New Generation JESSY HTS SQUID Results over the LALOR Deposit

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INTRODUCTION

This paper presents new data acquired in December of 2009 using the new generation of high temperature JESSY HTS SQUID sensor over the LALOR Zn-CU-Au-Ag deposit. The JESSY HTS SQUID sensor is manufactured by ***IPHT*** (Institute for Physical High Technology in Jena, Germany), and operated by ***Discovery Int'l Geophysics Inc***., (Surrey, BC and Saskatoon, SK).

ABOUT LALOR

The Lalor deposit is approximately 15 kilometres from the HudBay concentrator in Snow Lake, Manitoba, an area that is a significant past producer of gold. The ongoing evaluation, exploration and development of the Lalor deposit is a primary focus for the company, as the Lalor deposit could be of significant financial benefit to HudBay and support substantial long term activity in the Snow Lake area.

The LALOR Deposit is located within the meta-volcanics, meta-sediments and granitoids of the Churchill province near Snow lake, Manitoba. The Lalor deposit was discovered in March 2007. The deposit is located in the Chisel Basin portion of the Flin Flon Greenstone Belt and is believed to be the largest VMS deposit found in this region to date.

Zinc rich base metal zone: Mineralization occurs in six separate stacked lenses of zinc rich polymetallic near solid to solid sulphide mineralization approximately 570 meters to 1,170 meters below surface. In October 2009 an Indicated Resource of 12.3MT 1.6 g/t Au, 24.2 g/t Ag, 0.66% Cu, 8.70% Zn, and an Inferred Resource of 5.0MT 1.4 g/t Au, 25.5 g/t Ag, 0.57% Cu, 9.39% Zn were disclosed.

Gold zone: Low sulphide precious metal intersections associated with chalcopyrite and galena. In January 2009, HudBay reported the discovery of a new gold zone with the potential to have principal credits derived from gold mining and on October 8, 2009 announced a conceptual estimate of a potential gold zone, interpreted as five discrete mineralized lenses that can contact the near solid sulphide zinc rich mineralization.

Copper-Gold zone: Disseminated to near solid chalcopyrite with lesser pyrrhotite and minor pyrite, sphalerite and galena located to the north of Gold zone 27 at approximately 15 to 20 degrees down plunge and at vertical depths of between 1,200 and 1,300 meters.

For more details on the Lalor deposit, including the resource estimate for the zinc-rich base metals zone and the conceptual estimate of the potential Gold zone, please refer to the NI 43-101 compliant technical report for Lalor dated October 8, 2009 and the company's September 22, 2009, October 8, 2009 and December 17, 2009 news releases, available at www.SEDAR.com.

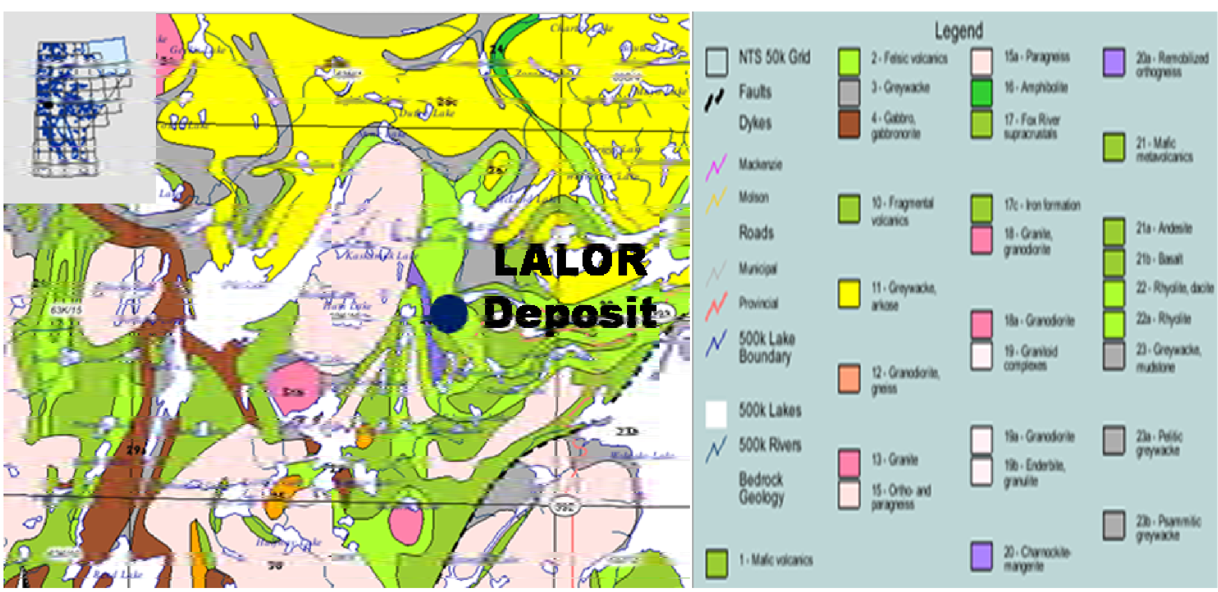

Figure 1: Regional Geology over the LALOR Deposit

SURVEY LAYOUT

The survey was conducted using transmitter loops already in place as shown in the accompanying figure.

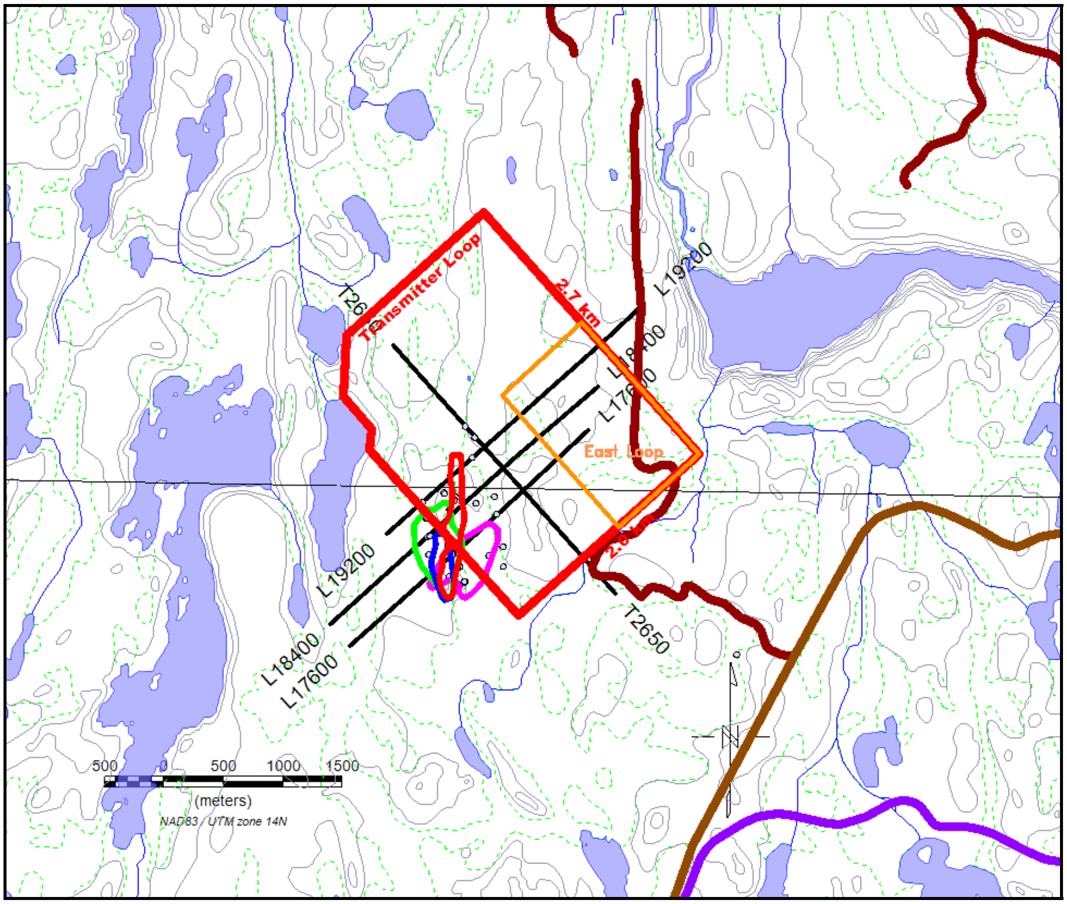

Figure 2: Survey Layout and Orebody Location

Lines 18400 and Lines 17600 were surveyed with the JESSY HTS SQUID at a transmitter frequency of 1.66 Hz using the large transmitter loop. Line 17600 was also surveyed with an induction coil at a transmitter frequency of 5 Hz with the large transmitter loop.

Lines 19200 and T2650 were surveyed with the JESSY HTS SQUID at a transmitter frequency of 0.5 Hz using the smaller east loop.

ABOUT HTS SQUID

The SQUID (**S**uperconducting **QU**antum **I**nterference **D**evice) consists of a small sensor (typically a couple of cm in size) which becomes a super conductor at low temperatures ~ 69 degrees Kelvin for HTS and ~ 4 degrees Kelvin for LTS applications. The sensor is located within a cryostat and is cooled with liquid nitrogen for HTS SQUIDS and liquid helium for LTS SQUIDS.

SQUID EM sensors have been in service for ground electromagnetic surveys for approximately 10 years, including the CSIRO LANDTEM HTS SQUID system and the proprietary JESSY LTS SQUID sensor developed for Anglo American Plc.

The new generation JESSY HTS SQUID sensor was developed by IPHT (Institute for Physical High Technology in Jena, Germany), and is operated by Discovery Int’l Geophysics Inc. (offices in Surrey, BC and Saskatoon, SK). The JESSY HTS is a robust sensor contained within a glass fibre reinforced plastic cryostat. The JESSY HTS is optimised for easy and fast operations and is suitable for all field conditions. After positioning the measuring unit, the control unit will be connected and placed in a few meters distance. After that the measurement is initiated with the button auto tune. Batteries need overnight recharging and the system is refilled with liquid nitrogen every day.

Coupled with the SMARTEM Receiver from ElectreMagnetic Imaging Technology (EMIT at www.electromag.com.au) and Phoenix’s high-powered TXU-30 transmitter, the JESSY HTS sensor is capable of directly measuring B-Field to an accuracy of several femtoTesla’s.

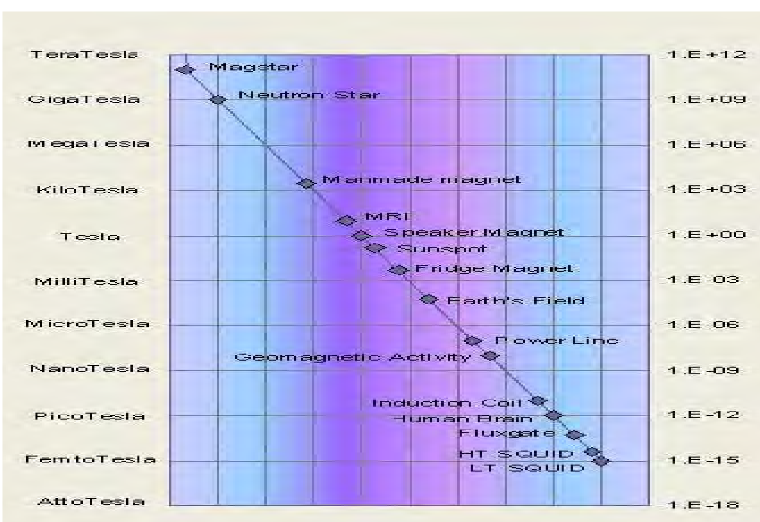

Figure 3 SQUID Sensitivity

B FIELD VS INDUCTION MEASUREMENTS

A number of authors have championed the advantages of B-Field measurements including Osmond and LeRoux. The JESSY HTS SQUID EM sensor offers the advantages of B-Field measurement as well as the unparalelled acuracy of SQUID sensors. Sources have cited acurracy improvements of up to 10 to 20 times that of conventional Induction coil recevers.

Conventional Induction coil recevers measures the time derivative of the magnetic field resulting from electric currents induced in the ground. With a square transmitter waveform, This measurement of dB/dt is an approximation of "impulse response".

The JESSY HTS SQUID sensor enables the collection of higher quality B-field data at lower frequencies. By measuring B-field TEM responses with the JESSY HTS SQUID sensor, one measures the time-integral of impulse response which is called "step response". The time-integral is an important "filter" and attenuates decays which are rapid (from weaker or unconfined conductors) in preference to decays which are slow (from strong conductors).

A significant advantage of the JESSY HTS SQUID is the ability to measure increasingly later time gates, resulting in better definition of highly conductive targets at increasingly greater depths. For base metal sulphide targets with high conductivities, the later time gates are crucial to defining deeper zones or targets that are undetected below other less conductive shallow bodies or conductive overburden.

As a result of the preferential attenuation of fast decays in a B-field TEM survey, it is easier to observe the response of a good conductor in the presence of a weaker conductor such as a host, overburden or less conductive bedrock feature. The response of a good conductor is observed in a B-field TEM survey earlier in time than it is in an equivalent dB/dt survey which means that it is more likely to be above the noise level.

Some indirect advantages of using the JESSY HTS SQUID sensor is the increased accuracy of the measurement may aid in the design of a more focussed EM survey array with a smaller transmitter loop to further reduce the background or layered response. Additionally, the higher accuracy of the resulting data collected with the JESSY HTS SQUID sensor will certainly result in more accurate models and interpretations of the data for exploration purposes.

TIME GATES

An essential factor in the discovery and evaluation of high conductivity targets with Time Domain EM surveys is the ability to measure later time gates at lower frequencies.

This was initially accomplished with the use of very large transmitter loops with high dipole moments and long stacking times to improve signal quality. The traditional TDEM surveys at 30Hz which measured decays out to about 8 milliseconds are not suitable for the task. Increasing the decay measurement to ~ 45 milliseconds with long stacking improved the signal significantly at late times and resulted in the detection of the Lalor deposit. Another leap forward in signal quality at later times of up to 130 milliseconds was obtained with the use of fluxgate and SQUID sensors (Mark Shore, et. al., 2009).

The JESSY HTS SQUID is also capable of these late times and perhaps even later decay times of up to several hundred milliseconds.

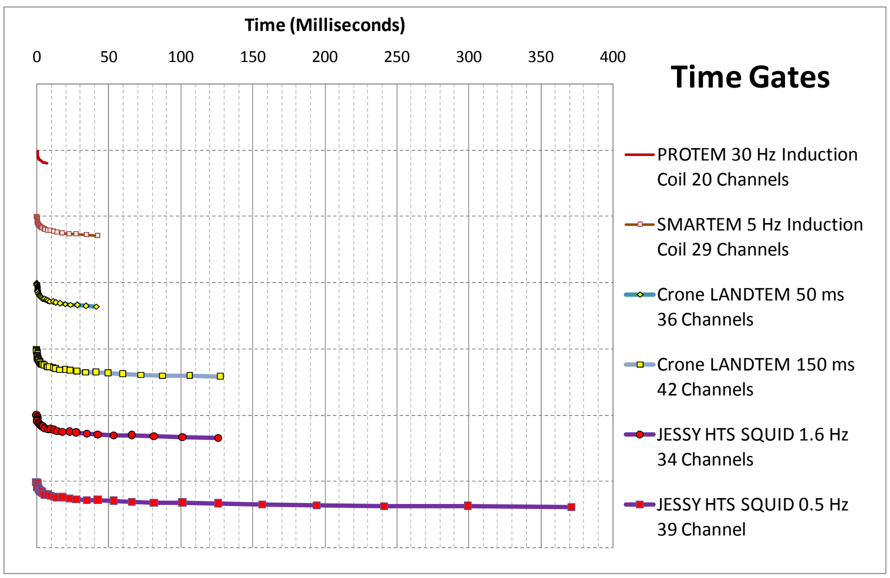

Figure 4: Time Gates

DECAYS

The JESSY HTS SQUID shows very stable and clean decays. Figure 5 shows a comparison of the Induction Coil (6 repeats at 256 stacks) and the JESSY HTS SQUID (10 repeats at 64 stacks). Figure 6 shows the JESSY HTS SQUID at 1.6 Hz (10 repeats at 64 stacks) and 0.5 Hz (16 repeat measurements at 32 stacks).

Figure 5: Induction Coil (5 Hz) and JESSY HTS SQUID (1.6 Hz)

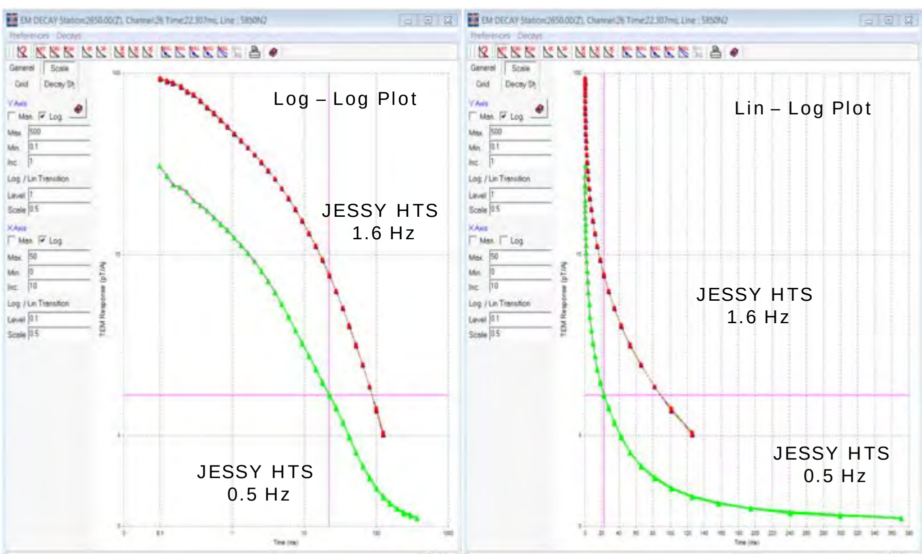

Figure 6: JESSY HTS SQUID Decays (1.6 Hz and 0.5 Hz)

PROFILE COMPARISONS

The profile data from the JESSY HTS SQUID is comparable (if not cleaner) than the existing fluxgate and LANDTEM SQUID, although the target is easily detected by all three sensors.

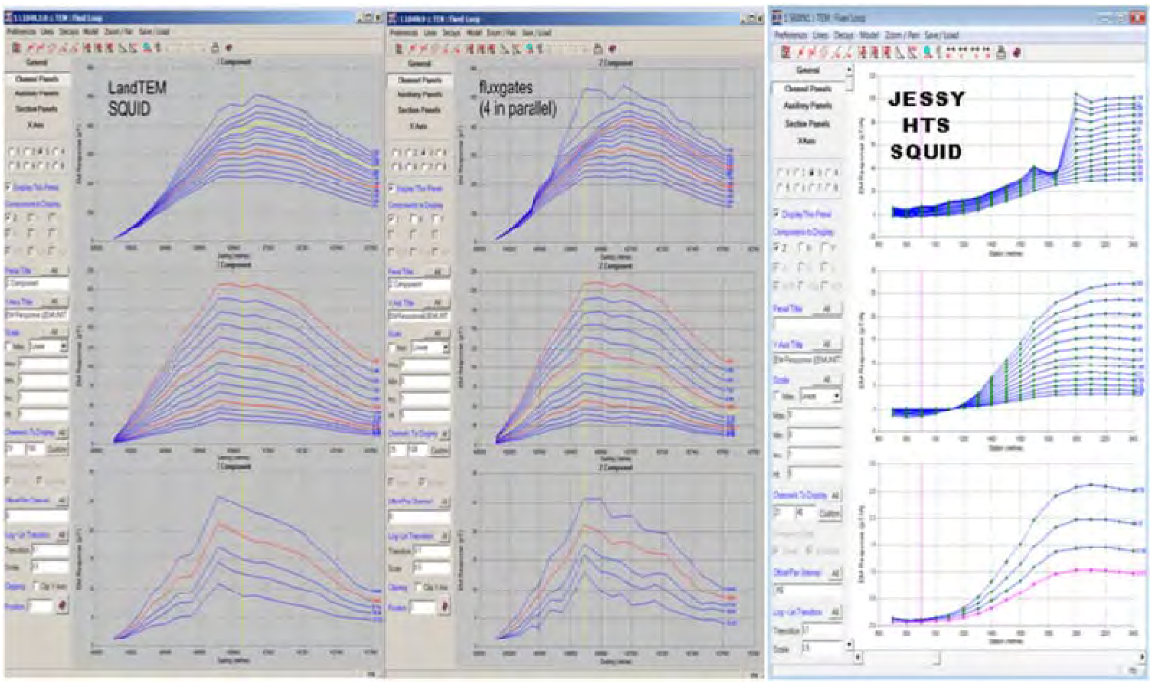

Figure 7: Profiles

MAXWELL MODEL INTERPRETATION

Without an interpretation, data is just data.

Maxwell from ElectroMagnetic Imaging Technology (EMIT at www.electromag.com.au) has an excellent plate modeling algotithm with inversion capabilities.

Model studies have suggested that characteristic peaks (or troughs) of complex conductors in close proximity may be displaced from the actual conductor location. Some further modeling shows the peak displacements are also affected by the conductor dips, conductivity and transmitter-receiver configurations. This suggests it is important to generate models to determine the actual conductor locations.

The procedure for interpreting EM data is to create relatively simple models with Maxwell to determine dips, positions and relative conductivity of complex conductors. This helps to compensate for any geometric effects of complex conductor systems.

Simple or complex conductors are initially based on the width of the anomaly. A single conductor appears as a well-defined anomaly. A complex conductor (either wide or multiple) appears as a much wider anomaly, which may be skewed depending on the conductivity differences within a wide conductor or among multiple conductors. The layered (or background response) is simulated by a horizontal sheet. For fixed loop surveys a large sheet (~10x loop size) is placed centered under each transmitter loop. The data may be further complicated by areas of conductive background (conductive blocks). The elevated background due to the conductive blocks is not immediately apparent until conductor models are examined.

The modeling / interpretation process consists of a controlled inversion with the Maxwell software. Quite often only a single component and a narrow range of channels can be used to determine an inverted model for the late time responses. In this case, an interpreted model was made with Maxwell with all 4 profiles simultaneously. A constrained inversion using late time channels 25 - 34 (22 ms to 125 ms) was performed with the only rigid constraint being the strike and dip direction derived from the geological data.

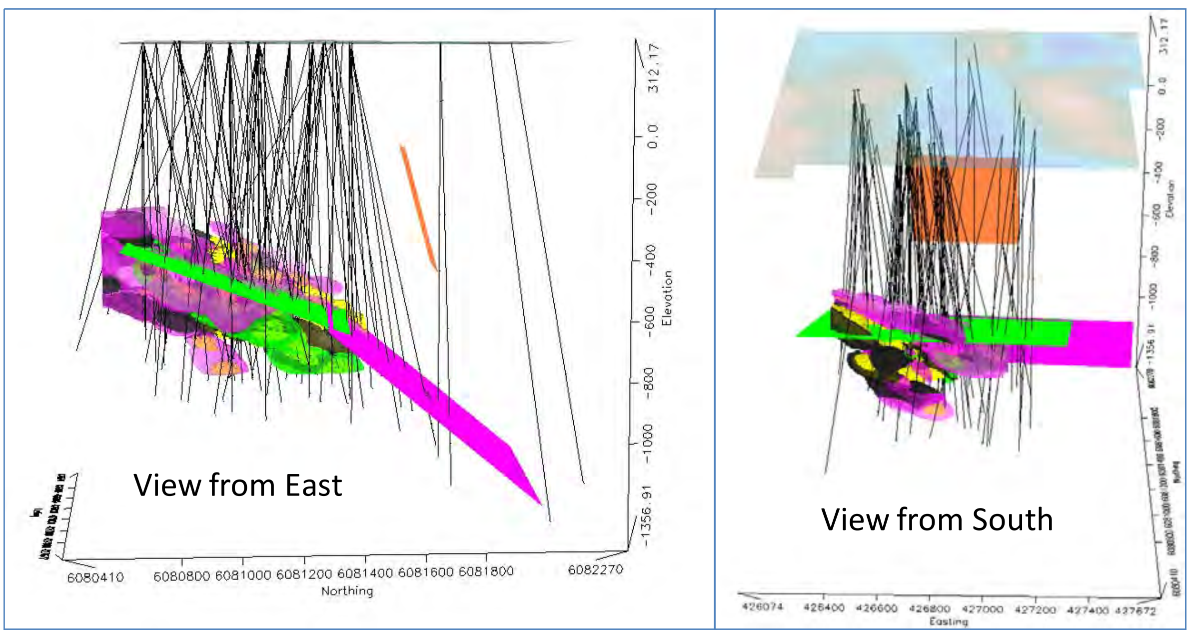

Figure 8: Maxwell Model & Ore Body Locations

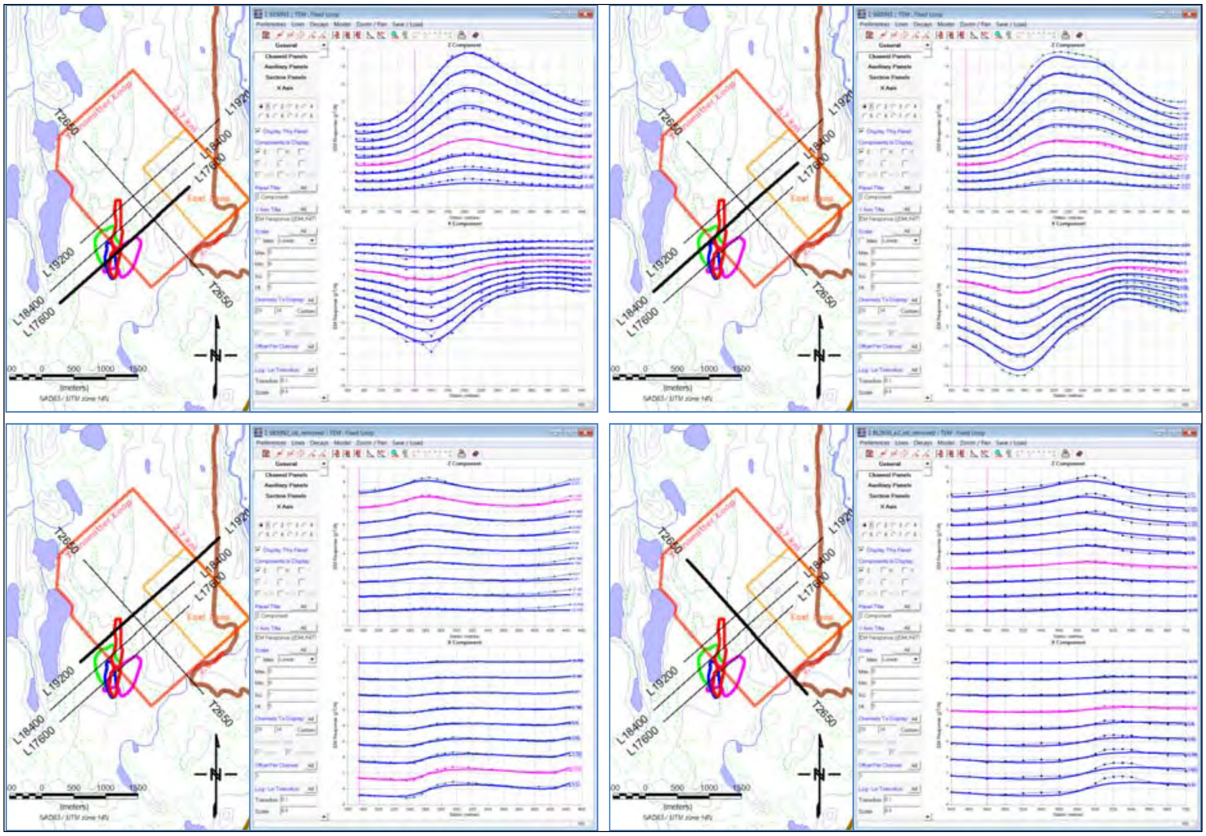

Figure 9: Maxwell Fitted Profiles

The Maxwell model was an attempt to fit the later time data on all 4 profiles from two separate loops simultaneously within a range of channels for both the Z and X components. It was almost immediately evident this is a complex model. For electromagnetic surveys, a complex model is apparently anything more than a single plate in a homogenous background.

The model does a very good job of capturing a first order approximation of the ore bodies. Not surprisingly, the green Maxwell plate is located near the surface of the complex ore bodies. The magenta plate suggests the anomalous area continues at depth with an increased dip. There is also strong evidence of a nearer surface feature and an off-line response. The model conductivities interpreted from the Maxwell inversion are approximately consistent with those measured from down-hole EM surveys (communication with HUDBAY Chief Geophysicist A. Vowles).

In particular, the final, best-fiiting model (Figure 10) demonstrates that the 1200m deep Copper-Gold zone has been detected and resolved with the superior signal-to-noise of the JESSY HTS SQUID sensor.

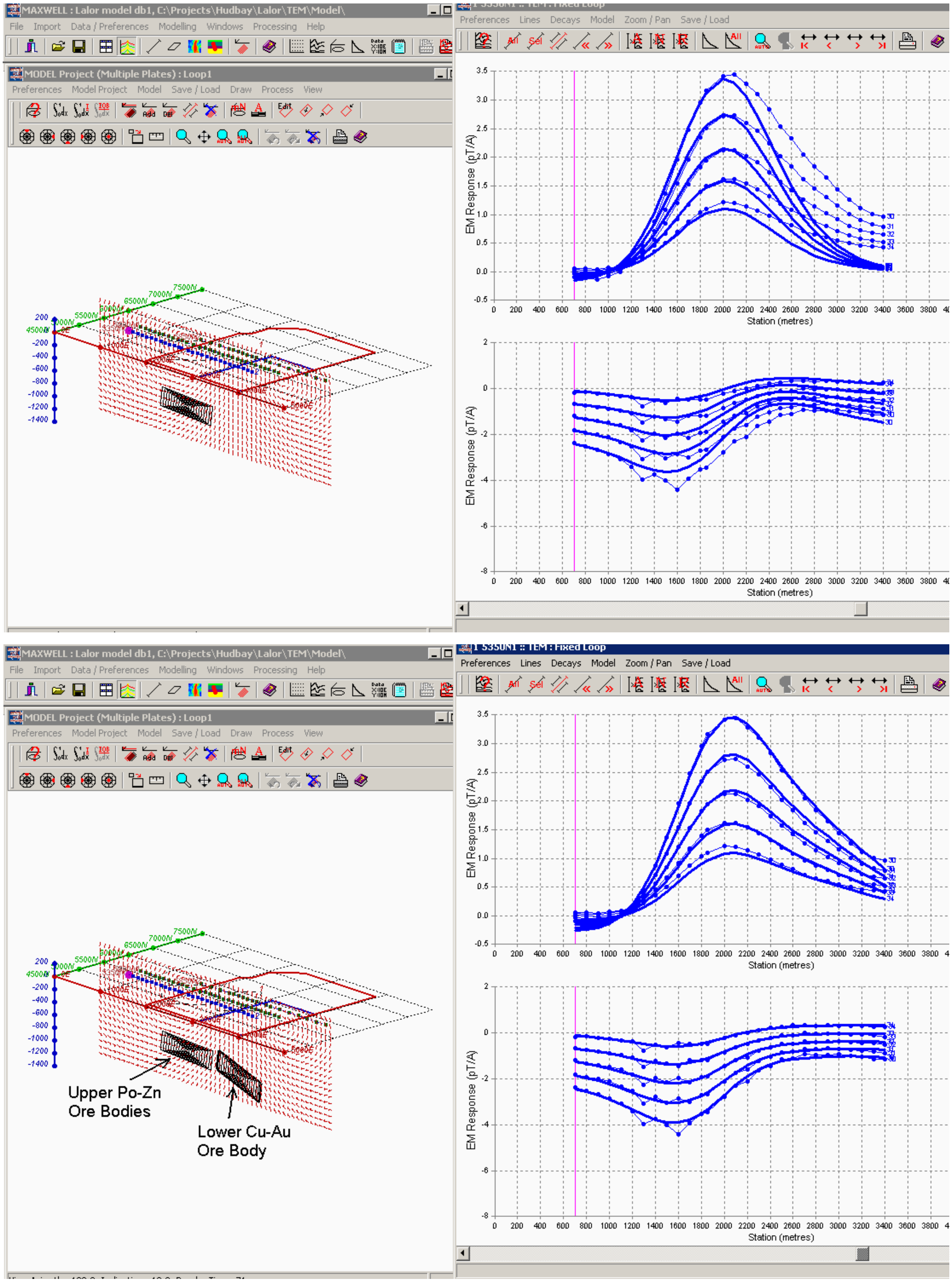

Figure 10: Maxwell model fit with and without the deep Cu-Au zone

CONCLUSIONS

The JESSY HTS SQUID (developed by IPHT and is operated by Discovery Int'l Geophysics Inc.) is an impressive new tool for electromagnetic surveys which require high accuracy and later time gates for the transient EM decay.

The JESSY HTS SQUID offers all the advantages of direct B-field measurement including

- The potential to see through other conductive bodies or conductive layers.
- Better conductivity resolution of good and "super" conductors with conductivities above 200 Siemens
- Suppression of the background response and the ability to image good conductors in early and late time transient decays.
- The unparalelled acuracy of SQUID sensors with accuracies of up to 10 to 20 times that of induction coil measurements.

The JESSY HTS SQUID's high accuracy lends new strength to model interpretations and inversions.