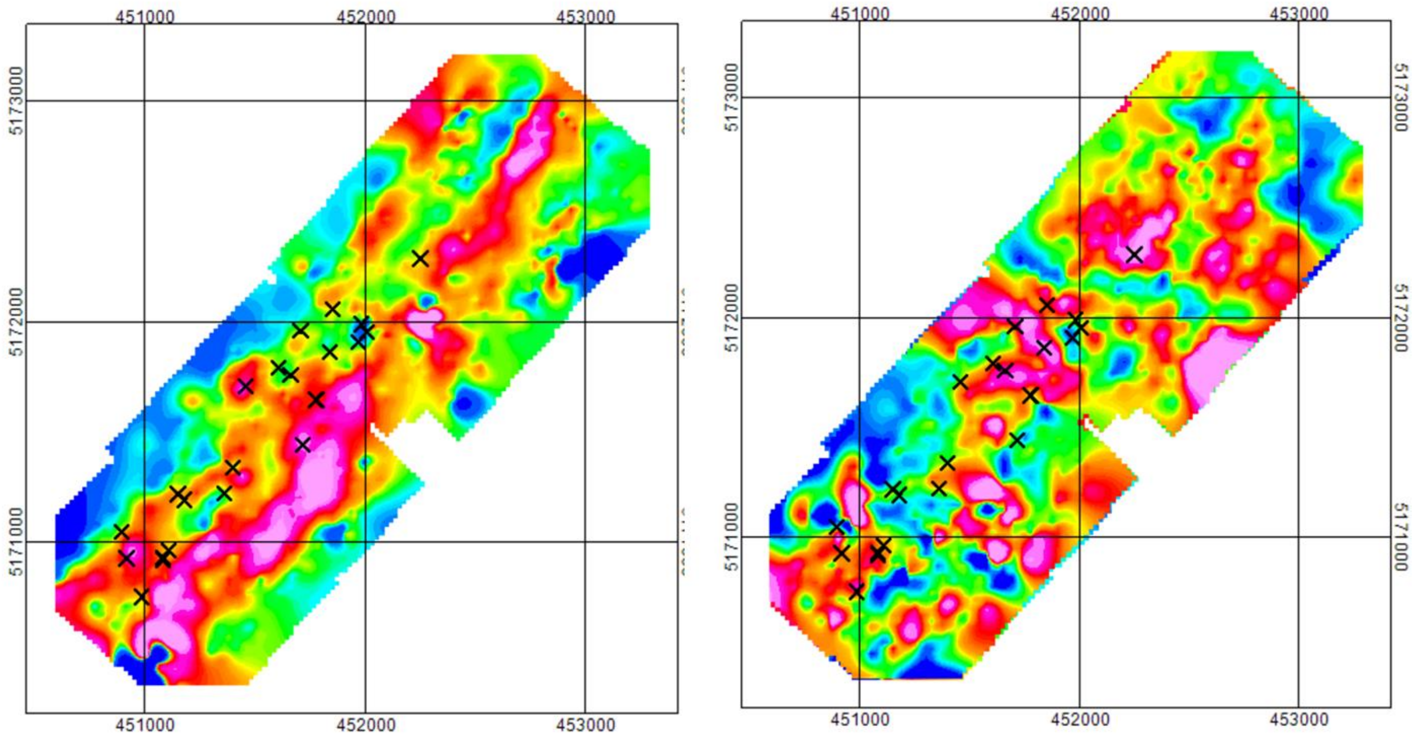
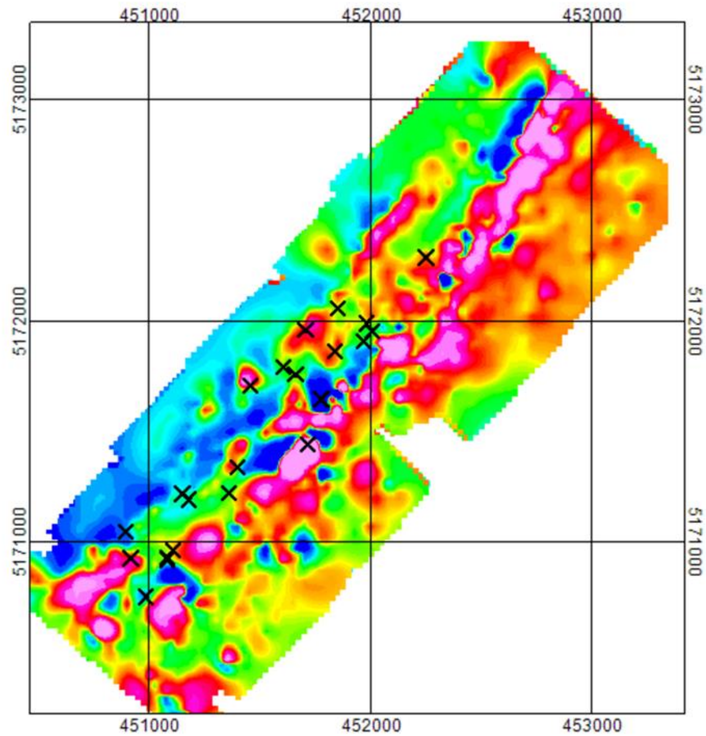


Figure 36. Iron Mask North BMR Drilling x over Q2372 IP/Resistivity. Left: IP-N2. Right: Res-N2.



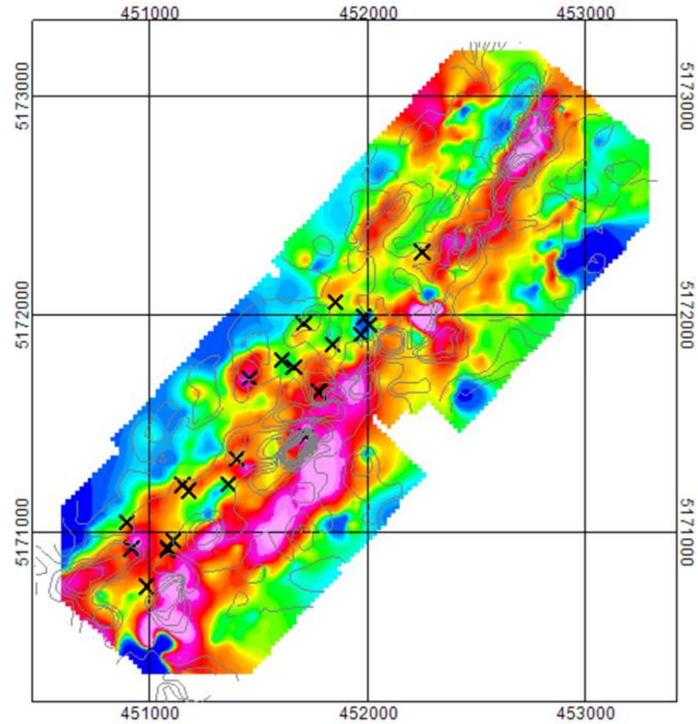


Figure 37. IM North Drilling marked by "x"s over Q2372 ground data. Left: Ground Magnetics. Right: Ground Magnetics contours over IP-N2.

Following the HLEM, magnetic and conventional Pole- Dipole IP surveys, over the Q2372b grid a 3DIP survey was carried out over the Cobalt Shaft area on the SW corner of the Q2372b grid. The results are shown in Figures 44 to 46.

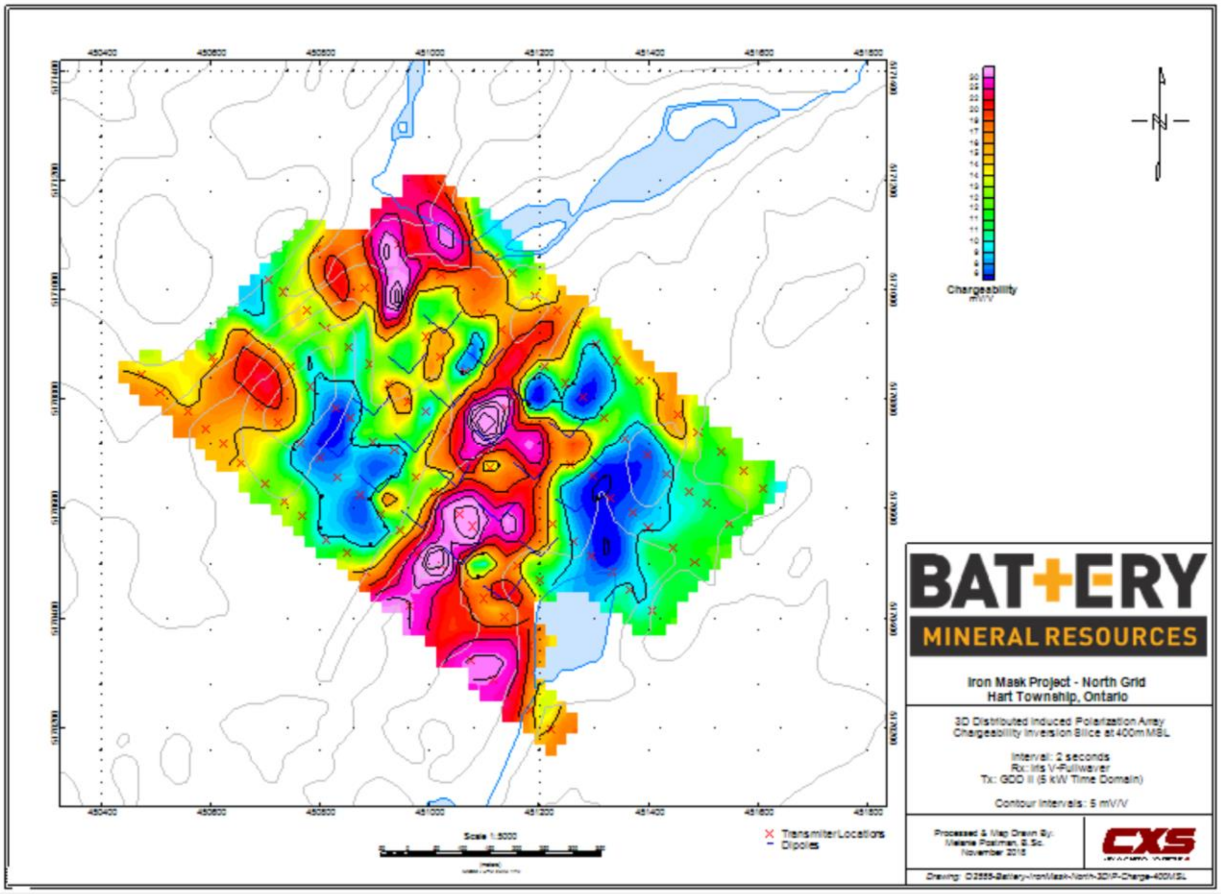


Figure 38. Q2555-IronMask-North-3 Cobalt Shaft area IP-Chargeability-400MSL plan map = ~-100m depth below surface.

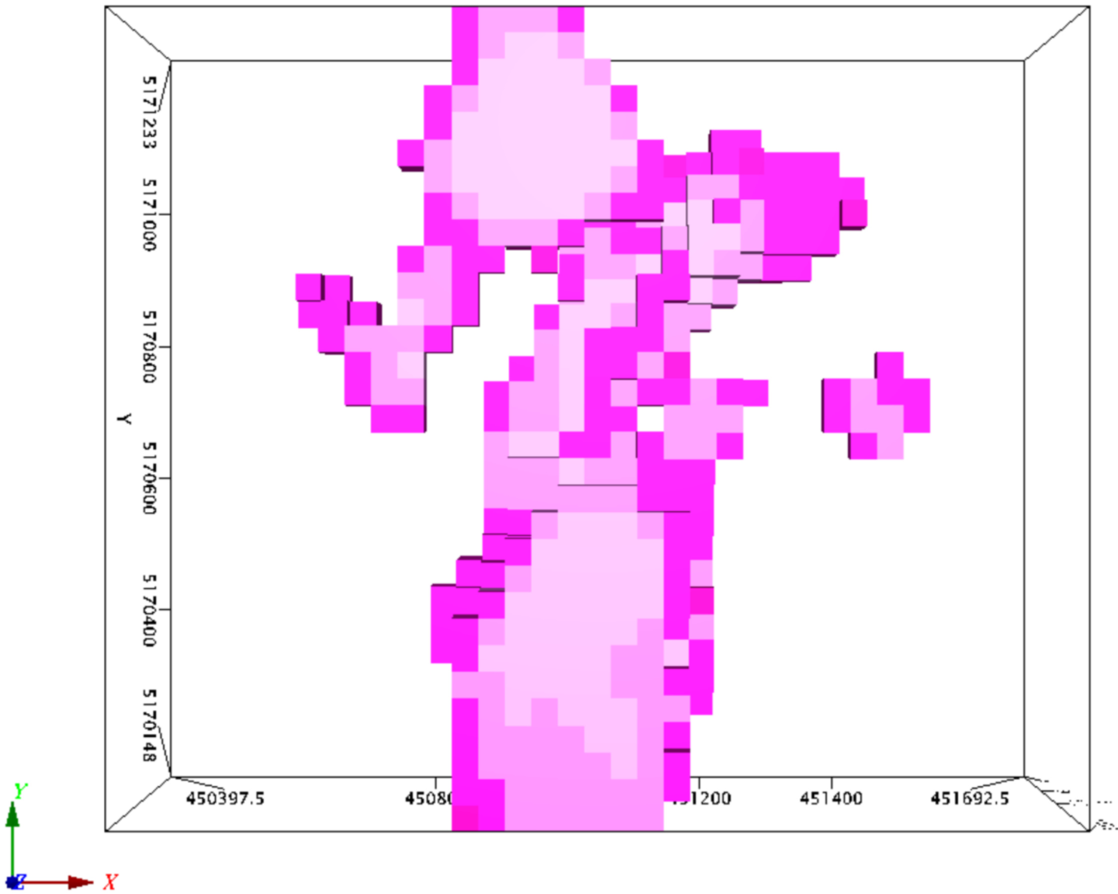


Figure 39. Q2555-CobaltShaft-Detail 3DIP volume with a Low cut-off of 20msec.

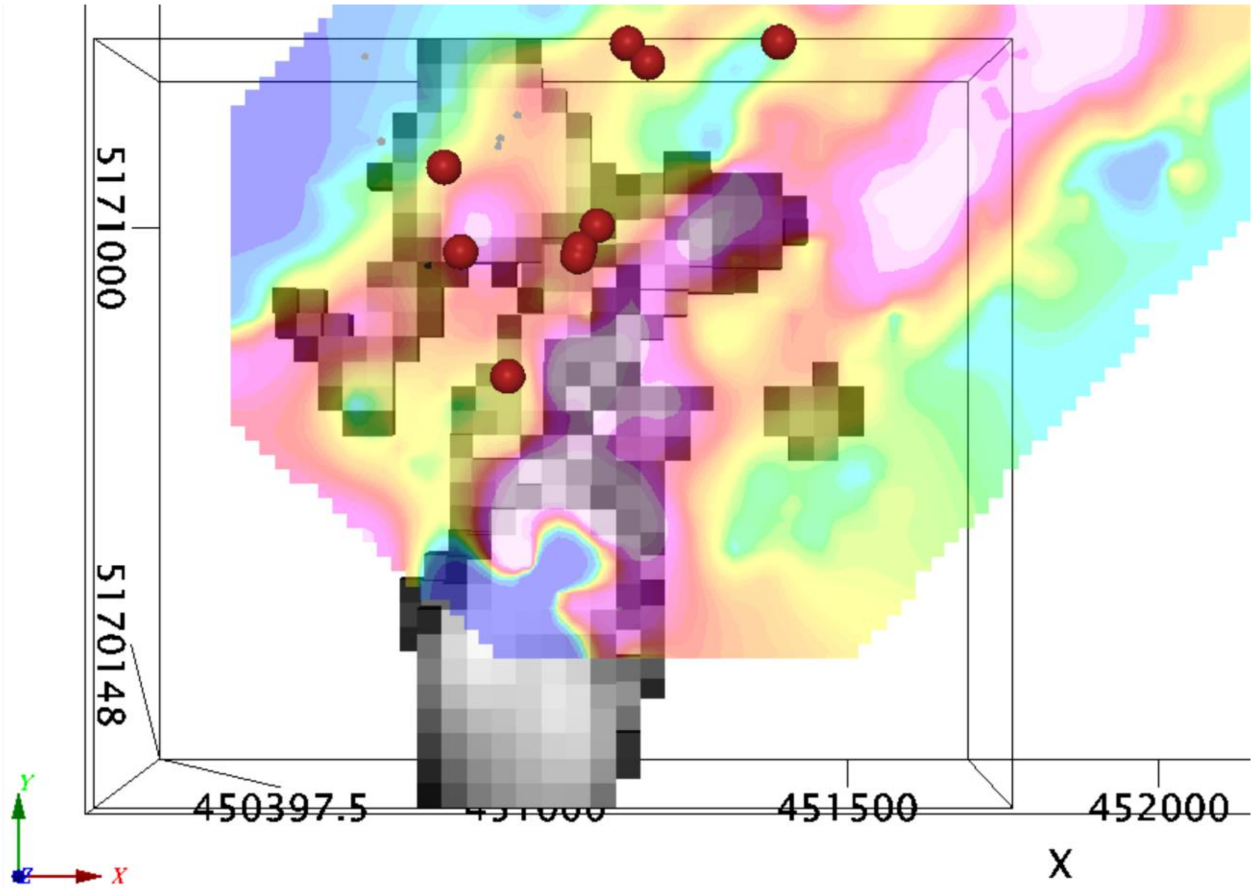


Figure 40. Q2555-CobaltShaft-Detail 3DIP Low cut 20msec (grey scale). Q2372IP-N2 (colour image) with Iron Mask North Drill hole collars.

As shown in Figure 46 there is a good correlation of the 3D IP with larger Pole Dipole IP survey. It is expected that the 3D IP would give a more accurate image of the distribution of IP-Chargeability and Resistivity at depth.

Iron Mask South

- Q2465-Cobra-IP-Mag-GPS

IP, magnetic and GPS positioning surveys were also conducted over the Cobra grid on the Iron Mask South block. The results are shown in Figures 47 to 49.

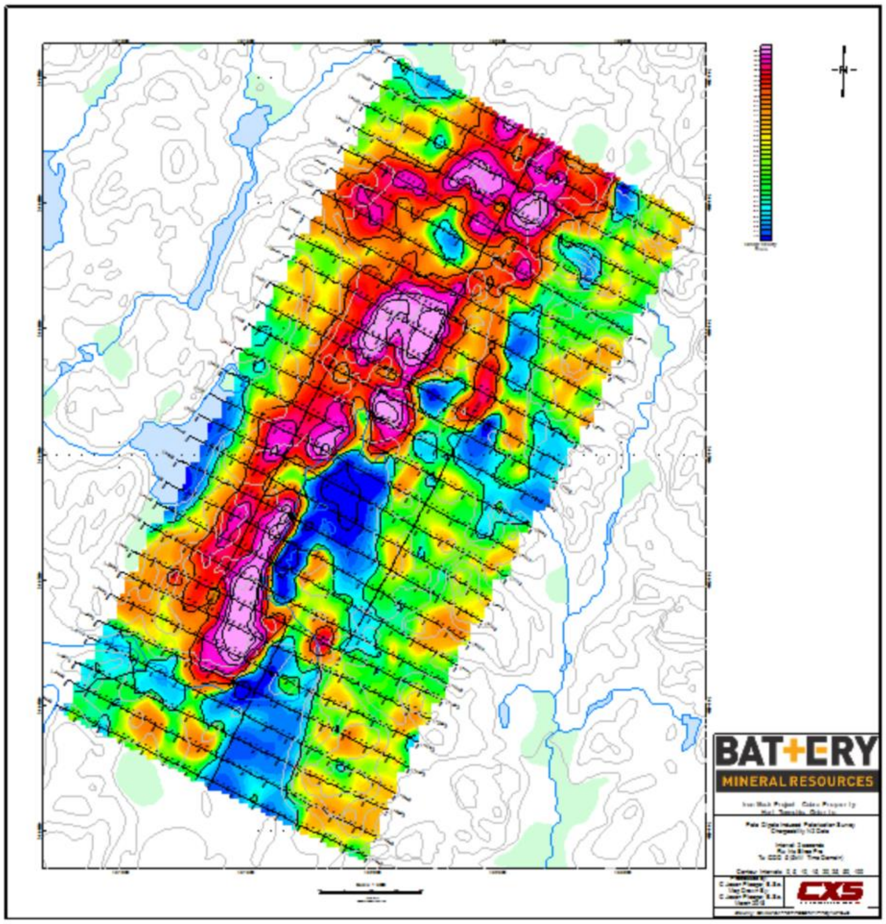


Figure 41. Iron Mask South Q2465-Battery-Cobra-IP-PDp-N2-Chg.

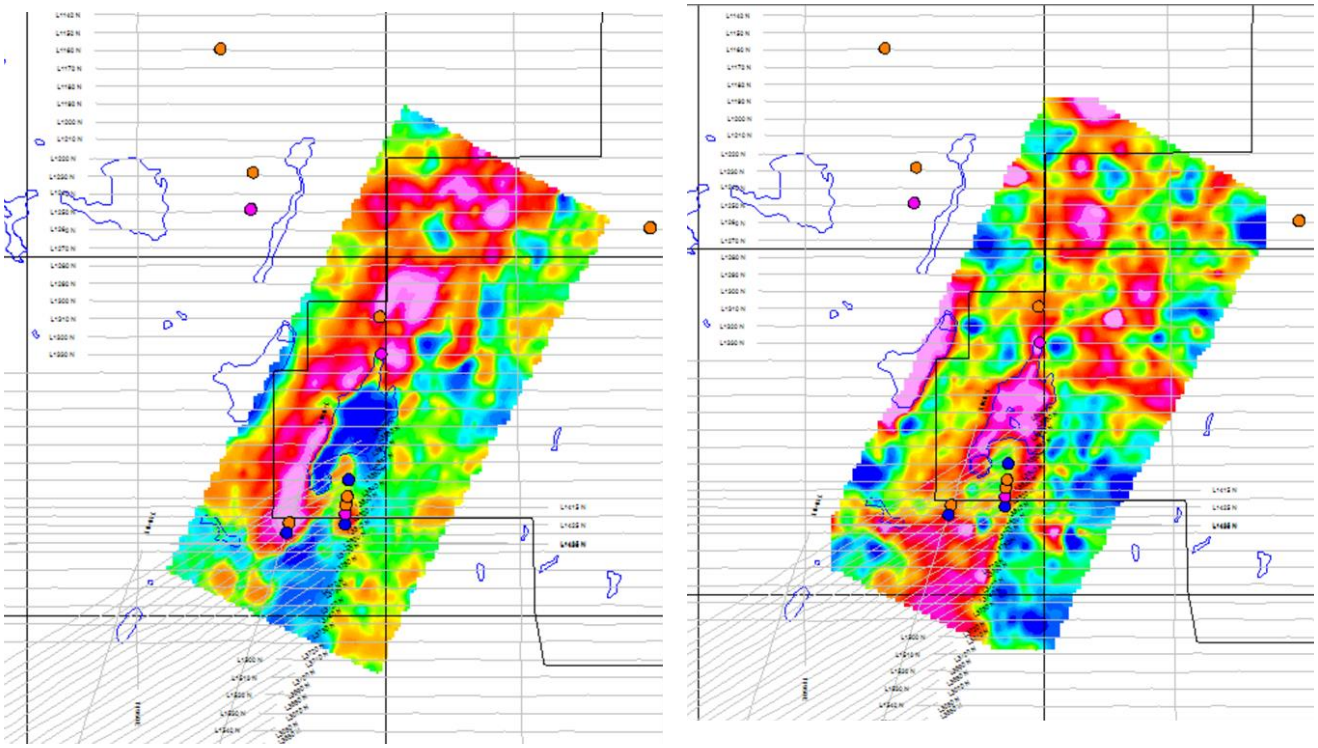


Figure 42. Iron MAsk Central Q2465-Battery-Cobra-IP-PDp-N2. Left: IP Red=high IP. Right: Resistivity Red=Low res. AEM anomalies coloured dots. Pink = Hi conductance.

As expected AEM conductivity anomalies and lakes correspond to Low Resistivity Values.

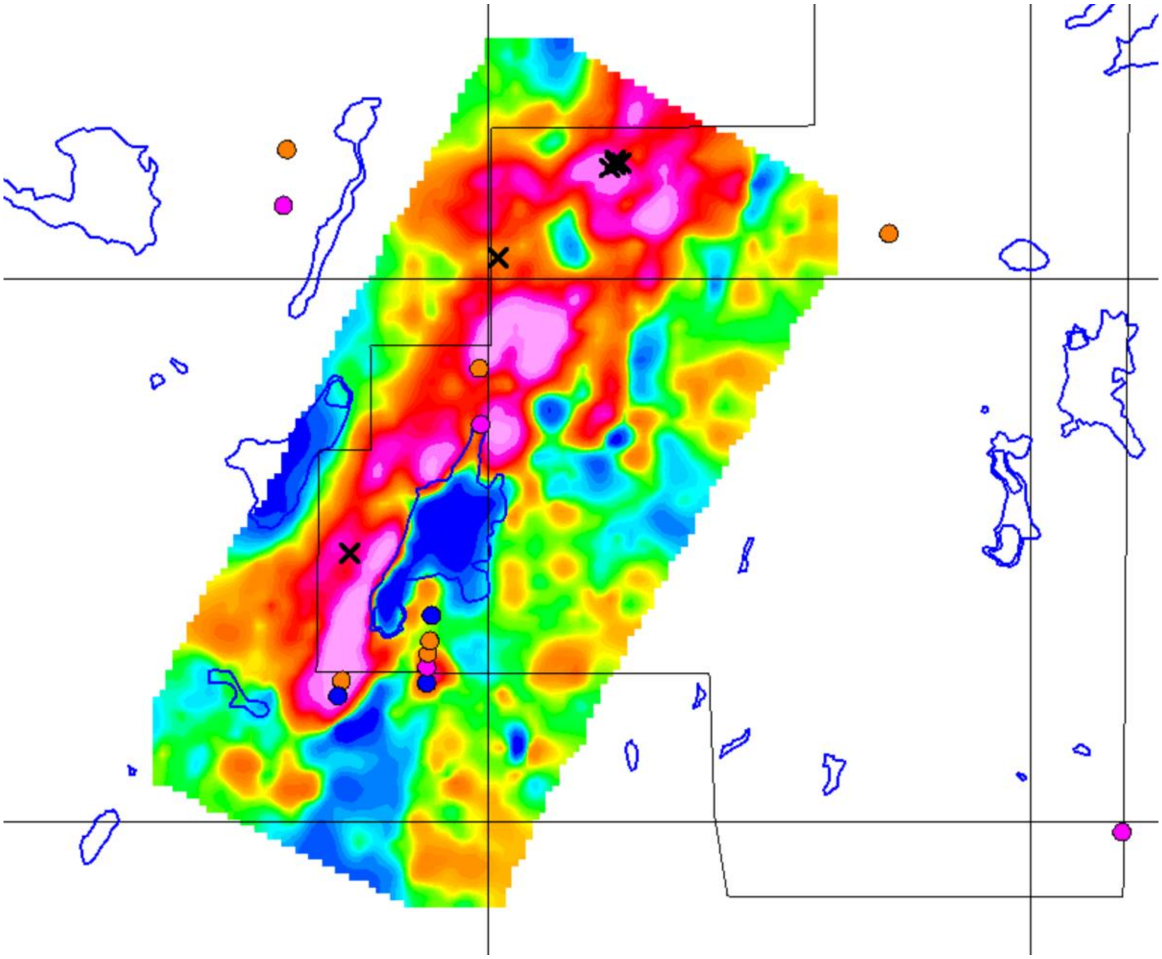


Figure 43. Iron Mask Central Q2465-Battery-Cobra-IP-PDp-N2-Chg with AEM anomalies coloured dots. Pink = Hi conductance and BMR drill holes indicated by x.

5 Conclusions

- Following integrated interpretation of the geophysical and geological results a total of 25 holes were drilled by BMR on geological and geophysical targets
- In general, the targets were tested and explained by drilling, but no significant mineralization was found

6 Recommendations

- No further work

References

BMR 2019 Website https://www.batterymineralresources.com/projects/at-a-glance/

Precision Geophysics Report_Dec_2016

Statement of Qualifications

I, Alan R. King, B.Sc, M.Sc, P.Geo, declare that:

1) I am a Consulting Geophysicist with residence in Sudbury, Ontario and am presently employed in this capacity with Geoscience North Ltd., Sudbury, Ontario;

2) I obtained a Bachelor of Science Degree (B.Sc.), in Geology from the University of Toronto in 1976, and a Master of Science Degree (M.Sc.), in Geophysics from Macquarie University in 1989;

3) I am a registered geophysicist with a license to practice in the Province of Ontario (APGO member # 1178);

4) I have practiced my profession continuously since 1976 in North and South America, Australasia;

5) I am a member of the Society of Exploration Geophysicists, and the Australian Society of Exploration Geophysicists;

6) I have no interest, nor do I expect to receive any interest in the properties or securities of the company, its subsidiaries or its joint-venture partners;

7) I am the Professional Geologist/(Geophysicist) and a member in good standing of APGO who has authored this Report;

8) The statements made in this report represent my professional opinion in consideration of the information available to me at the time of reviewing this report.

Dated this 3[th] day of Dec, 2019.

Signature

Alan King

Geophysicist

Geoscience North Ltd.