Appendix 3

Airborne Geophysical Interpretation of the Storm Copper Property

Airborne Geophysical Interpretation

of the

Storm Copper Property

Somerset Island
Qikiqtaaluk (Baffin) Region, Nunavut

NTS Map Sheets 058C/10–11 & 058C/14–15

for

COMMANDER RESOURCES LTD.

by

Intrepid GEOPHYSICS LTD.

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Summary

A helicopter-borne electromagnetic and magnetic survey was flown by Geotech Ltd. in July 2011 over the Storm Copper Property on Somerset Island ~120 kilometres south-southeast of Resolute Bay. The survey is comprised of ~3,970 line-kilometres of data acquired on a grid pattern of 300 and 150 m spaced traverses oriented at N030°E, controlled by 1,500 m spaced tie lines oriented at right angles toward N120°E. The electromagnetic technology utilized is Geotech's *VTEM Plus* time-domain system in a towed-loop configuration. Products obtained from this airborne geophysical survey include the total magnetic intensity, calculated (magnetic) vertical derivative, dB/dt and B-field both X- and Z-components, both dB/dt and B-field calculated Time Constants Tau, and a digital elevation model. Resistivity depth imaging (RDI) sections and apparent resistivity depth slices were also subsequently supplied as part of the interpretation phase of this project. A geosoft-format database of the profile data, as well as grids of total magnetic intensity, calculated vertical derivative, a single mid-time B-field Z-axis component, dB/dt and B-field time constants and the digital elevation model were provided by the contractor.

Enhanced derivative grids of the magnetics were generated and imaged as part of this interpretation; a texture and phase analysis of the magnetics was also undertaken in order to identify and map possible zones of structural complexity which may in turn indicate zones of favourable mineralization. A profile by profile review of all AEM anomalies was carried out preparatory to identifying high-priority areas of interest and zones for further investigation and ground follow-up.

The original objectives of this survey were two-fold:

- Utilize a more detailed and higher resolution approach in terms of line spacing and survey elevation via a helicopter platform in order to facilitate mapping of bedrock lithologies and structure which in turn may influence the emplacement or hosting of stratabound copper mineralization, and
- Look for centres of conductivity along the extent of the Central Graben structure and particularly in the vicinity of the 4100N Zone, which may have been missed by the coarser-spaced although similar in terms of dipole moment (power) Geotem survey.

These objectives have been or are being met via this interpretation; the data has enabled both the mapping and delineation of controlling structures, and identification of anomalous conductivity suggesting sulphide mineralization.

The principle anomalies of interest occur coincident to the known 4100N, 2750N and 2200N; also responding well to the VTEM system are the ST97-15 and ST99-34 zones; these 5 zones comprise the sole, unambiguous bedrock responses in the entire survey. The 3500N zone does not have a significant positive AEM response, but does lay right along the gradient edge from positive (extended and layered conductive zone) to negative response, apparently at the southern edge of the NW-trending graben. All of these conductive responses are distinguished by a complete lack of direct magnetic correlation.

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1. Introduction

The Storm Property is located on the northwest corner of Somerset Island, Nunavut. The property is 82,307.5 hectares in size and is centred at ~94° 03’ 04” West, 73 39’ 33” North; it is host to a large area of carbonate-hosted copper mineralization (Storm) as well as a zone of zinc-silver mineralization (Seal). The Seal zinc-silver zone sits on tidewater on a peninsula that extends into Aston Bay. The Storm copper zone is located ~20 kilometres inland from the Seal zone and is the focus of the present study. The property area was acquired by Commander Resources in 2008 through the award of four (4) Prospecting Permits, which are valid for a term of five (5) years.

Zinc mineralization was discovered in the early 1970s, but the first drilling on the property occurred in 1995 by Cominco Ltd (now Teck Ltd.). The second hole of the program in 1995 intersected 10.5% Zn, 28 g/t Ag over a drilled width of 18 metres. Additional drilling in 1995 and 1996 resulted in a small deposit described in the assessment reports as being about 2 Mt grading 8% Zn with some silver credits. This zone was named the “Seal Deposit” by Cominco geologists.

Cominco geologists discovered large chalcocite boulders in a stream bed about 20 km inland from the Seal deposit in 1996; copper mineralization was subsequently found over a seven (7) kilometre structural trend, hosted by Paleozoic dolomite and limestone. Exploration work by Cominco in 1997 and 1999 and later by Noranda (now Xstrata) in 2000 and 2001 led to the discovery of four centres of copper mineralization, the 4100N, 2750N, 2200N and 3500N zones.

Work previously conducted on the property at large has included airborne magnetic and electromagnetic surveys, extensive soil geochemistry, ground geophysics (IP, HLEM and UTEM) and diamond drilling. 17 holes were initially drilled in 1997 on the Storm copper project; a total of ~4,560 metres of diamond drilling was completed in 41 holes in 1999, and a further ~1,350 metres in eight holes was drilled in 2000. Following Noranda’s program in 2000 and 2001, no further work was done on the property and the claims gradually lapsed.

Massive sulphides have been the most important exploration target for electromagnetics since the 1950s; in fact, the method was developed for this particular application. However, it needs to be recognized that a good understanding of the type of massive sulphide deposit being sought must be fully understood. Some sulphide deposits are highly conductive and magnetic, while other deposit types may not have any discernible geophysical signature. Fortunately in this case, ground electromagnetics (horizontal-loop e.m.) and induced-polarization carried out in 1997 and a subsequent airborne electromagnetic (Geotem) survey as well as further ground work completed in 2000 by Cominco indicated the presence of identifiable, highly conductive copper-sulphide targets which were in turn confirmed by drilling. Physical property testing completed by Cominco reported[1] “…mineralization in the holes could adequately explain the conductivities seen in the airborne and ground follow-up surveys.’

Given conductive cover, compact, low flying AEM systems such as the helicopter time domain systems currently in use have a considerable advantage over higher flying fixed-wing systems with towed birds. This statement[2] is based on four premises:

a) as a transmitter is reduced in altitude, the footprint of the current system induced in the ground is also reduced

b) compact current systems decay more quickly than large ones implying that conductors under cover appear earlier in time

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[1] MacRobbie, P.A., Hall, D., Smith, A. and Rees, M., 2000, Storm Property Assessment Report, 152 p.

[2] Macnae, J., 2007, Developments in broadband airborne electromagnetics in the past decade *in* Advances in Airborne Geophysics, Proceedings of Exploration 07: Fifth Decennial International Conference on Mineral Exploration, edited by B. Milkereit, 2007, p. 387-398.

c) the depth of penetration of a dipolar source through conductive cover is greater than that of a more uniform source, and

d) the closer a receiver is to the transmitter, the less the effects of current gathering and the earlier in time a target response can be seen.

An HTEM system at 30 m altitude would therefore have an advantage in conductive cover penetration of at least a factor of 2 over an otherwise identical fixed-wing system at 120/90 m transmitter/receiver altitude.

Based on conclusions drawn from a re-assessment of the property by Commander Resources and a qualifying NI 43-101 report (Cook and Moreton, 2009), an airborne electromagnetic and magnetic survey was conceived and designed to cover the property and aid in the design of the 2011 exploration program. Overarching objectives of this survey were two-fold:

- Utilize a more detailed and higher resolution approach in terms of line spacing and survey elevation via a helicopter platform in order to facilitate mapping of bedrock lithologies and structure which in turn may influence the emplacement or hosting of stratabound copper mineralization, and
- Look for centres of conductivity along the extent of the Central Graben structure and particularly in the vicinity of the 4100N Zone, which may have been missed by the coarser-spaced although similar in terms of dipole moment (power) Geotem survey.

A helicopter-borne electromagnetic and magnetic survey (VTEM Plus) was subsequently carried out in July 2011 over a selected portion of the Storm Property; the interpretation of this survey is the focus of this report.

1.1. Location and Access

The Storm Property is located within the high Arctic Qikiqtaaluk (Baffin) Region of Nunavut approximately 120 south-southeast of Resolute Bay on Cornwallis Island, and is centered at ~94° 03’ 04” West, 73 39’ 33” North on NTS Sheets 058C/10–11 and 058C/14–15.

The property is practically accessible only by air from Resolute Bay, the closest permanent settlement; this trip necessitates an open-water crossing of approximately 70 kilometres in each direction. Daily air service to Resolute is available through Iqaluit, with connections from Ottawa and Montreal. Resolute also has service once a week from Yellowknife.

Figure 1. Storm Copper Project Location Map

Prime Minister Stephen Harper announced (August, 2007) the construction of a pair of multimillion-dollar military facilities within the contested waters of Canada's Arctic territory. The facilities consist of a new army training centre at Resolute, Nunavut, and a deep-sea port at Nanisivik Naval Facility. A statement issued by the Prime Minister says, "The Training Centre will be a year-round multi-purpose facility supporting Arctic training and operations, accommodating up to 100 personnel. Training equipment and vehicles stationed at the site will also provide an increased capability and faster response time in support of regional military or civilian emergency operations." Although not as busy as it once was, Resolute Bay Airport is still the core of the town, serving as an aviation hub for exploration in the region and connected by direct service to Iqaluit. The Tadjaat Co-op, part of the Arctic Cooperative, runs a grocery and retail store, a hotel, a restaurant, cable TV service, Internet, snowmobile rental, and an airport gift shop. The town has four hotels - Narwhal Inn, Qausuittuq Inns North and South Camp Inn, and the Airport Hotel – all of which have fewer than 100 rooms each, and several lodges. Other facilities include a Royal Canadian Mounted Police Detachment, a school (which provides education from kindergarten to Grade 12) and a gym.

1.2. Climate and Physiography

The climate on Somerset Island and the surrounding Canadian High Arctic is that of high latitude, continental landmass characterized by low mean temperatures and low precipitation. Because of the high latitude, the sun sets completely in late October and only fully rises again in early March; the intervening period is without sunlight. Resolute Bay (nearest centre with reported climate data) has a polar arctic climate with long cold winters and short cool summers. Environment Canada reports Resolute's average high for the year a -13.3°C while the average low for the year is -19.5°C. Resolute has a very dry climate with an average precipitation of 150 mm a year, most of it falling as snow from August to September. The record high for Resolute is 18.4 °C on July 9, 2011. The record low for Resolute is -52.2 °C on January 7, 1966. The whole region is one of continuous permafrost, which extends to depths of 400–500 m.

Resolute is one of Canada's northernmost communities and is second only to Grise Fiord on Ellesmere Island (Alert and Eureka are more northerly but are not considered towns—just military outposts and weather stations). As of the 2006 census the population was 229. Like most other northern communities, the roads and most of the terrain are all gravel.

Geological field exploration is best conducted from mid-June to late-August. Local lakes, rivers, and streams are generally ice-free by mid-July and do not freeze again until the end of August when snow begins to fall. Peel Sound, to the west, and Barrow Strait, on the north coast of Somerset Island, are generally ice-free by mid-July; however, the ensuing large areas of open water often create frequent periods of heavy fog over the low-lying parts of the island. This problem abates when the ocean freezes over again.

1.3. Claims

The Storm Copper Property is currently owned 100% by Commander Resources Ltd., through the granting of 4 prospecting licenses which are valid for 5 years from date of issue:

Permit	Area	Status	Issue_Date	Expiry_Date	Owner	Percentage
7547	21859.8	Active	01/02/2008	31/01/2013	Commander Resources Ltd.	100
7548	21860.3	Active	01/02/2008	31/01/2013	Commander Resources Ltd.	100
7549	16565.0	Active	01/02/2008	31/01/2013	Commander Resources Ltd.	100
7880	22022.3	Active	01/02/2010	31/01/2015	Commander Resources Ltd.	100

Table 1. Mineral Claims comprising Storm Property

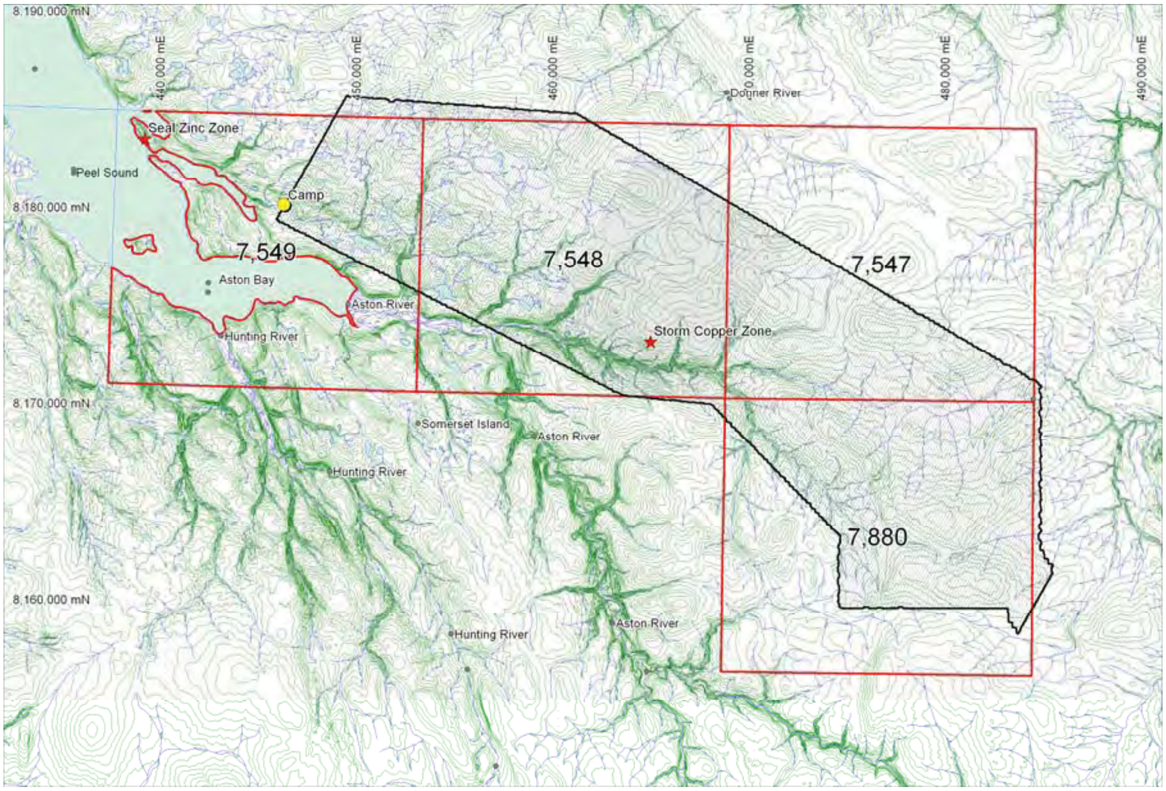

Figure 2. Storm Property Prospecting Licenses with VTEM flightpath

2. Geology

2.1. Regional Geology[3]

The geology of Somerset Island and the Boothia Peninsula is dominated by the Boothia Uplift, a major, positive, cratonic and supracrustal structural feature, formed mainly in the Late Silurian to Early Devonian. It extends due north for over 800 km from the Boothia Peninsula to the Grinnell Peninsula on Devon Island[4] (Figure 3). The Boothia Uplift was linked kinematically to the stresses in the coeval Caledonian Orogen (to the east) and its structural-stratigraphic history in part resulted from basement anisotropies which developed during the latest (?) Proterozoic continental break-up[5]. According to Miall[6], the uplift was formed by west-directed basement thrusting in response to the Caledonian Orogeny. The Archean-Aphebian crystalline core of the uplift is flanked on the east and west, and overlain to the north, by sedimentary rocks of the Arctic Platform[7]. In this part of the Archipelago, the Arctic Platform consists mainly of a structurally conformable, generally northward thickening succession of dominantly carbonate rocks ranging in

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[3] Cook, R.B. and Moreton, C, 2009, Technical report on the Storm Copper Project, Somerset Island, Nunavut. NI 43-101 Report prepared for Commander Resources Ltd., February 15, 2009, 96 p.

[4] Okulitch, A.V., Packard, J.J., and Zolnai, A.J., 1991: Late-Silurian-Early Devonian Deformation of the Boothia Uplift; *in* Chapter 12 of Geology of the Innuitian Orogen and Arctic Platform of Canada and Greenland. H.P. Trettin (ed.) GSC, Geology of Canada, no. 3, pp.302-307.

[5] De Freitas, T.A., Trettin, H.P., Dixon, O.A. and Mallamo, M., 1999: Silurian System of the Canadian Arctic Archipelago; Bulletin of Canadian Petroleum Geology, vol. 47; no. 2, pp. 136-193.

[6] Miall, A.D. 1986: Effects of Caledonian tectonism in Arctic Canada; Geology, v14, pp. 904-907, Nov. 1986.

[7] Stewart, W.O. 1987: Late Proterozoic to early Tertiary stratigraphy of Somerset Island and northern Boothia Peninsula, District of Franklin, NWT, GSC paper 83-26, 75 pp.

age from Early Cambrian to Early Devonian. The Storm Copper property is immediately underlain by Arctic Platform carbonates.

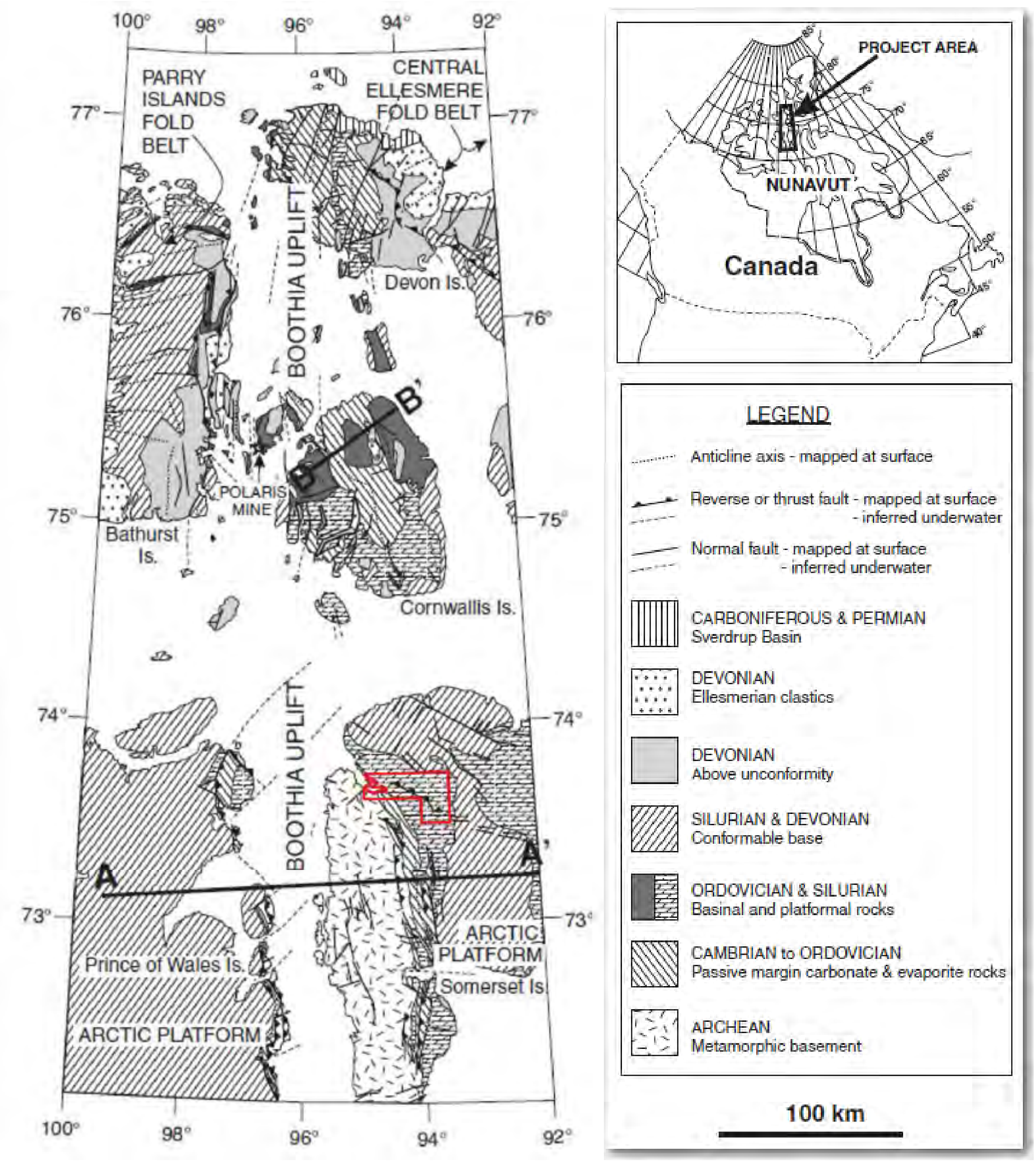

Figure 3. Regional Geology[8]

The core of the Boothia Uplift consists of near-vertical bedding/foliation reflecting north-south trending, tight, generally upright folds. Granulite-facies Archean and Early Proterozoic quartzo-feldspathic, pelitic, calcareous and mafic rocks dominate. The overlying folded and faulted successions of Late Proterozoic and Paleozoic carbonate and clastic rocks on either side of the Boothia Uplift are termed the Cornwallis Fold and Thrust Belt. The fold structures exposed at surface in the Paleozoic rocks consist of broad open anticlines and synclines with predominantly

[8] Dewing, K. and Turner, E.C., 2003, Structural setting of the Cornwallis lead-zinc district, Arctic Islands, Nunavut in Geological Survey of Canada Current Research 2003-B4, 9 p.

north-south axes. On Somerset Island, the distribution of Paleozoic rocks outlines a large asymmetrical syncline with the youngest formations preserved in the core. Superimposed on this main feature are structures related to local block faulting, flexures and relatively gentle folding. Prominent fault directions noted on northern Somerset Island run north-south, northwest-southeast, and northeast-southwest.

The final major tectonic event to affect the area occurred during the Eurekan Orogeny (Tertiary - Eocene) when generally north-trending, extensional, normal faults were created and older faults reactivated in response to the compressional events occurring in the Sverdrup Basin (500 km to the north).

2.2. Property Geology and Conceptual Models

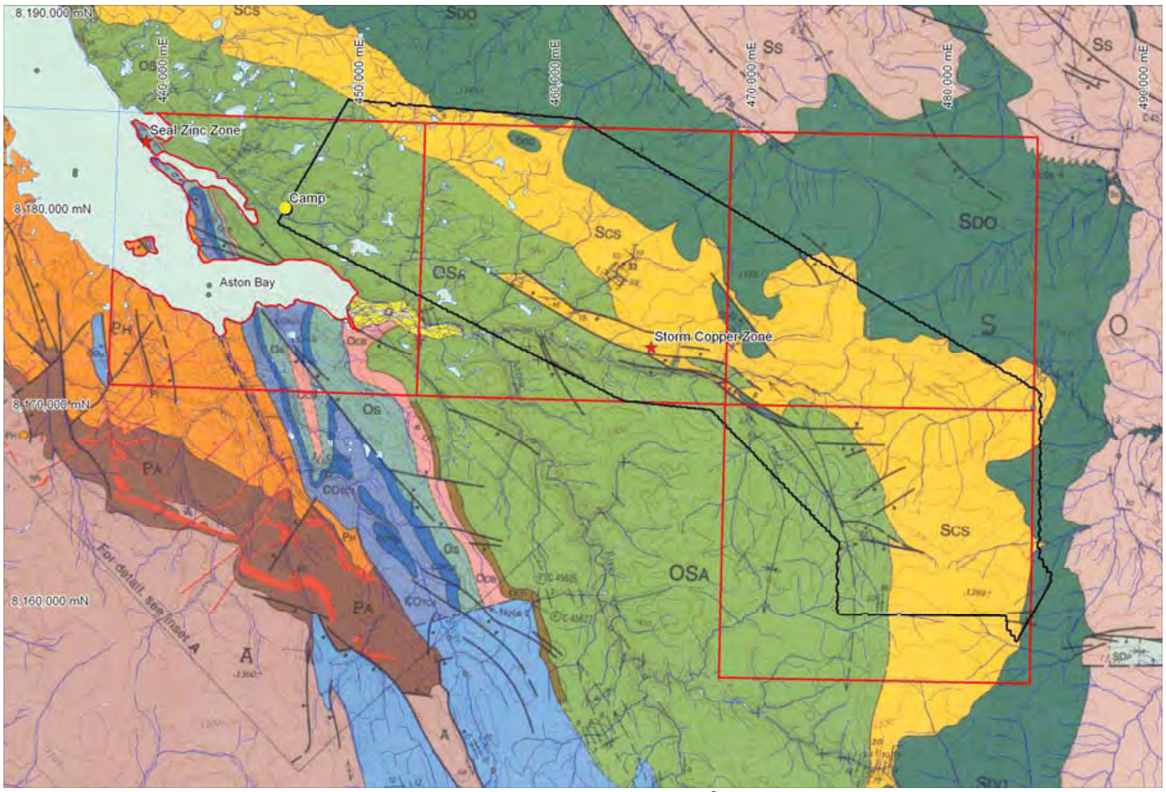

Figure 4a. Local Geology[9]

Cook and Moreton[10] report the Storm Copper to be a variant on the classic sediment-hosted copper deposit; it is epigenetic, carbonate hosted and located within an intracratonic sedimentary basin which was subjected to folding and faulting. Local ground conditions, including faulting and brecciation, appears to have exerted a strong control on the localization of mineralization.

Examples of this deposit type include Redstone (Northwest Territories) and Kennecott (Alaska) although the type deposit is commonly regarded to be the Kupferschiefer district (Germany).

[9] Stewart, W.D. and Kerr, J.Wm.,1984 Geology of Somerset Island North, District of Franklin. Geological Survey of Canada, Map 1595A, scale 1:250,000.

[10] Cook, R.B. and Moreton, C, 2009, Technical report on the Storm Copper Project, Somerset Island, Nunavut. NI 43-101 Report prepared for Commander Resources Ltd., February 15, 2009, 96 p.

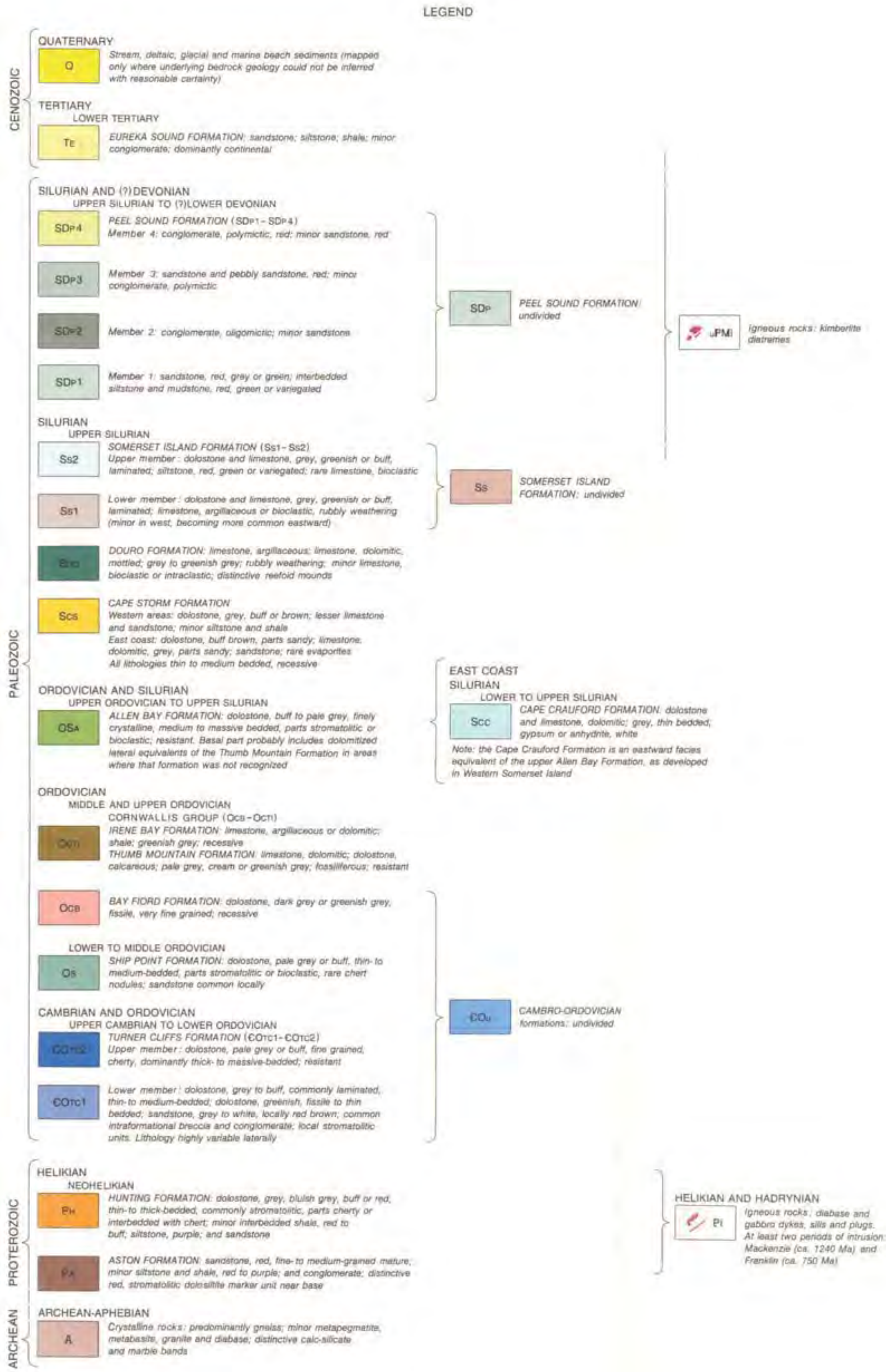

Figure 4b. Legend

These deposits are described by Lefebure and Alldrick[11] in brief as '…stratabound disseminations of native copper, chalcocite, bornite and chalcopyrite in a variety of continental sedimentary rocks including black shale, sandstone and limestone. These sequences are typically underlain by, or interbedded with, redbed sandstones with evaporite sequences. Sulphides are typically hosted by grey, green or white strata.' Cox[12] more recently elaborates '…Sediment-hosted copper deposits are stratabound, that is, they are restricted to a narrow range of layers within a sedimentary sequence but do not necessarily follow sedimentary bedding. They are epigenetic and diagenetic, that is, they are formed after the host sediment is deposited, but in most cases, prior to lithification of the host. They form independently of igneous processes.'

3. Airborne Geophysics

3.1. Exploration Criteria

Historically, exploration geophysics applied toward sediment-hosted copper deposits appears to have not been particularly successful. The deposits have the form of concordant layers of sulphides, whose lateral extent is 10 to several 100s times the layer thickness. The most common ore minerals range into sphalerite (non-conductive) and galena (weak to moderately conductive); associated minerals include quartz, pyrrhotite, pyrite, chalcopyrite, marcasite, arsenopyrite and cassiterite. The most common rocks associated with the sulphide zone are wedges of sedimentary breccia and conglomerate; chert and barite are common in the overlying sequence of chemical sediments. Geological prospecting has been the most successful tool of exploration for these major deposits, although this is very possibly due to their size and lateral extent as well as timing of discovery. Nevertheless, geophysical methods in principle should be an effective tool for present and future exploration for high-grade, large tonnage sediment-hosted sulphide deposits in specific instances; for instance, airborne electromagnetics has been used successfully in Australia for Mt. Isa and McArthur River –type deposits (although these would properly be termed SEDEX lead-zinc deposits). A major phase of exploration in the late 1960s and 1970s made extensive use of IP/resistivity surveys which proved capable of detecting sulphide mineralization, although this was not necessarily copper-bearing. The poor conductivity of the mineralization and the generally conductive near surface has often precluded the use of EM methods. Gravity methods are typically ineffective for detecting mineralization, because responses associated with weathering and stratigraphy dominate the data. The mineralization itself is usually nonmagnetic.

The following (very general) exploration guides are provided by Lefebure and Alldrick (1996):

Geochemical Signature: Elevated values of Cu, Ag, Pb, Zn and Cd are found in host rocks, sometimes with weaker Hg, Mo, V, U, Co and Ge anomalies. Dark streaks and specks in suitable rocks should be analysed as they may be sulphides, such as chalcocite.

Geophysical Signature: Weak radioactivity in some deposits; resistivity, IP and gravity could also be useful but there are no definitive tools.

Other: Deposits often occur near the transition from redbeds to other units which is marked by the distinctive change in colour from red or purple to grey, green or black. The basal reduced unit within the stratigraphy overlying the redbeds will most often carry the highest grade mineralization.

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[11] Lefebure, D.V. and Alldrick, D.J.,1996, Sediment-hosted Cu+/-Ag+/-Co, in Selected British Columbia Mineral Deposit Profiles, Volume 2 - Metallic Deposits, Lefebure, D.V. and Hõy, T., Editors, British Columbia Ministry of Employment and Investment, Open File 1996-13, pages 13-16.

[12] Cox, D.P., Lindsey, Singer, D.A., Moring, B.C. and Diggles, M.F., 2007, Sediment-hosted copper deposits of the world: deposit models and database. US Geological Survey Open-File Report 03-107, 53 p.

Cominco's work in 1997–2000 successfully identified 4 zones of Cu mineralization within a wider-spread area of low-grade copper 'background.' These 4 zones contain locally high-grade intervals of chalcocite (79.85% Cu), bornite (63.31% Cu) and chalcopyrite (34.63% Cu) with local concentrations of accessory minerals, covellite (66.46% Cu), native copper, cuprite, malachite and azurite. Pyrite and marcasite occur as the main non-copper sulphides. The mineralization is hosted within the upper 80 metres of the Silurian Allen Bay Formation dolostone close to the conformable contact with the overlying Cape Storm Formation[13].

More significantly, both ground and airborne electromagnetic surveys (Maxmin HLEM, UTEM and Geotem) isolated several conductive zones which were subsequently drilled and shown to have at least some degree of Cu mineralization. The 4100N Zone, comprising the strongest electromagnetic conductor, is essentially a blind outcrop beneath a veneer of Cape Storm Formation. The Storm area was initially tested by seventeen widely spaced drill holes, all of which are mineralized, is open in all directions and offers excellent exploration potential. It is evident that copper mineralization, exposed intermittently along a five-kilometre strike length, is preferentially located adjacent to the North and South (bounding) faults. The proximal disposition of the 4100N, and 2200N and 2750N zones on the north and south sides, respectively, of the Central Graben suggests that mineralization may have been more continuous across the graben stratigraphy prior to final movement along the bounding faults.

Geophysical signatures may include all or some of the following:

- direct electromagnetic response associated with anomalous conductivity arising from massive sulphides dominated by copper mineralization and a paucity of lead or zinc;
- magnetics to map controlling structure;
- induced polarization/resistivity surveys to outline disseminated sulphides and d.c. resistivity surveys to help map alteration zones; and
- airborne and ground radiometric surveys to help delineate alteration zones and anomalous gamma-ray radiation.

The main advantage of electromagnetic methods is their ability to distinguish between a very good conductor and one that is just slightly more conductive than the surrounding host rock. This is not as definite with dc resistivity methods due to their dynamic range limitations, and so the historically most successful applications of electromagnetics have been in finding highly conductive base metal deposits. The following figure illustrates how almost all of the ore minerals are electrically much more conductive than barren rocks.

[13] Commander Resources Ltd. Internal Report, Storm Property Summary. www.commanderresources.com

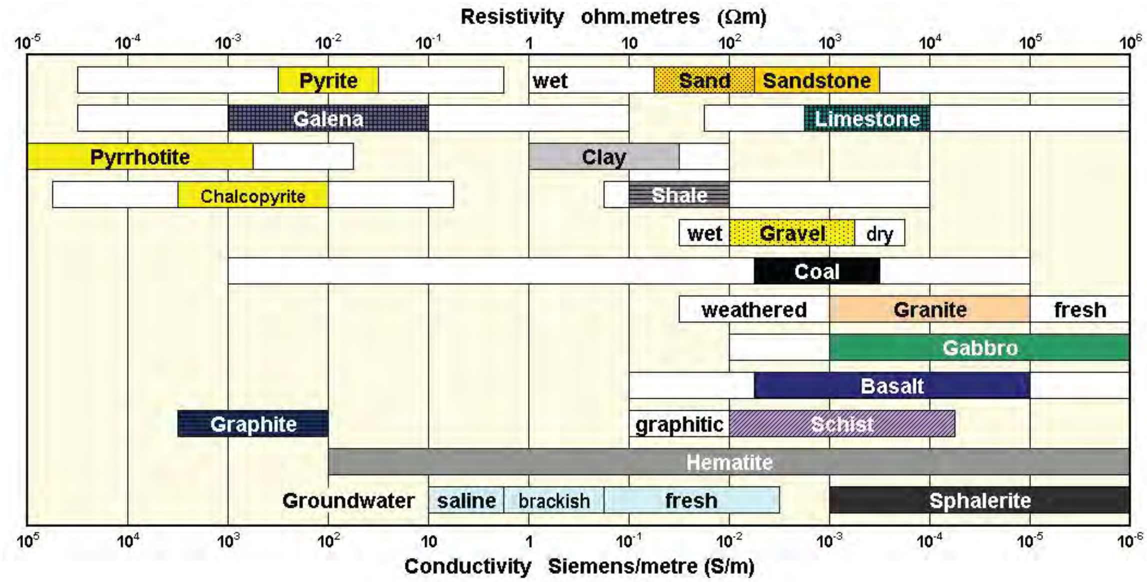


Figure 5. Conductivity / resistivity of common rocks and minerals

A conclusion is drawn whereby electromagnetics is or will be likely successful only in cases where copper sulphide dominates mineralization and the lead / zinc assemblage is not significant. Geological studies have shown that most of the copper deposits are structurally controlled at some scale. Analysis of modern regional airborne magnetic and radiometric datasets allows the structural and stratigraphic setting of the deposits to be determined, although weak overall levels of magnetization mean that intensive filtering/enhancement of the aeromagnetic data is required. Most deposits are associated with the intersection of linear magnetic anomalies, which are interpreted as faults. Units within the host succession have distinctive radiometric responses, allowing the stratigraphy to be mapped confidence. Regional to local airborne geophysical data provide a cost-effective means of identifying further occurrences of the structural/stratigraphic scenarios of the known deposits.

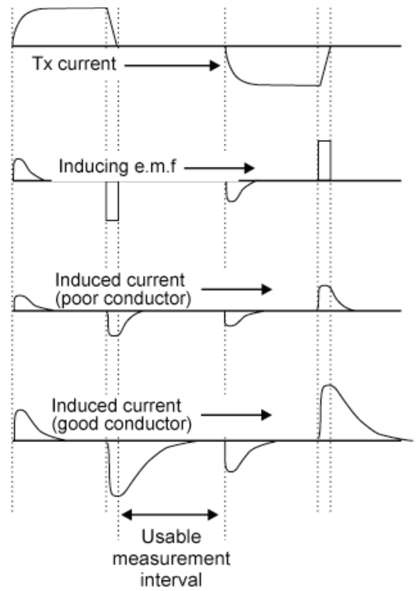
3.2. Time-Domain EM Overview

Electromagnetic induction is based on Faraday's law of induction which states that a changing magnetic field will produce an electric field, which in turn will create an electric current. Electromagnetic induction methods generate an electromagnetic field which induces current in the earth which in turn causes the subsurface to create a magnetic field; by measuring this magnetic field, subsurface properties and features can be deduced. This method measures the magnitude and phase of induced electromagnetic currents, which are related to the subsurface electrical conductivity. Electrical conductivity is a function of the soil and rock matrix, percentage of saturation, and the conductivity of the pore fluids. A transmitter (Tx) coil or loop is used to generate a time-varying magnetic field, the primary field, which induces an electromagnetic force in the neighbouring regions of space. This electromagnetic force drives eddy currents in the earth, and other conductive elements, which in turn produce a new magnetic field, the secondary field, registered by one or more receiver (Rx) coils. The secondary magnetic field contains information on the resistivity distribution in the ground, which can then be converted into geological knowledge because of the different electric properties of earth materials.

[14]A modified square wave of the type shown below flows in the transmitter circuits, and transients are induced in the ground on both the upgoing and downgoing 'ramps.' Only currents induced during the downgoing ramps are used, since only they can be observed in the absence of the

[14] Milsom, J. and Erikson, A., 2011, Field Geophysics, 4th Edition, John Wiley & Sons Ltd. Press, p.165-166.

primary field. Ideally, the upramp transients should be small and decay quickly; the upramp is accordingly often ‘tapered’ to reduce induction. In contrast, the downramp current flow is terminated as quickly as possible to maximize induction. Transmitter self-induction must be minimized and single-turn loops are preferred to multi-turn loops (at least in principle).



Field Geophysics, Fourth Edition. John Milsom and Asger Eriksen.

Figure 6. Transient electromagnetic (TEM) transmitted and received signals

Geotech’s VTEM system uses an in-loop transmitter – receiver geometry to provide a symmetric response to allow for intuitive conductor interpretation. The coincident, vertical dipole transmitter – receiver configuration provides a symmetric system response. Any asymmetry in the measured EM profile is due to conductor dip, not the system, or direction of flying.

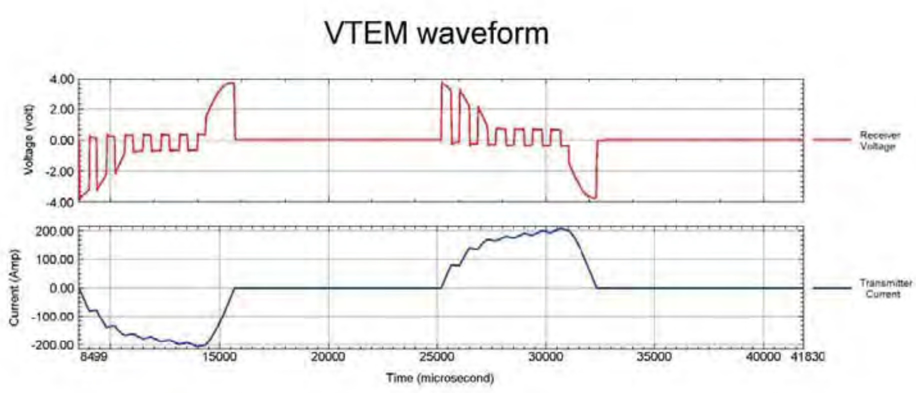


Figure 7. VTEM receiver measured waveform and the derived pulse shape

Geotech uses a complicated waveform which has been optimized to use as much of the helicopter’s spare electrical power as possible. Depending on the requirement of the survey, the pulse width can be modified, i.e., lengthened, or shortened, or simplified. For a known transmitter – receiver geometry, the dB/dt seen in the receiver is proportional to the current in the transmitter. The current waveform in the transmitter is obtained by integrating the dB/dt receiver coil response and then scaling to the maximum current. A typical receiver measured waveform and the derived pulse shape is shown in the preceding figure.

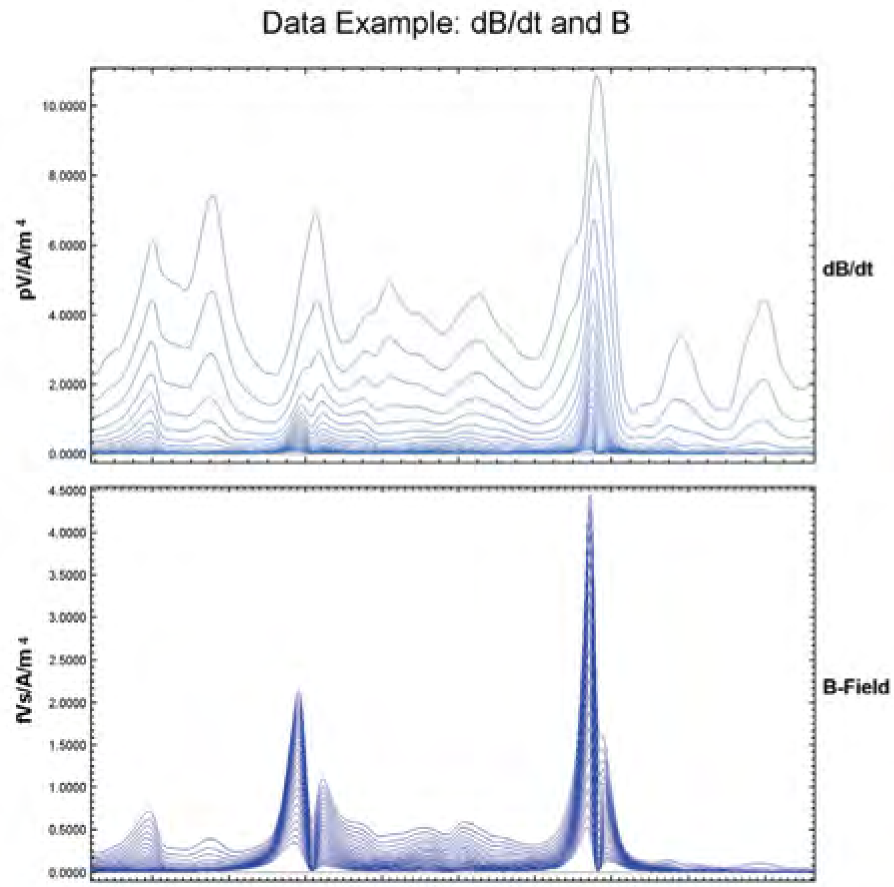


Figure 8. An example of VTEM dB/dt and B-Field data is shown.

It can be seen from the above figure that the B-Field data responds to the better conductors and that the overburden response is suppressed. This is allows for easier interpretation of bedrock EM anomalies. The high signal-to-noise ratio of the system is also readily seen in the data.

3.3. Operations

Geotech Ltd. was contracted in June 2011 to fly an airborne electromagnetic and magnetic survey for Commander Resources Ltd. over the Storm Property on Somerset Island; operations were based out of Resolute Bay on Cornwallis Island as no camp facilities were in place on the property. Operations therefore involved a twice-daily open water crossing by helicopter and crew, some 70 km in each direction which necessitated appropriate equipment and protocols as per Transport Canada guidelines and regulations; a fuel cache located at the old Cominco site was utilized for daily re-fuelling. In the event, no problems were encountered and the survey was completed safely and without incident. Data acquisition occurred during the period July 2–24, 2011; 30 production flights were undertaken in 13 days with 10 days lost due to equipment and weather. Final survey coverage consisted of 3,969.647 line-kilometres, including tie lines. Flight lines were flown east-west (030°–210°) with a line separation of 150 m. Tie lines were flown orthogonal to the traverse lines (120°–300°) at intervals of 1,500 m; a central block of interest was in-filled resulting in an effective 75 m traverse line spacing.

The survey employed the VTEM Plus electromagnetic system. Ancillary equipment consisted of a caesium magnetometer, radar altimeter, GPS navigation system and a digital recording system. Ground equipment included GPS and magnetometer base stations for navigation control and monitoring of diurnal fluctuations. The instrumentation was installed by Geotech personnel in a Eurocopter Aerospatiale (AStar) 350 B3 helicopter, registration C-GXGX. The helicopter is owned and operated by Geotech Aviation. Although the stated nominal survey speed was 80 kph, the actual average ground speed achieved was 92.2 km/h (25.6 m/s); the average EM bird terrain clearance was 43.1 metres while the average magnetic sensor clearance was 62.1 metres.

A complete description of the field program is provided by the contractor's logistical report[15], attached to this report as Appendix B.

3.4. Data Presentation

Electromagnetics

The VTEM electromagnetic system utilizes receiver and transmitter coils in concentric-coplanar and Z-direction oriented configuration. The receiver system for the project also included a coincident-coaxial X-direction coil to measure the in-line dB/dt and calculate B-Field responses. Thirty-two time measurement gates were used for the final data processing in the range from 96 to 7036 µsec. A three stage digital filtering process was used to reject major sferic events and to reduce system noise. Results are presented as stacked profiles of EM voltages for the time gates, in linear-logarithmic scale for the B-field Z component and dB/dt responses in the Z and X components. B-field Z component time channel recorded at 2.021 milliseconds after the termination of the impulse is also presented as contour colour images. Calculated Time Constant (TAU) are presented for both B-field and dB/dt Z-component responses. Test resistivity depth images are presented for 4 selected lines; based on these initial tests, a further 41 lines over the central, in-fill zone were additionally processed through inversion and RDIs presented.

Magnetics:

The magnetic data was corrected for diurnal variations and then subjected to tie-line levelling; this data was then interpolated between survey lines using a random point gridding method to yield x-y grid values for a standard grid cell size of approximately 37.5 metres for the entire property and 15 metres for the in-fill area. A calculated vertical derivative (vertical gradient) was computed via a Fourier transformation and also mapped.

This airborne geophysical interpretation is based on an integrated analysis using a combination of GEOSOFT's integrated editors (spreadsheet and flight path), INTREPID's advanced Fourier filtering and multiscale edge detection, ER MAPPER's image enhancements and MAPINFO's GIS capability. All the final data is also presented as a series of digital maps and images generated at scale of 1:25,000. The airborne geophysical gridded data was analyzed using the following enhanced images:

- Total Magnetic Intensity; pseudocolour and colourdrape images
- Calculated Vertical Derivative; greyscale shaded-relief and colourdrape images
- Total Horizontal Derivative; colourdrape images
- Analytic Signal (total gradient); colourdrape images
- Tilt derivative; colourdrape images
- Total horizontal derivative of the tilt derivative; colourdrape images

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[15] Geotech Ltd., Project no. 11053. Report on a helicopter-borne versatile time domain electromagnetic (VTEM plus) and aeromagnetic geophysical survey, Storm Property, Resolute, Nunavut *for* Commander Resources Ltd., August, 2011, 68 p.

- B-Field and dB/dt Calculated Time Constants, pseudocolour images
- B-Field and dB/dt Z-Component, pseudocolour images
- Fraser Filter X Component dB/dt, colourdrape images
- Digital Elevation Model, colourdrape images
- Multiplots of magnetics and electromagnetics.

Projection Specifications:

Map projection	NUTM15
Datum	NAD83
Central meridian	93° West
False Easting	500000 m
False Northing	0 m
Scale Factor	0.9996 m

In addition, the analysis and interpretation included a methodical review of the underlying profile data via both the contractor-supplied multiplots and an interactive review via GEOSOFT's integrated editors; example shown below in Figure 8.

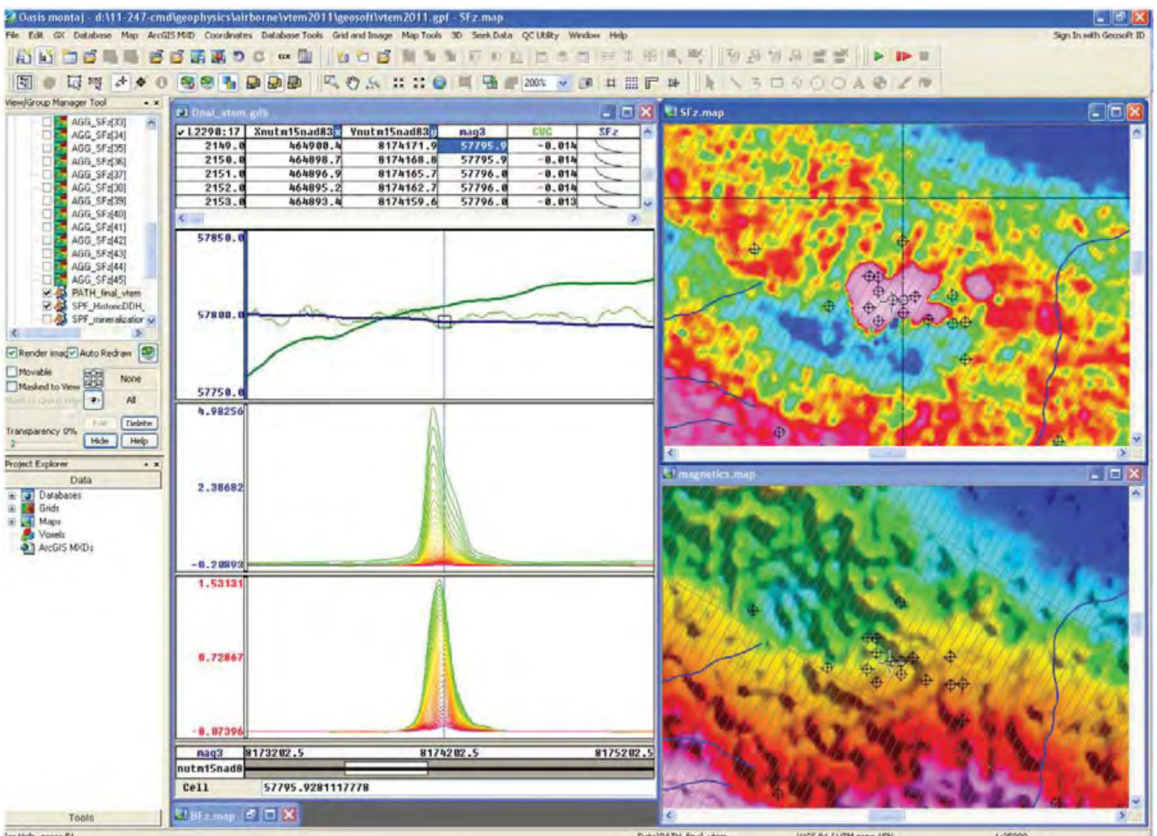

Figure 9. Interactive review of profiles and images

The subsequent analysis depends in part at least on the processing, visualization, mapping, and integration capabilities provided by specialized geophysical software. Discrete features and trends are checked on a profile by profile basis, linked to a variety of images and GIS layers, before final decisions as to interpretation and recommendations for ground follow-up are made.

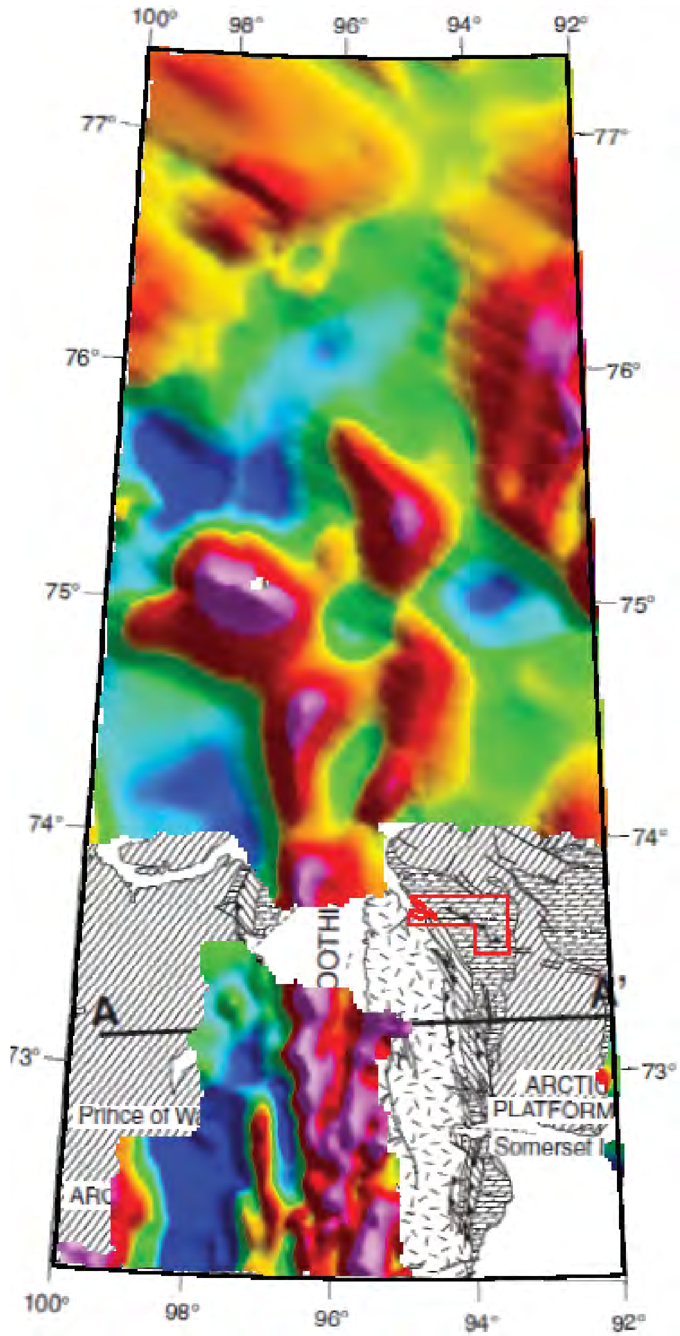

Figure 10. Regional Aeromagnetics (Natural Resources Canada) – Boothia Uplift

An image of the regional aeromagnetics (above) serves to place the Storm property in some context; in this case, the image is superimposed upon the Boothia Uplift regional geology previously shown (blank region in terms of coloured magnetics indicates unfortunately no data).

Modern high-resolution aeromagnetic data provides a clearer view of completely obscured rocks, allowing much finer divisions of provinces regionally, and units locally. As magnetic field compilations extend to greater scales, they may be used to tie existing isolated interpretations or maps together through continuous data coverage, provide continent-scale perspectives on geologic structure and evolution, and extend geological mapping of exposed (particularly Precambrian basement) regions into sediment-covered areas. A fundamental building block in these interpretations is the geophysical domain, distinguished on the basis of anomaly trend, texture, and amplitude. Where basement is exposed, these domains often coincide with lithotectonic domains, geologic provinces, or cratons, depending on the scale of investigation. Delineating areas of magnetic anomalies having similar characteristics is intended, therefore, to isolate areas of crust having similar lithological, metamorphic, and structural character, and possibly, history. Anomaly trends may indicate the type of deformation undergone: for example, sets of parallel, narrow curvilinear anomalies may attest to penetrative deformation whereas broad ovoid anomalies might suggest relatively un-deformed plutons. The average anomaly amplitude within a domain reflects its bulk physical properties. For example, calc-alkaline magmatic arcs generally are marked by belts of high-amplitude positive magnetic anomalies while greenstone terranes commonly are associated with subdued magnetic fields. Additionally, where anomaly trends show abrupt changes in direction at domain boundaries, the relative age of the adjacent domains may also be inferred.

One of the by-products from the airborne geophysics program is a digital elevation model, derived from the GPS height and radar altimeter. Although not as accurate as a terrestrial geodetic survey, it remains a relatively inexpensive and accurate model of the topography of the study area. The errors contained in these sorts of DEMs are of the order of approximately 10 metres; the main contributions being from the radar altimeter data (1–2 metres) and the GPS height data (5–10 metres). When height comparisons are made in areas of flat terrain to elevations obtained during the course of third order gravity traverses and/or the elevations of geodetic stations, the errors are on the order of approximately 2 metres.

The final total magnetic intensity (Figure 12, following) has been corrected for parallax and diurnal, and a spike-removal filter applied. Additionally, the data was edited for abrupt elevation shifts which did cause some associated jumps or spikes. The data was then tie-line levelled and gridded using a bi-directional grid technique using a 37.5 m cell size, one-fourth of the nominal traverse line spacing. A correction for the regional reference field (IGRF) was applied.

Also shown on following figures are the B-field Z-component channel 36 as well as the B-Field and dB/dt calculated time constant (Tau, in ms). As concluded by Smith and Annan[16], in cases when the exploration target is a highly conductive body, or at least more conductive than the surrounding host, B-field data will improve the chances of anomaly recognition. In cases where the exploration target is weakly conductive, the dB/dt response has a greater signal-to-noise ratio.. In cases where the exploration target has an unknown conductance or conductivity, or when there are multiple targets which fall into both the above categories, a system utilizing both dB/dt and B-field is preferable.

- The response of poor conductors such as weakly conductive overburden is suppressed on B-field data
- The signal-to-noise ratio for good conductors (10–2,000 S) is greater on B-field data than dB/dt data.
- The response of conductive zones is frequently easier to interpret on B-field response profiles as larger amplitudes generally correspond to more conductive zones
- The effect of spherics is suppressed on B-field data
- The B-field response spans a smaller range of values than dB/dt, making it easier to plot or image; this tends to simplify the interpretation task.

[16] Smith, R. and Annan, P., 1998, The use of B-field measurements in an airborne time-domain system: Part I Benefits of B-field versus dB/dt data. Exploration Geophysics, vol. 29, p. 24–29.

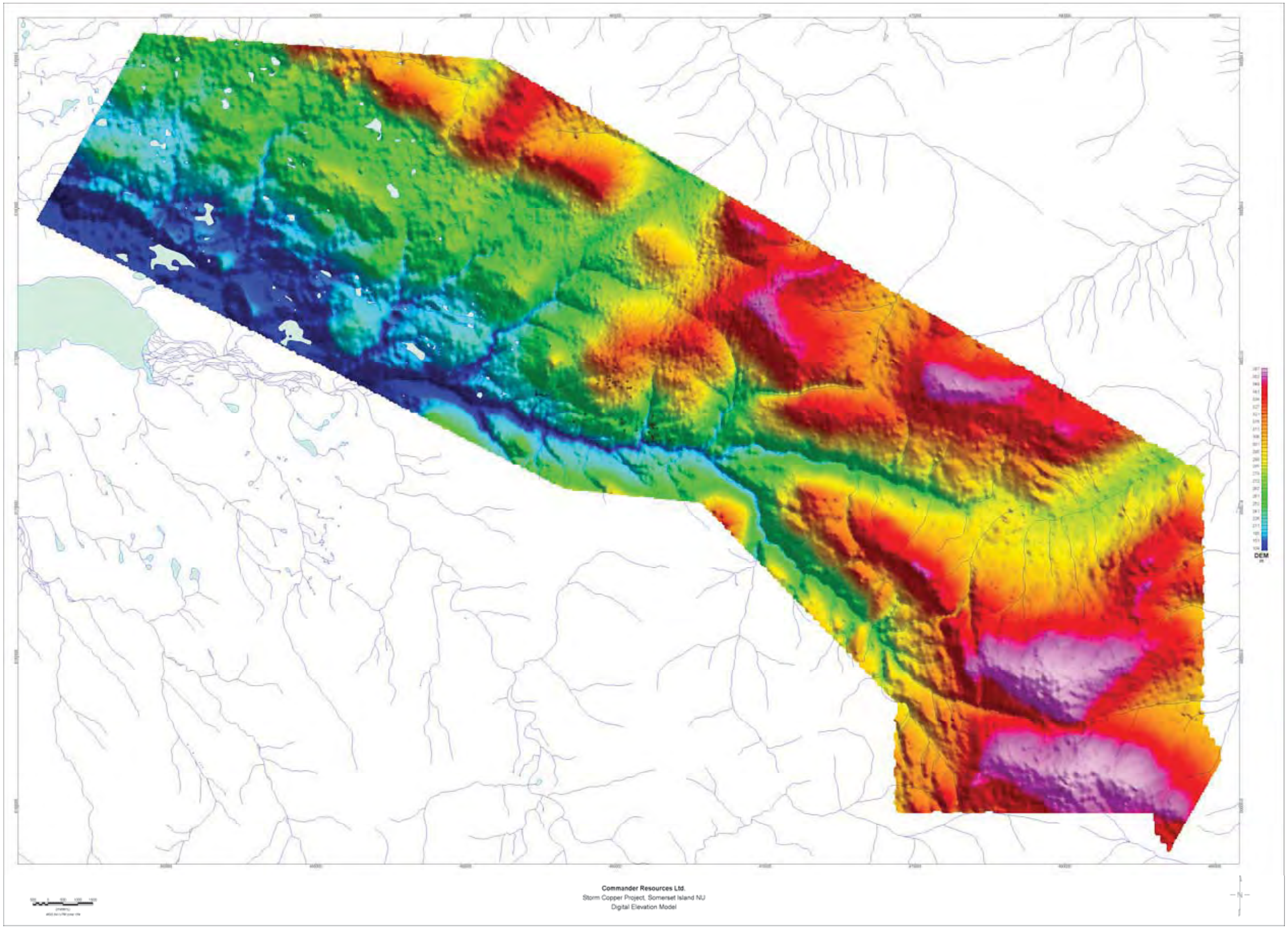

Figure 11. Digital Elevation Model (airborne geophysics)

The image above reflects the moderate topography of the survey block, with ~350 m relief being present.

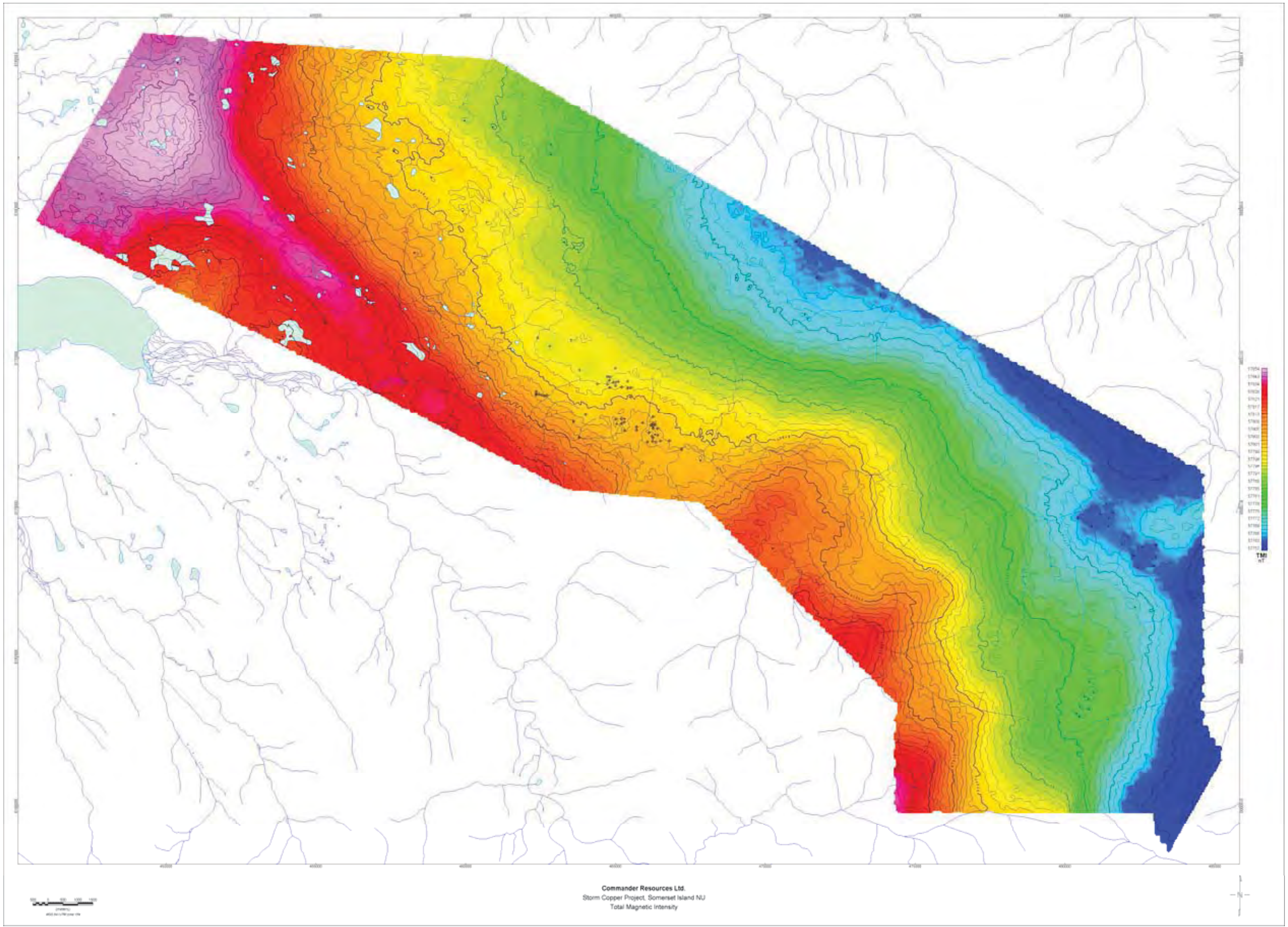

Figure 12. Residual Magnetic Intensity (2 nT contours)

The magnetic field is relatively quiet (dynamic range ~100 nT), in keeping with the platform carbonates and depth to crystalline basement.

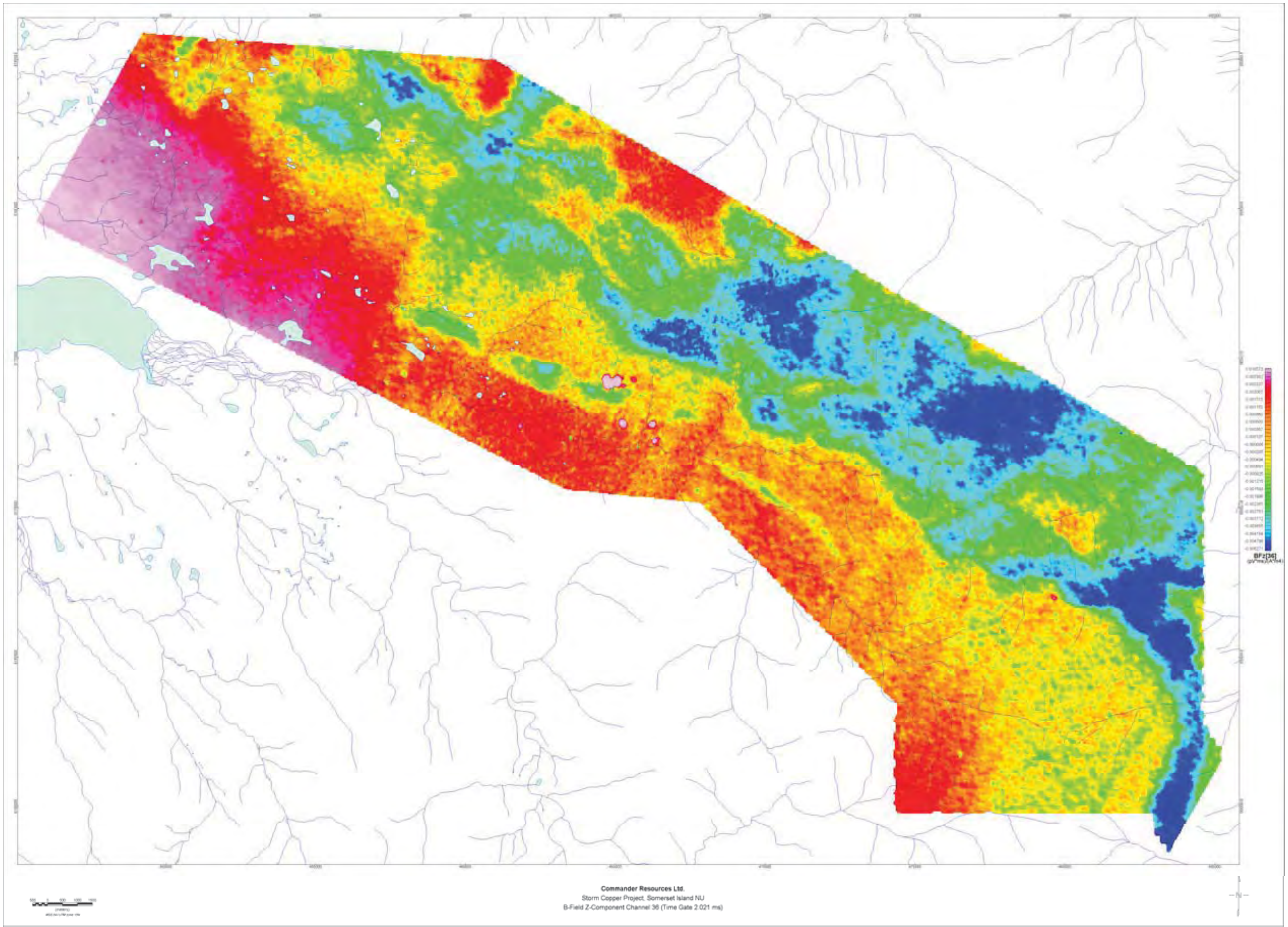

Figure 13. B-Field Z[36]

In this case, the historic drill collars are ‘turned off’ so that the strong conductive anomalies become more apparent.

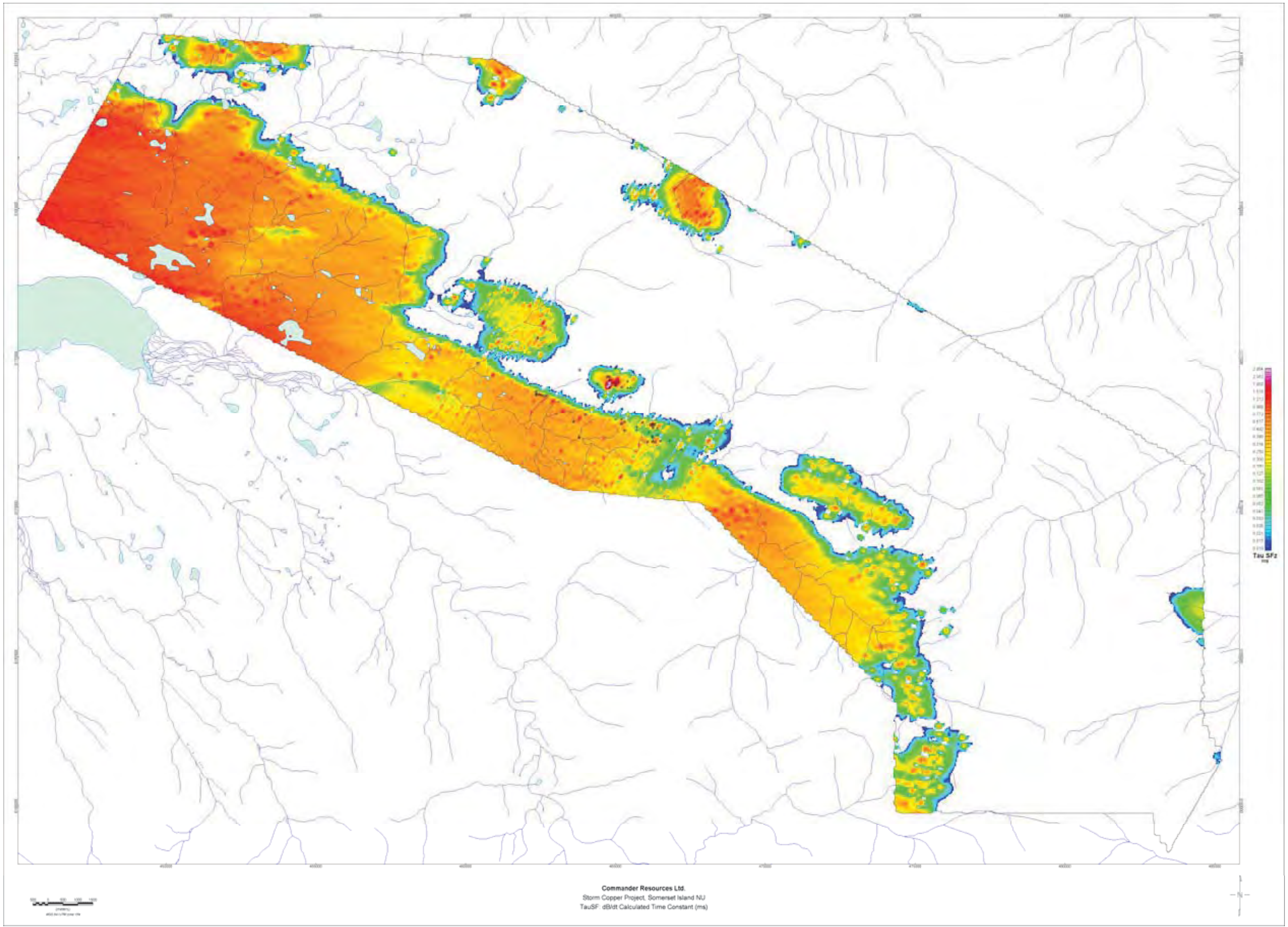

Figure 14. Time Constant (Tau) calculated from dB/dt data

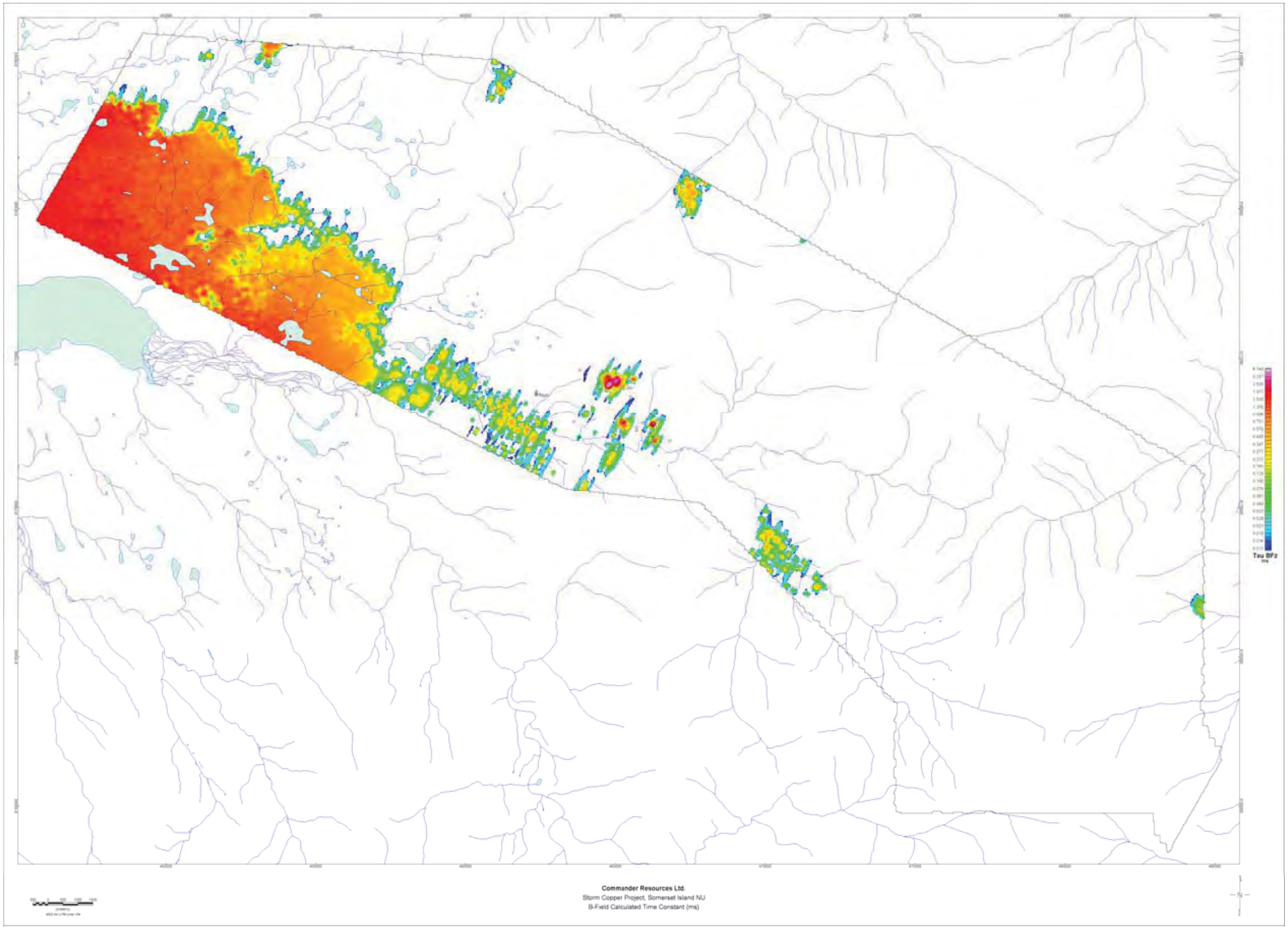

Figure 15. Time Constant (Tau) calculated from B-Field data

As mentioned in a preceding section, the B-field is less responsive to weaker conductors than dB/dt; hence this image is rel. constrained.

4. Data Interpretation

4.1. Overview — Magnetics/Electromagnetics

A first step in the interpretation is to compare the airborne geophysical response to the known showings on the property; thereafter, parallels to these are sought and identified throughout the survey as a whole. As previously stated, 4 main zones of anomalous copper mineralization have been identified by Cominco; these are the so-called 4100N, 2200N, 2750N and 3500N zones. Responses on the AEM data vary from very strong conductivity at the 4100N Zone to not readily discernible on the 3500N Zone. There also appears to be no direct correlation to magnetics.

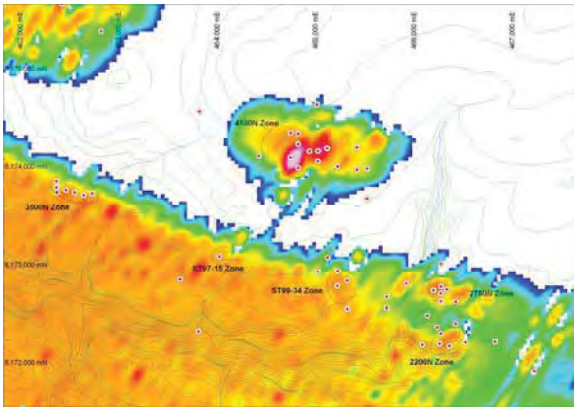

Figure 16a. dB/dt Tau Storm Cu mineralization

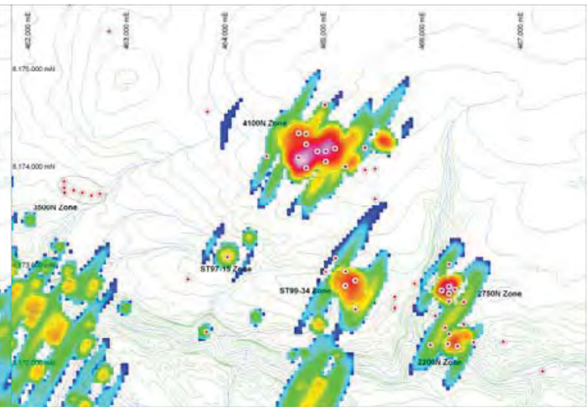

Figure 16b. B-field Tau Storm Cu mineralization

There occur two further ‘zones’ which are apparent on the AEM data; although drilled by Cominco, there are no names assigned in the various reports; accordingly, these have been named by their central drill hole as ST97-15 and ST99-34 respectively.

4.2. Magnetics

Overall, the magnetics are dominated by a relatively intense, irregular magnetic anomaly at the northwest end of the surveyed area; extending from this anomaly is a southeast-trending dyke-like high. The source of these two magnetic anomalies is felt to lay in the Proterozoic basement; modelling of the SE-dyke feature indicates a depth to source of ~534 m below sea level, having a reasonable fit on the anomaly as it extends away from the more extensive intrusion on the very western end of the survey (this latter feature is not resolved sufficiently by this airborne survey to permit reliable modelling or depth estimates). A summary model is shown on the following page.

Enhancement filters applied to the magnetic grid have highlighted a limited number of structural orientations and trends. The aeromagnetic data is primarily reflecting very long wavelength, buried features believed to be sourced in the Proterozoic basement at some depth (i.e.. ≥ 500 m). However, a high-frequency, shallow component is evident throughout; this is felt to be due to magnetic minerals contained within the Paleozoic platform carbonates (extending from Silurian Douro and Cape Strom formations through to Upper Ordovician Allen Bay Formation), possibly originating in magnetite-precipitating bacteria, or possibly related to detrital materials themselves related to variation in sea levels. It may be that the carbonate susceptibilities (if and when these could be determined in future exploration and drilling campaigns) can therefore be considered as one of the environmental proxy data for the research of sequence stratigraphy. A degree of remanence is also suspected, although there is no evidence to support or deny this concept at the present time. A simple 10-group classification was run on the magnetic intensity to isolate and identify the main ‘bands’ of these intra-sedimentary magnetic patterns; results are shown in a following figure.

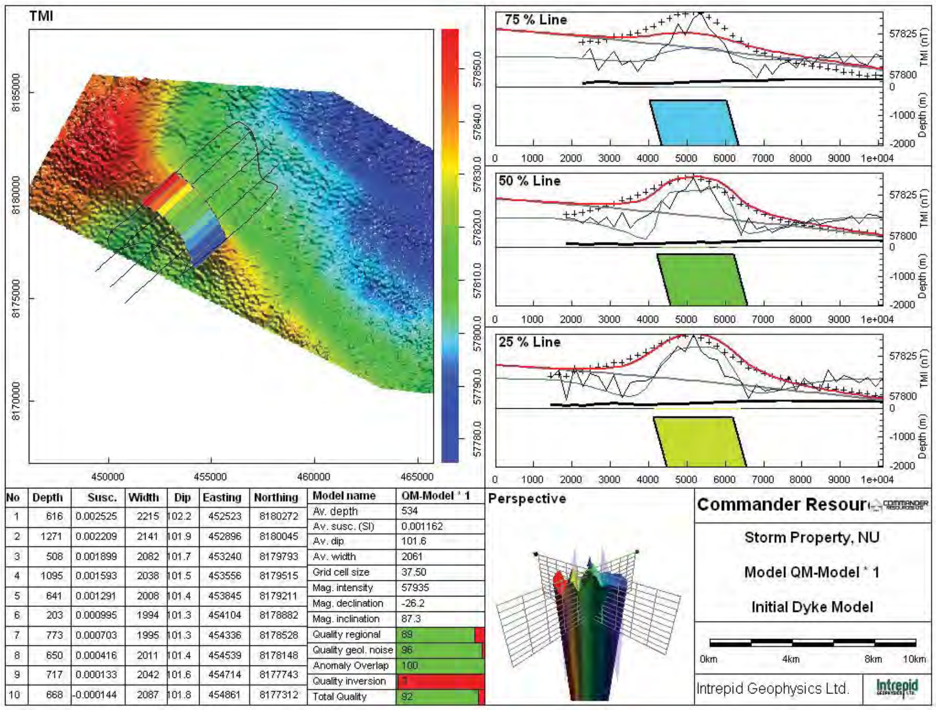

Figure 17 QuickMag model – SE dyke feature

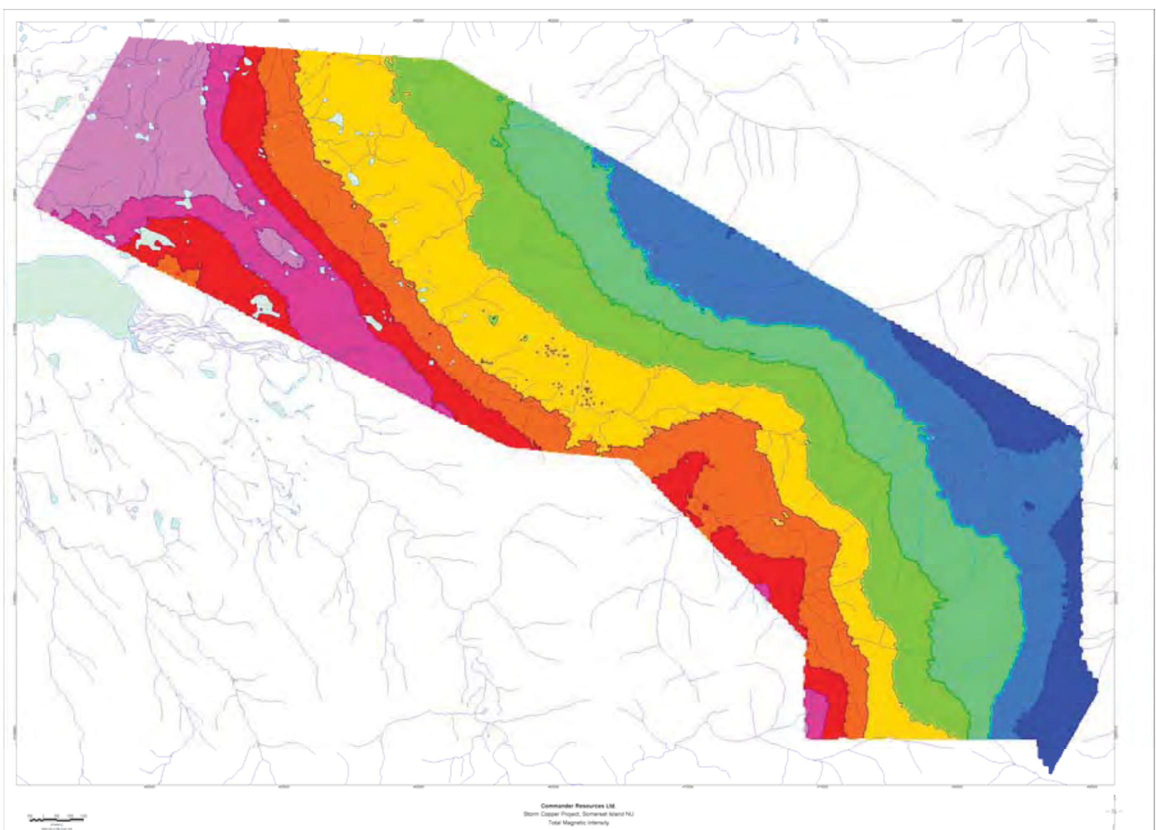

Figure 18. Unsupervised Classification of Magnetic Intensity

A combination of the total horizontal and tilt derivative are typically suitable for mapping shallow basement structure and mineral exploration targets; they have distinct advantages over many conventional derivatives. The total horizontal derivative provides an effective alternative to the vertical derivative to map continuity of structures and enhance magnetic fabric. The advantages of the tilt derivative are its abilities to normalize a magnetic field image and to discriminate between signal and noise.

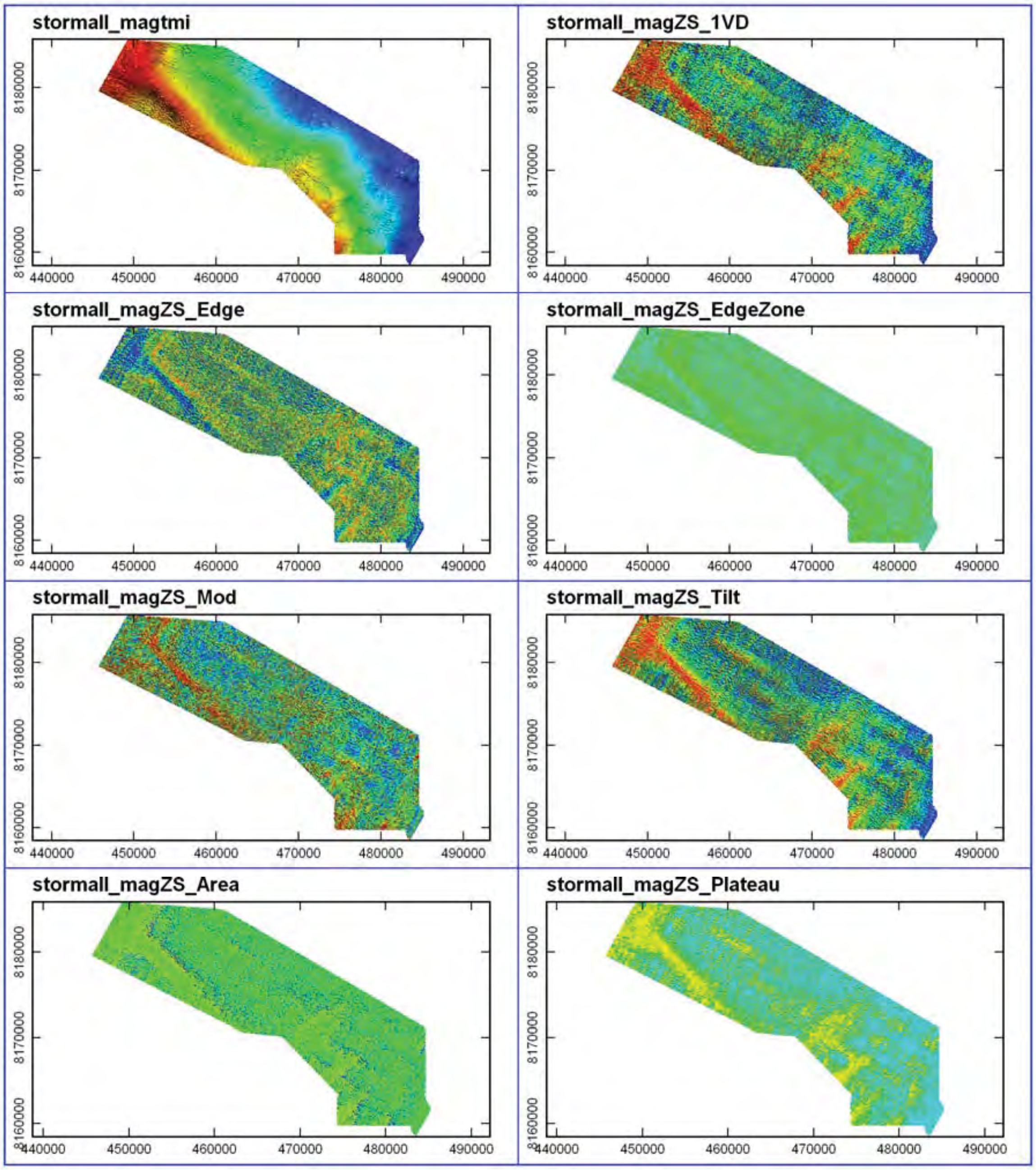

Figure 19. ZS Filter (magnetics) mosaic

Additionally, a suite of filters known as the 'ZS' filters'[17] (after Zhiqun Shi, the primary author of this development) were employed and are depicted in summary form on Figure 19 above. Two types of filters have been developed for the purpose of enhancing weak magnetic anomalies from

[17] Shi, Z. and Butt, G., 2004, New enhancement filters for geological mapping, Extended Abstracts, ASEG 17th Geophysical Conference and Exhibition, Sydney 2004.

near-surface sources while simultaneously enhancing low-amplitude, long-wavelength magnetic anomalies from deep-seated or regional sources. The Edge filter group highlights edges surrounding both shallow and deeper magnetic sources. The results are used to infer the location of the boundaries of magnetized lithologies. The Block filter group has the effect of transforming the data into ‘zones‘ which, similar to image classification systems, segregate anomalous zones into apparent lithological categories. Both filter groups change the textural character of a dataset and thereby facilitate interpretation of geological structures.

4.2.1. Multiscale edge analysis

The analysis of lineaments is of fundamental importance to understanding geological structures and the stress regimes in which they are produced. Automatic analysis of lineaments has previously been done with information mapped from remotely sensed data, using either satellite-based imagery or aerial photographs. Potential field data may also be analyzed in terms of their lineament content. Edge detection and automatic trend analysis using gradients in such data are methods for producing unbiased estimates of sharp lateral changes in physical properties of rocks. The assumption is made that the position of the maxima in the horizontal gradient of gravity or magnetic data represents the edges of the source bodies, although this should be used with caution. Such maxima can be detected and mapped as points, providing the interpreter with an unbiased estimate of their positions. The process of mapping maxima as points can be extended to many different levels of upward continuation, thus providing sets of points that can be displayed in three dimensions, using the height of upward continuation as the z-dimension. There have been recent developments and use of this method for interpretation of potential field data (e.g. Archibald *et al,* 1999[18] and Hornby *et al,* 1999[19]). Archibald (1999) refers to this process as ‘multiscale edge analysis.’

In multiscale edge analysis the assumption is made that lower levels of upward continuation map near-surface sources while higher levels of continuation map deeper sources. This assumption is generally true but must be treated with caution, due to the non-uniqueness of potential field solutions. The INTREPID software’s unique implementation of multiscale edge analysis includes the use of Eüler ‘worms’ which provide a view of structural geology obtained directly from potential field geophysical data. The method is based on Fourier techniques for continuation, reduction to pole and total horizontal derivatives coupled with automatic edge detection.

[18] Archibald, N., Gow, P. and Boschetti, F., 1999, Multiscale edge analysis of potential field data: Exploration Geophysics, 30, 38-44.

[19] Hornby, P., Boschetti, F. and Horowitz, F.G., 1999, Analysis of potential field data in the wavelet domain: Geophysical Journal International, 137, 175-196.

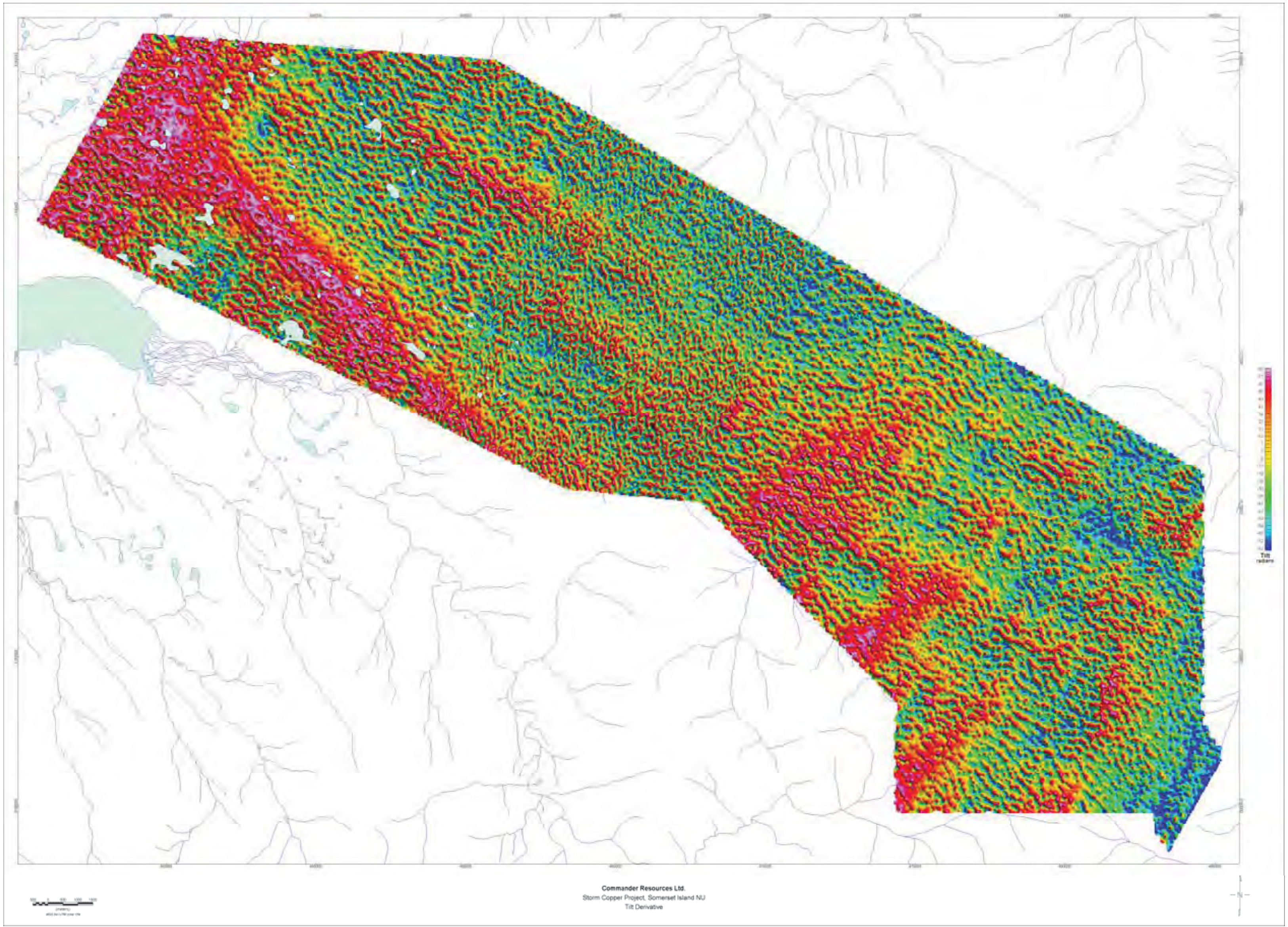

Figure 20. ZS Filter: Tilt Derivative

The tilt derivative above provides a substitute for both the vertical derivative and the high-frequency band pass residual anomaly.

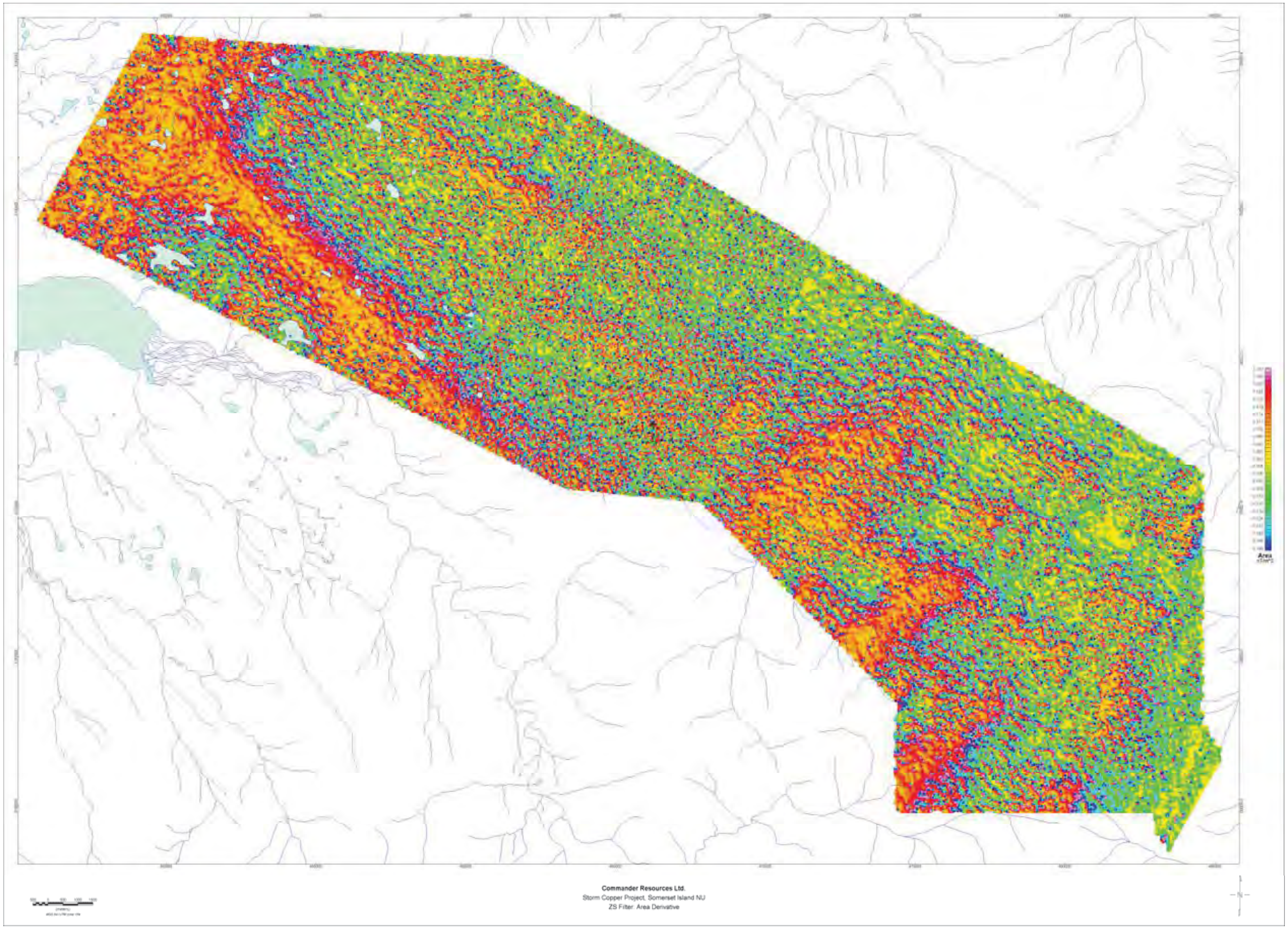

Figure 21. ZS Filter: Area Derivative

The ‘Area’ filter above serves to effectively segregate anomalous zones into apparent lithological categories.

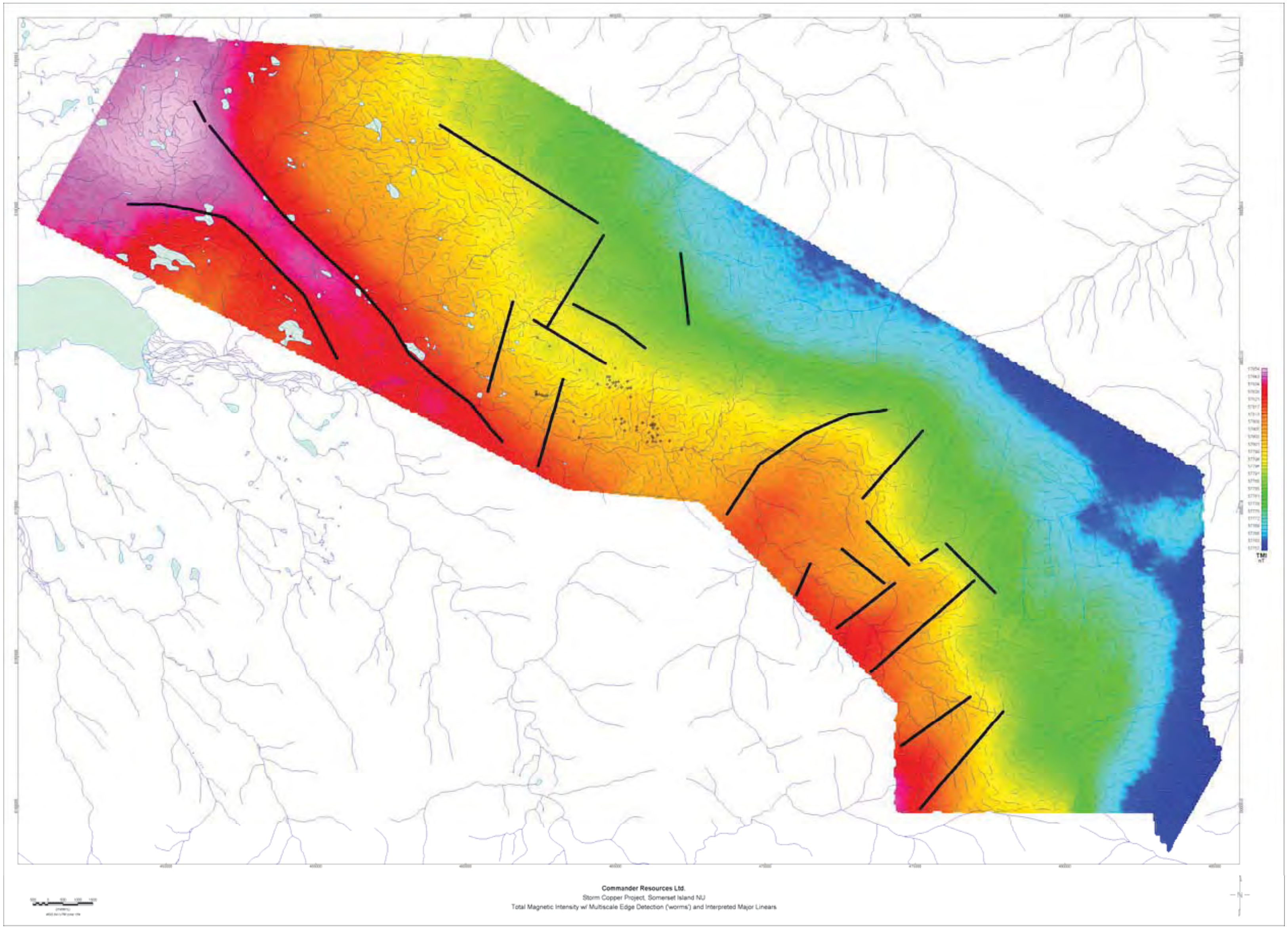

Figure 22. Multiscale edge detection (‘worms’) with interpreted major linears

Multiscale edge detection (‘worms’) with interpreted major linears from analysis of all derivatives, superimposed on magnetic intensity.

4.3. Electromagnetics

The airborne electromagnetic images are dominated by obvious, positive zones at the western-most extents of the survey; these are interpreted as broad, formational type responses and are very likely due at least in part to salt water incursion into near-surface sediments / bedrock from Aston Bay and Pelly Sound. However, a sharply-defined gradient is seen to extend southeast from these positive zones through the 3500N Zone before 'bending' south-southeast and following the trend of a tributary to the Aston River. The prominent 'edge' mapped by the AEM is interpreted to map or delineate the southern margin of the Central Graben reported by McRobbie *et al* (2000) and late reiterated by Cook and Moreton (2009).

Three pronounced negative zones of AEM response are also seen on this data (following figure); two are approximately elliptical in shape, while the eastern-most zone is elongated. These negative zones are a peculiar phenomena[20]; sign reversals (negatives) arising from coincident loop time-domain e.m. (such as the VTEM system) can occur when the polarization decay becomes greater than the fundamental inductive response. For most conductivity structures, negatives will not be observed unless the IP chargeability of the ground is exceptionally large. However, in special circumstances the fundamental inductive response is particularly small, and thus negatives can be produced by conductivity structures with geologically feasible chargeabilities. Examples of such circumstances are: in localised zones between inductively interacting conductors, at the edge of overburdens, and over relatively resistive grounds which have a thin polarisable surficial layer. In this case, near-surface polarizable material (e.g., glacial clays) lying over more resistive bedrocks are considered as the being the probable cause of these negative AEM anomalies on the Storm property.

Broad positives and peculiar negatives aside, the principle anomalies of interest occur coincident to the known 4100N, 2750N and 2200N; also responding well to the VTEM system are the ST97-15 and ST99-34 zones; these 5 zones comprise the sole, unambiguous bedrock responses in the entire survey. The 3500N zone does not have a significant positive AEM response, but does lay right along the gradient edge from positive (extended and layered conductive zone) to negative response, apparently at the southern edge of the NW-trending graben. All of these conductive responses are distinguished by a complete lack of direct magnetic correlation.

Based on initial modelling of selected lines, a consecutive series of 41 flight lines over the main Storm copper zone were chosen for detailed resistivity depth imaging (RDI); this work was carried out by Geotech Ltd. using their in-house implementation of the method. This technique is used to rapidly convert EM profile decay data into an equivalent resistivity versus depth cross-section, by deconvolving the measured TEM data. The Resistivity-Depth transformation is based on the apparent resistivity transform of Meju[21] and the TEM response from a conductive half-space. The program was developed by Alexander Prikhodko of Geotech Ltd., and depth-calibrated based on forward plate modeling using the Maxwell plate modelling software of ElectroMagnetic Imaging Technology Pty. Ltd. (EMIT). Further details of this process are supplied in an appendix to the Geotech logistics report (Appendix A to this report). Basically, the recorded TEM apparent resistivity data are transformed to an effective subsurface resistivity at an approximate exploration depth to yield an almost continuous picture of the resistivity distribution beneath the observational location.

[20] Smith, R.S. and G.F., 1988, TEM coincident loop negatives and the loop effect. Exploration Geophysics, vol. 19 (1988), p. 354–357

[21] Meju, M.A., 1998, Short Note: A simple method of transient electromagnetic data analysis. Geophysics, vol. 63, no.2, p. 405–410.

The RDIs provide reasonable indications of conductor relative depth and vertical extent, as well as accurate 1D layered-earth apparent conductivity/resistivity structure across VTEM flight lines.

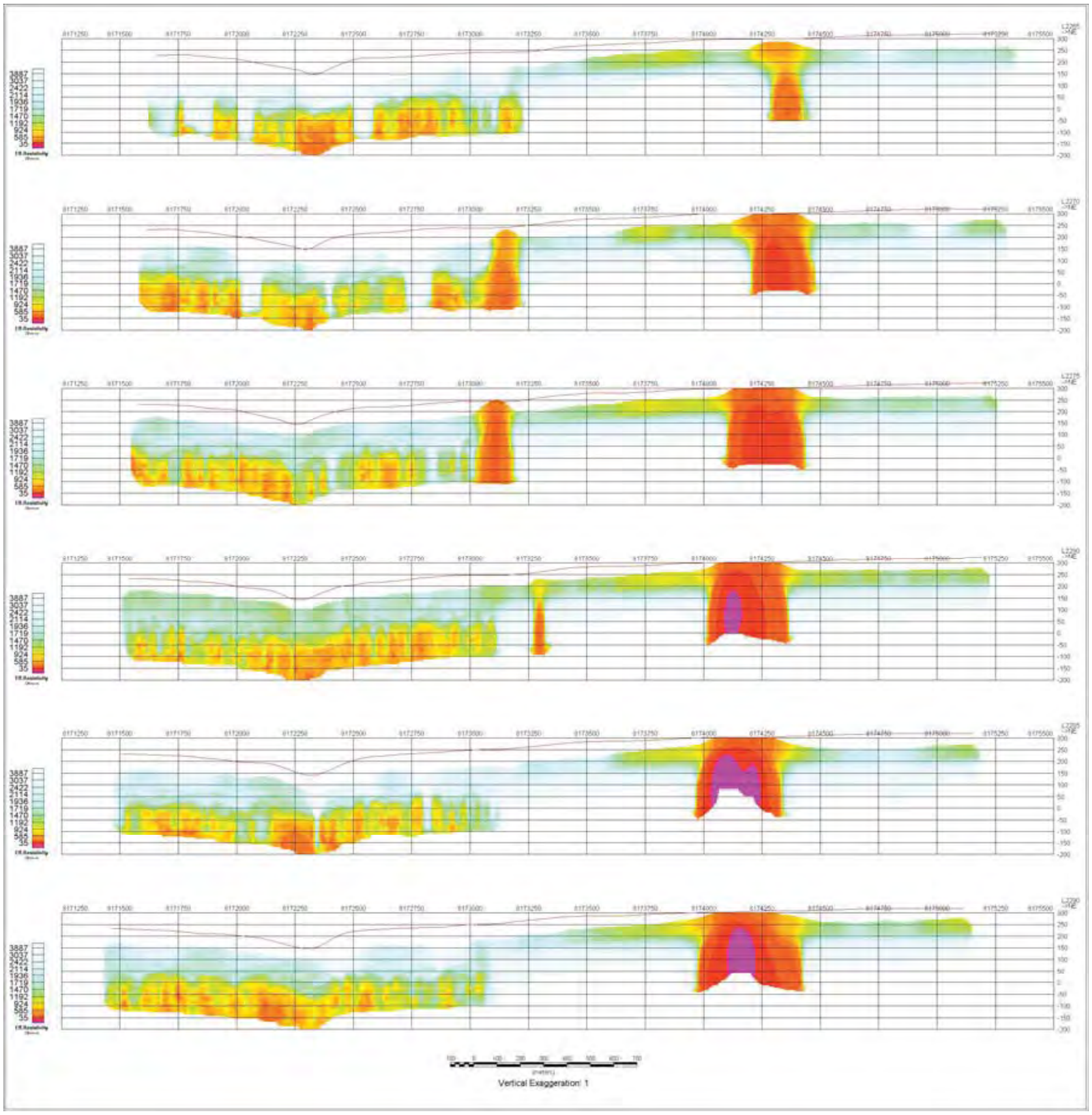

Figure 23. Example of stacked RDIs, Lines 2265-2290 inclusive

The series or stacked set of RDIs above displays 5-6 lines approaching the 4100N Zone from the west; the centre of 4100N Zone itself is shown on L2290 (bottom RDI), with the very conductive response at surface corresponding (more or less) to DDH ST00-60. The individual RDI for L2290 itself is shown on the following image, along with the historical drill collars and subsurface traces.

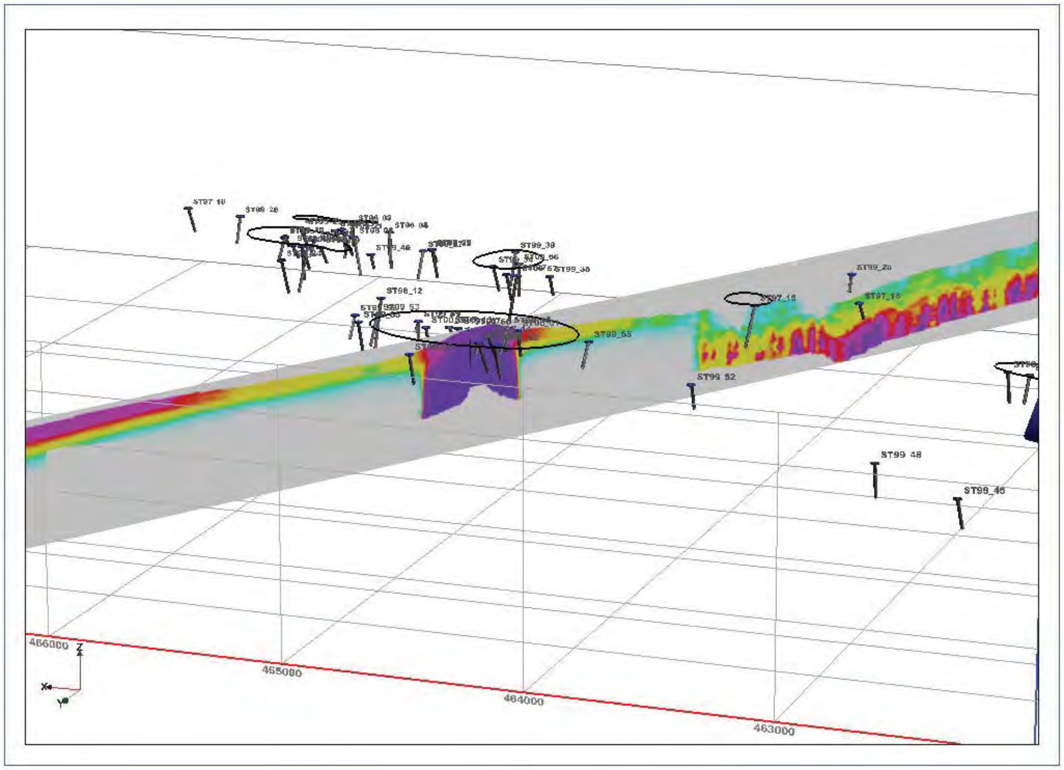

Figure 24. RDI section – Line 2290 looking toward 160° at inclination -15° (drill holes indicated)

The full set of RDIs are then gridded in a 3-dimenisonal context to produce a voxel model (a 3-dimensional solid representation of the Earth's apparent resistivity. Example results of this process are displayed following.

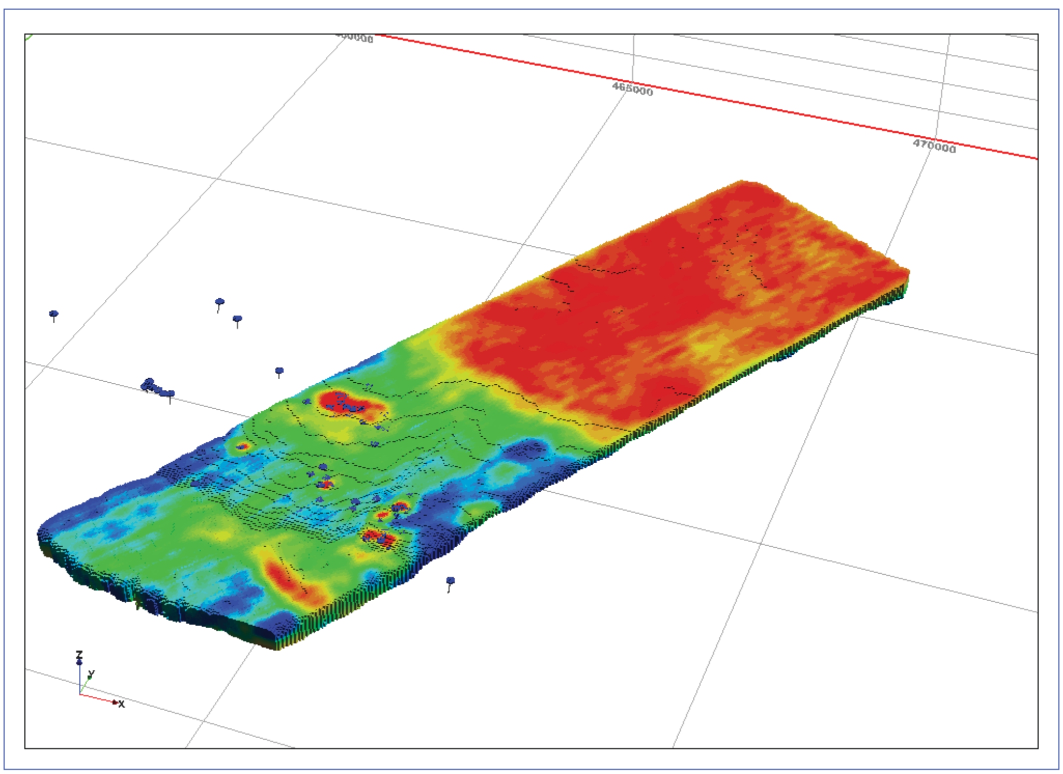

Figure 25. RDI voxel – overview using reverse colour lookup (red denotes higher conductivity)

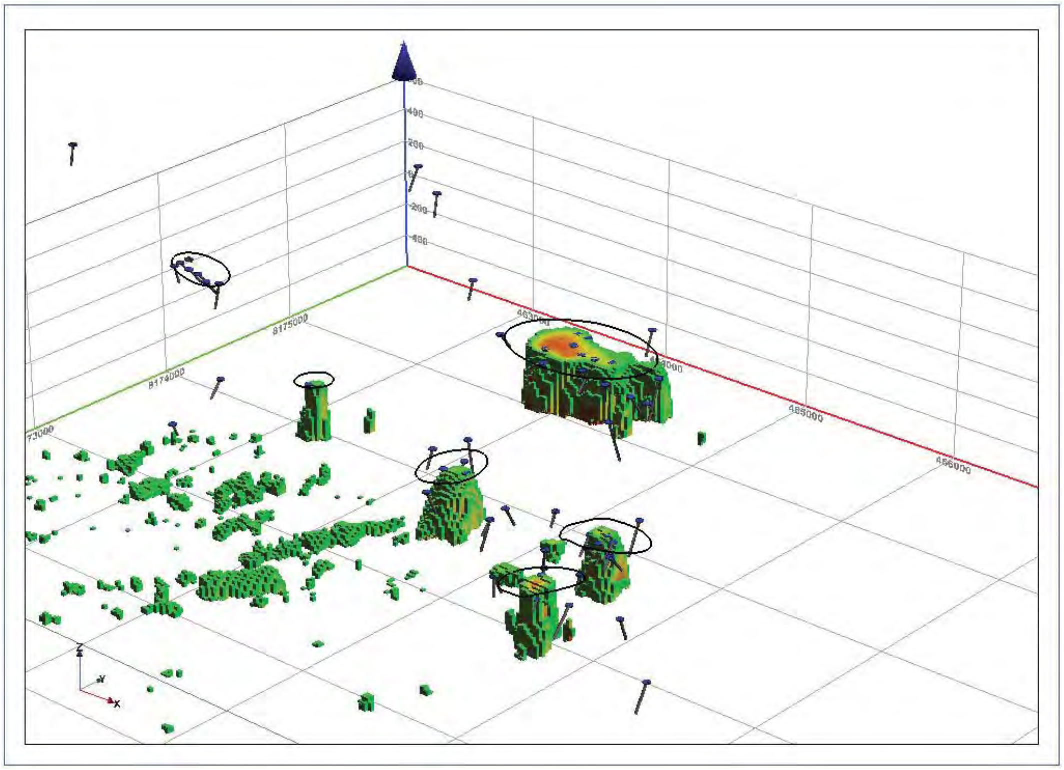

Figure 26. RDI – close-in view toward 320° and inclination -25° with RDI clipped to 500 ohm-m maximum

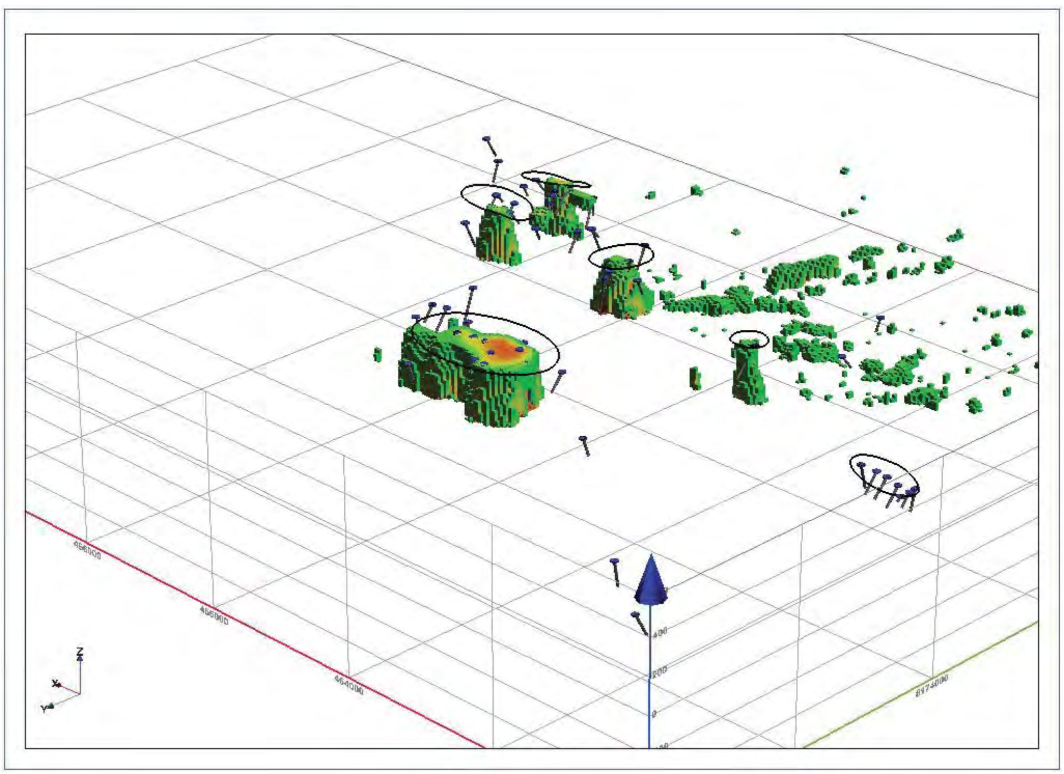

Figure 27. RDI – close-in view toward 135° and inclination -25° with RDI clipped to 500 ohm-m maximum

Analysis of the RDI inversions in conjunction with the historical drilling suggests that there remain portions of the 4100N, ST97-15, ST99-34 and 2200N Zones in particular, that have not been drill tested adequately. Further, the deep (100 to 200 m below sea level) conductive trends shown to be extending southward from the 4100N Zone have not been tested at all.

Additional modeling using the Maxwell plate modelling software should permit precise drill targeting for these bodies; this is currently being undertaken but will not be included in this report due to time constraints (assessment filing deadlines).

Notwithstanding the lack or absence of unambiguous bedrock conductors removed from the above, drilled zones, 9 target ‘areas of interest’ are identified on the following image as A-I; without exception, all represent primarily surficial or near-surface conductivity with very weak mid-time decays (and little or no late-time decays). These targets do not have similar characteristics to the main Storm zones discussed above, but nonetheless present themselves as possible areas for ground follow-up and geochemical sampling. They may reflect sulphides deficient in copper, or sulphides dominant in zinc and/or lead mineralization and thus not amenable to direct detection by electromagnetic methods.

ID	Xnutm15nad83	Ynutm15nad83
A	472700	8170375
D	461055	8184305
E	457600	8181900
C	467636	8180289
B	462101	8176193
F	453330	8185405
G	452640	8184185
H	451485	8185280
I	484100	8166650

Table 2. VTEM Secondary ‘areas of interest’

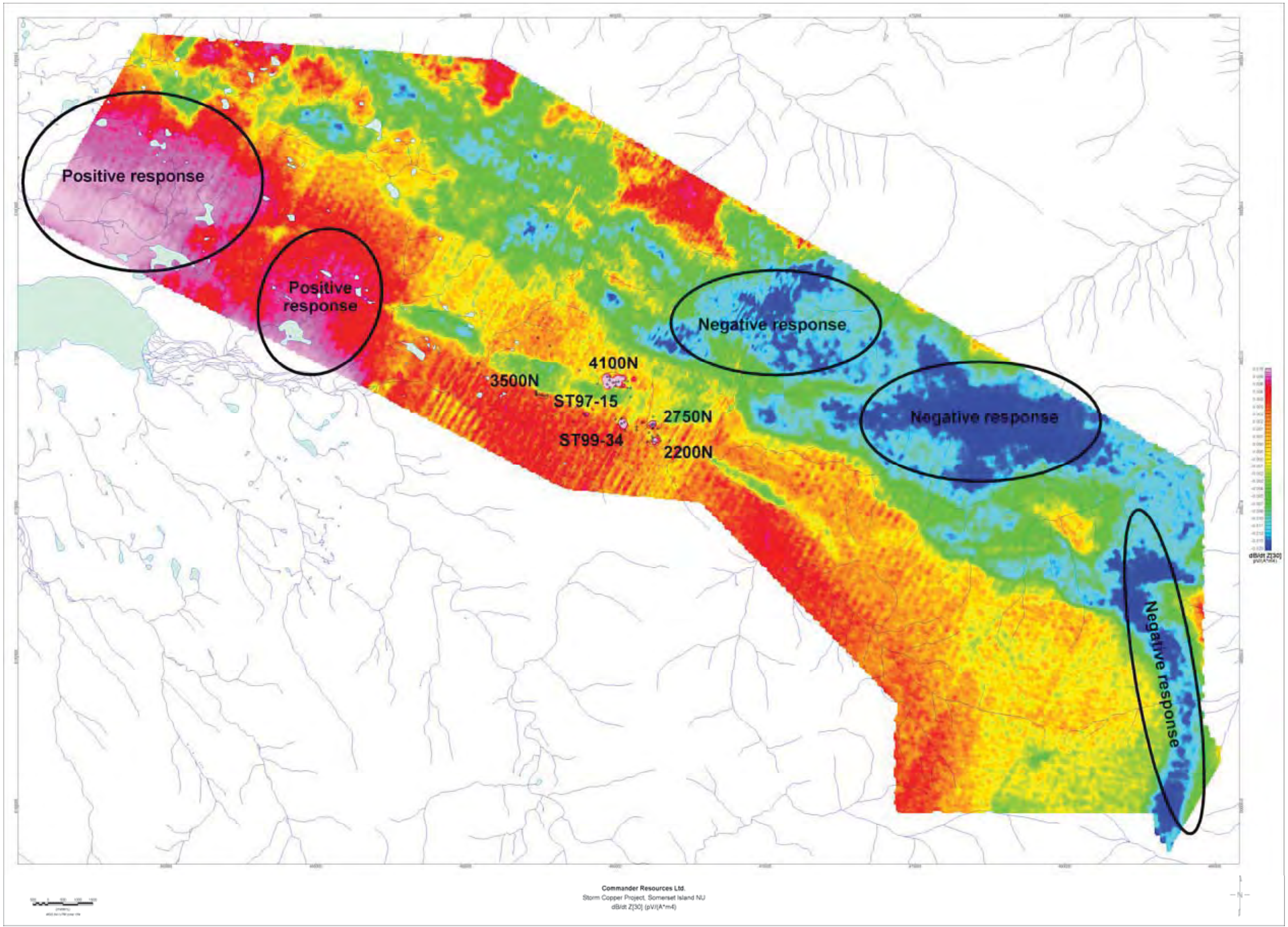

Figure 28. dB/dt Z[30] pseudocolour image with anomalous zones indicated

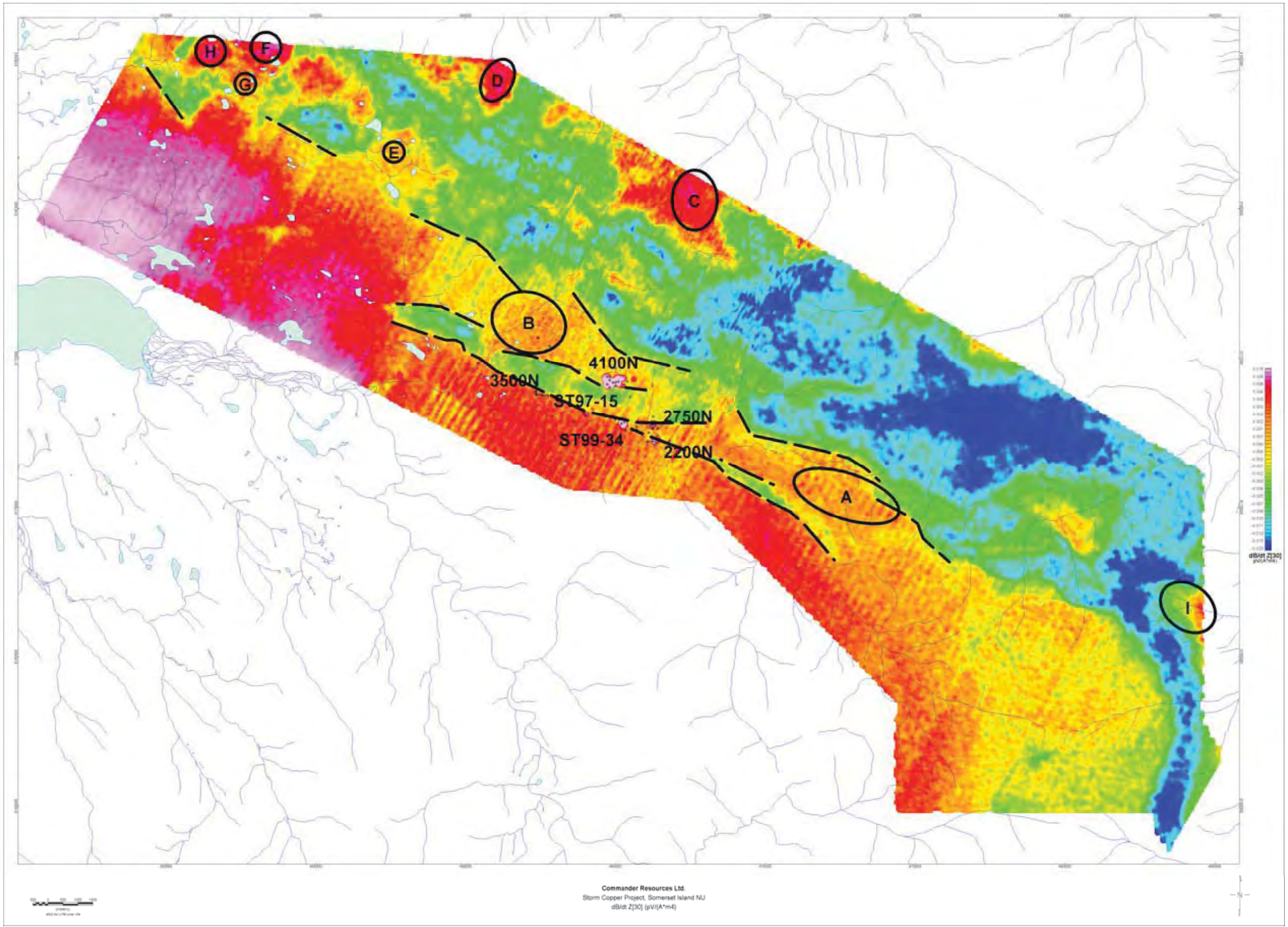

Figure 29. dB/dt Z[30] pseudocolour image with prospective target zones indicated