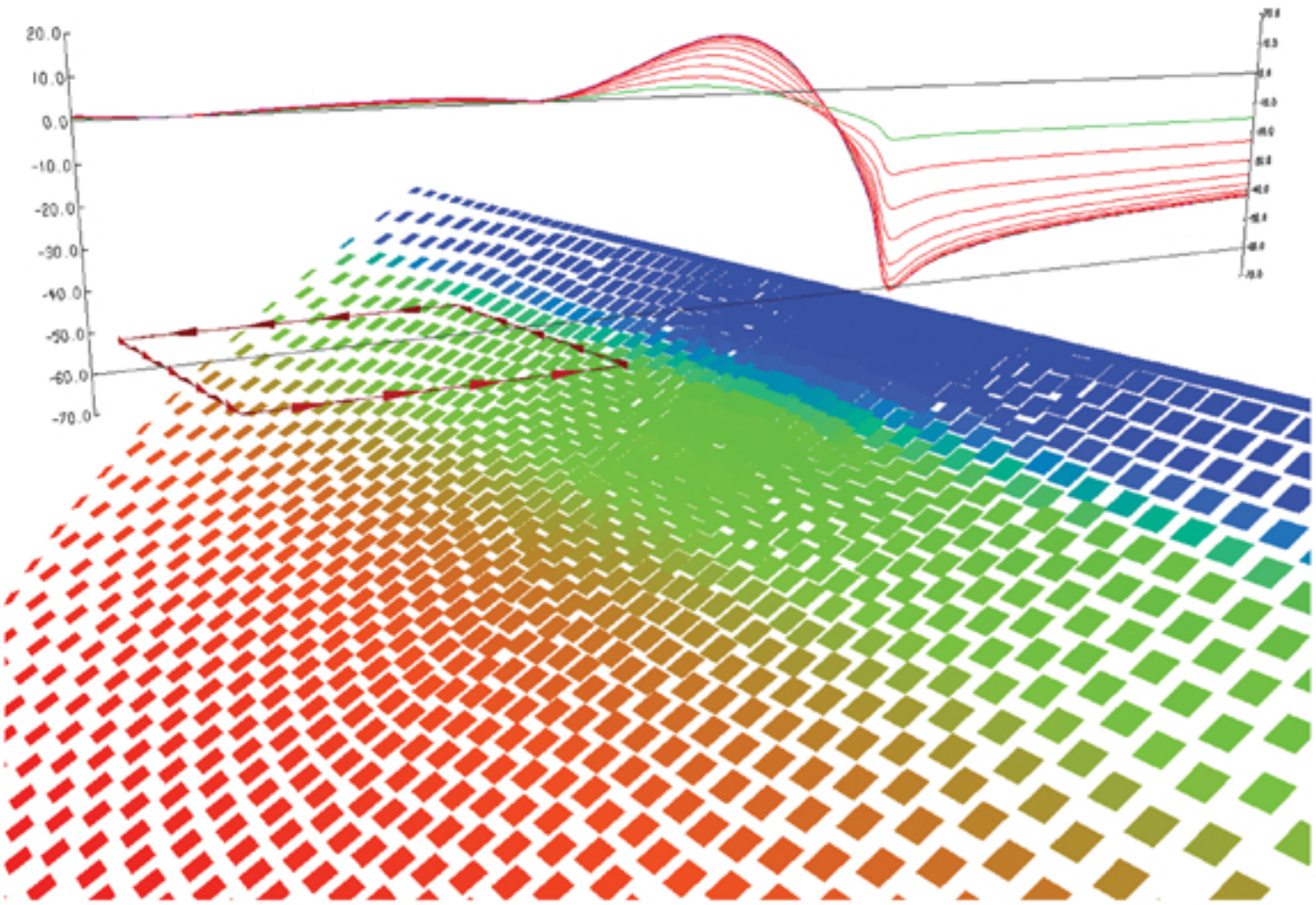
LAMONTAGNE

GEOPHYSICS LTD.
GEOPHYSIQUE LTEE.

Deep Electromagnetic Exploration For Over 30 Years



MultiLoop II Mesh Rendering with Loop & Plot

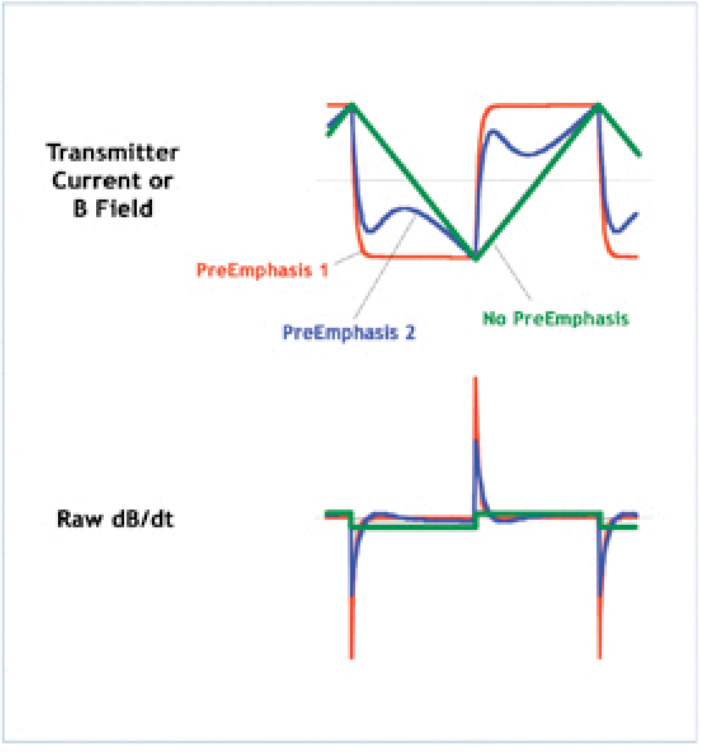
LAMONTAGNE GEOPHYSICS LTD. GEOPHYSIQUE LTEE.

UTEM: The Only True On-Time Transient EM System

Lamontagne Geophysics Ltd. designs the most technically-advanced TEM systems for surface and down-the-hole EM surveying. Our UTEM systems provide maximum depth of investigation, efficient field deployment, superior resolution of conductive bodies and ease of interpretation. The unique waveform and design of our UTEM systems help us achieve these results. Where other transient EM systems become less sensitive in conductive environments, or as the conductivity of the target rises, the Lamontagne UTEM maintains a much more uniform target sensitivity.

The UTEM system consists of a transmitter, receiver and either a coil for surface exploration, or a borehole probe for down the hole applications.

UTEM 4 Borehole System with Winch



Ideal Ramp Waveform & Pre-Emphasis Deconvolution

Pre-Emphasis/Deconvolution (PE/DC) is used to improve the signal-to-noise ratio (SNR) of the sampled signal

UTEM Waveform: The UTEM transmitter waveform, which is dynamic over its entire range, is unique in EM exploration. The UTEM system measures the EM response while the transmitter field is changing (on-time measurements). This is the only way to detect and characterize extremely conductive deposits. Such structures generate a secondary field that tracks the primary field variations so as to exclude any time varying field from their interiors. By measuring while the transmitter field is changing, UTEM sees both the freely decaying and the directly driven part of the secondary field. Other time domain systems measure mainly while the transmitter waveform is off and depend primarily on the freely decaying part of the field, therefore they are insensitive to very high conductivity structures. An additional benefit of the UTEM's waveform is that measurements are taken over the entire waveform so no response signal is wasted, leading to improved surveying productivity and better signal to noise per unit survey time.

The unique features of the UTEM waveform and sampling scheme combine to produce UTEM's uniform response sensitivity. The amplitude of the UTEM response varies little over a wide range of target conductivities and thickness, parameters which affect the decay time of the response, therefore, the response amplitude expected for a given target size is predictable.

Reconnaissance EM Surveys

For your reconnaissance needs, a light-weight current-regulating UTEM 3 transmitter - specifically designed for large transmitter loops - provides excellent depth of exploration. The surface system has the capability of measuring three components of the time-varying electromagnetic field (Hx, Hy, Hz) for various loop configurations.

The large loop Hz mode is ideally suited for massive sulphide and deep-basement conductor mapping. In this mode, the survey can be designed for reconnaissance or detailed mapping of conductors at depth. A wide range of transmitter loop sizes (exceeding 4km x 4km) and the ability to search inside or outside the loop enables the detection of conductors of any orientation.

This transmitter is designed to use lightweight 17 gauge (1mm) or 14 gauge (1.5mm) magnet wire for the transmitter loop. It is possible for a one or two person crew to lay out a large loop (2km x 2km) in one day, even in difficult terrain, keeping survey costs low while allowing application in demanding environments. This results in the ability to cover large areas in a cost-efficient manner.

The compact UTEM 3 receiver/coil system is lightweight, rugged and suitable for all field conditions. The receiver, which is also used for ISR surveys, can be used at base frequencies ranging from 1Hz to 88Hz. It has five selectable PE/DC levels to optimize the signal-to-noise ratio for each frequency range. The UTEM 3 surface coil is specially designed for use with the UTEM 3 receiver. It has unique features such as active guarding and a B field feedback sensing method to give it exceptional sensitivity and response stability.

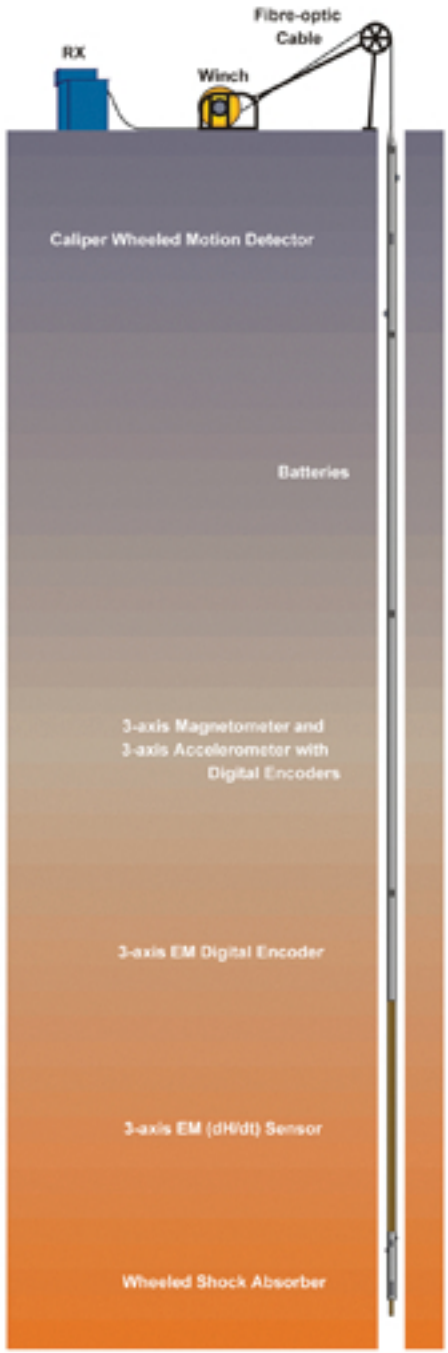
UTEM 5 Surface Coil & Receiver

This newest addition to the UTEM fleet is tailored for exploring deep, highly-conductive targets at low frequencies

Deep Exploration

For exploring at depth and/or with low frequencies, the UTEM 5 receiver and coil used in conjunction with the UTEM 4 transmitter is a valuable tool. It is designed particularly for deep and very low frequency measurements. The UTEM 5 surface coil samples all three components of the magnetic field simultaneously at a 100kHz rate. The resulting data are processed and recorded in real-time by the UTEM 5 receiver.

This system features extremely low noise, along with excellent performance specifications at low frequencies - ideal for highly conductive targets. This combination would be invaluable for deep exploration at low frequencies.



BHUTEM 4 Probe

Simultaneous EM measurement in 3 axes

Borehole UTEM

The UTEM 3 receiver and transmitter, designed to be rugged and lightweight, can also be used for axial component down-the-hole surveying. Used with UTEM 3 axial probe, it is an ideal light weight system for reconnaissance drill programs.

The UTEM 4 receiver, for use with the UTEM 4 borehole (BHUTEM 4) probe, has unique features such as asynchronous channel sampling, simultaneous stacking of 3-axis BHEM data and programmable PE/DC noise reduction, making it ideal for deep high resolution BHEM measurements.

The High Power UTEM 4 transmitter can also be used with borehole surveys. This transmitter is useful for deeper boreholes and lower frequencies and has a higher current output (+/- 10A, +/- 525V output). The usable frequencies can range from 31Hz down to 0.5Hz. This transmitter has many benefits; DSP synthesized waveform, 4-quadrant current regulation and a digitally controlled, optically isolated output stage.

The UTEM 3 axial probe was the first UTEM sensor probe for axial component down the hole surveys. It was instrumental in discovering the Victor Deep deposit at a depth of 2.5km. It was the first EM downhole sensor with fibre-optic output signal.

The UTEM 4 borehole probe measures the three components of the EM field (axial and the two transverse) simultaneously and at exactly the same measuring point. The magnetometers and accelerometers contained in the probe are used to accurately calculate the probe's orientation. In addition, the temperature reading (taken to correct the accelerometer's reading) can be used to locate temperature anomalies due to sulphide bodies. The use of fibre optic cable link and digital signal output in both these probes completely eliminates noise pickup and signal degradation, allowing the UTEM probe to explore to greater depths than any other system.

Survey Services: Exploiting the UTEM's Advantages

The unique system response of Lamontagne's UTEM equipment lends itself to a very wide range of applications. It was designed to provide uniform wideband coverage for both large loop surface and down-the-hole surveys for deep exploration.

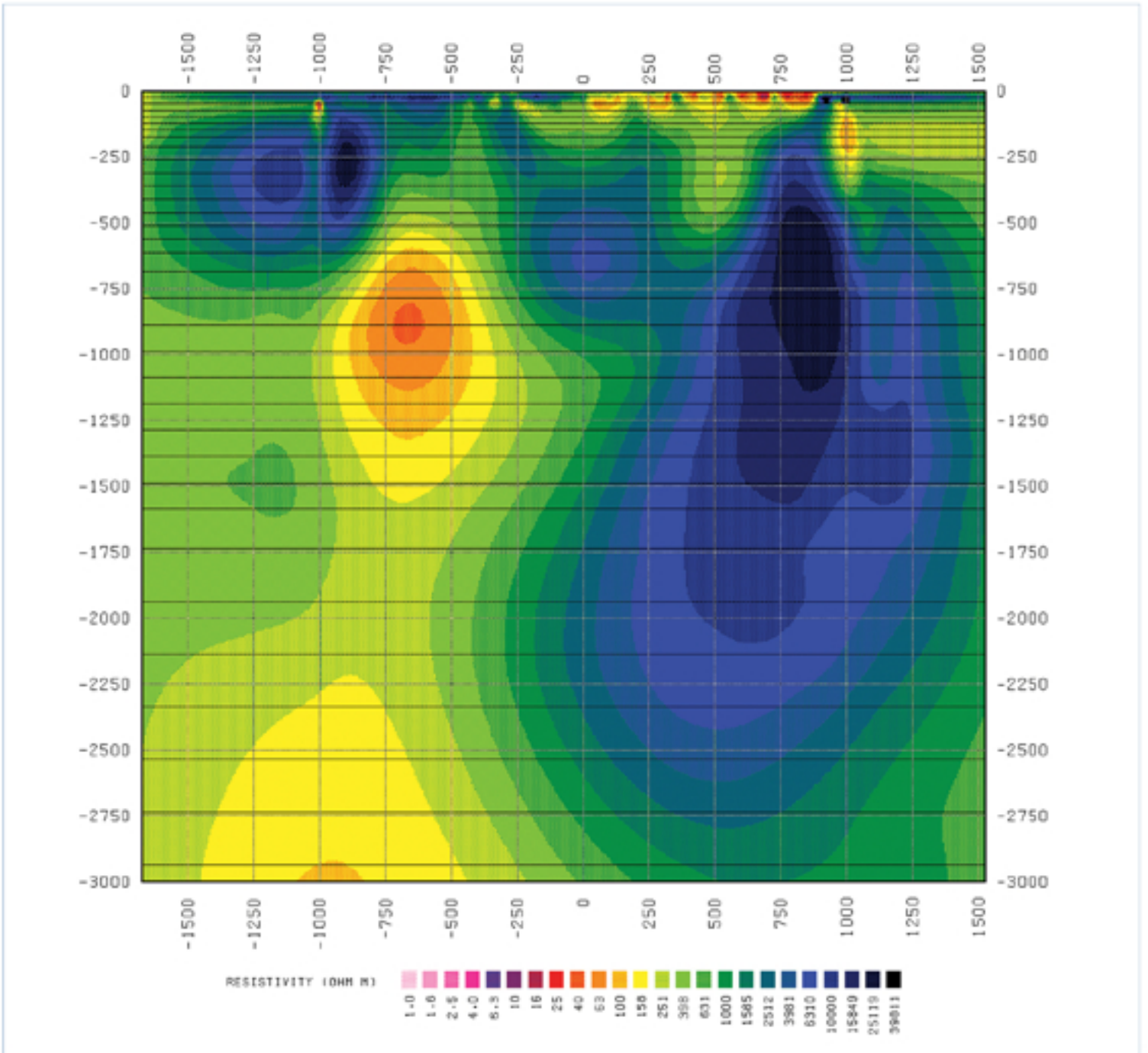
Lamontagne provides survey services with our UTEM system for base metal, precious metal, uranium and hydrocarbon exploration as well as ground water. UTEM has even been used in deep crustal studies. Lamontagne provides experience, expertise and tools for the design, execution and interpretation of EM surveys.

Inductive Source Resistivity (Electric Field)

The UTEM 3 receiver/transmitter can also be used in the Inductive Source Resistivity (ISR) mode to measure the E-field. The UTEM system has the capability of measuring two components of the electric field (Ex, Ey) for various loop configurations. The ISR method is an effective tool for mapping the resistivity structure of the ground to several kilometres. When used with a single transmitter loop, ISR can be an effective, rapid reconnaissance tool that can be used in place of gradient array resistivity methods, particularly in frozen, arid or rocky areas where ground contact is difficult.

Since ISR combines multi-time channel data with multiple transmitter geometry, it has more information from which to reliably build sections than does a standard resistivity survey that depends on geometry alone. The ISR technique can be used to detect resistivity contrasts in environments too resistive for standard EM methods. By selecting the line orientation, ISR can be used to preferentially detect conductors or resistors, and so differs from a standard EM survey where conductors alone are targeted.

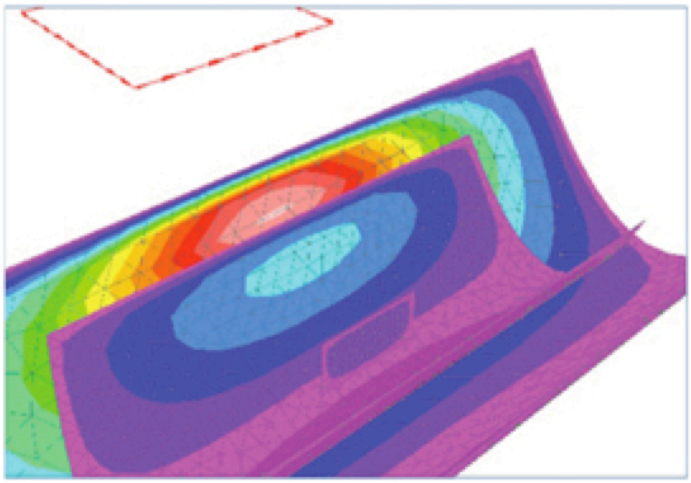
ISR has been used in the past on a number of gold prospects and has mapped silicification and iron formation. It has also been used to detect alteration zones associated with mineralization in Athabaska Basin uranium exploration.



Inductive Source Resistivity (ISR) Results in Shea Creek

Interpretation & Modelling Tools

Modelling Programs (MultiLoop 2 and 3): These programs are sophisticated EM modelling applications. MultiLoop 2 has been available for some time and is a multi-conductor EM modelling tool for controlled source EM systems. MultiLoop 2 can simulate the EM response of multiple interacting plates, giving an excellent approximation of true physical response. MultiLoop is a powerful tool for interpretation, planning EM surveys and testing hypotheses. MultiLoop 3 is used to model thin conductors that may have complex shapes and varying conductances. This would be used in more complex situations and for planning EM surveys.



MultiLoop 3
Modelling of eddy current in syncline conductors

New Developments

Conductivity vs Depth Imaging (CDI): Used to reduce and process the data collected from multi-fold depth sounding. It generates a conductivity vs. depth section from the UTEM data.

Curved Reflector CDI (CRCDI): The CDI process has been greatly enhanced through the use of *curved reflectors* instead of receding transmitter loop images in the apparent depth fitting. The aim is to make CDI applicable in areas where the structure is not quasi-layered.

ISR Resistivity Imaging: The ISR resistivity imaging technique uses a two-step process to calculate a resistivity section from multi-fold/multi-channel electric field data measured with the ISR configuration. It uses a CDI process in the first step to extract diffusion depth information from the time variation of the data. To better render the lateral resistivity variation, it then uses a 2D resistivity inversion, subject to the diffusion depth constraints and also model smoothness conditions.

History of Geophysical Surveys & Field Experience

Our innovations in design give our UTEM system the sensitivity and search depth to achieve exploration results:

Levack Footwall - FNX Mining
Nickel Rim South Mine - Falconbridge
Victor Deep in Sudbury - Inco.
Heringa in the NWT - St. Joe Minerals.
McCreedy East Footwall in Sudbury - Inco.
Kudz Ze Kayah in the Yukon - Cominco.
Hellyer in Tasmania - Aberfoyle - Cominco.

...and other yet undeveloped deposits worldwide. All of these discoveries used Lamontagne's UTEM system.

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