



**Mira Geoscience**  
*...modelling the earth*

# 3D Electromagnetic Modelling and Interpretation Consulting Services

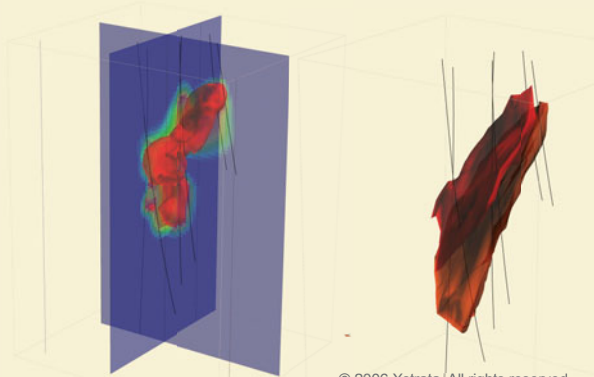
**A comprehensive geophysical interpretation team**

## Summary

Electromagnetic geophysical methods have proven to be useful and cost effective tools because mineral deposits, and associated alteration zones, are often either electrically conductive or resistive in relation to their setting. The ground, borehole or airborne EM data responses can be complex and require expert analysis, such as quantitative modelling, to provide the best geologic interpretation.

Our team of experienced geophysicists offers 3D electromagnetic (EM) modelling that will generate the information most useful to guide follow-up exploration and drill programs, provide an understanding of exploration targets within their geologic setting, and define orebody geometry. Results can be integrated with geological information, other geophysical techniques, and modelling constraints that can be incorporated to guide the results.

Common applications include nickel exploration, VMS deposits, SEDEX deposits, deposits associated with graphitic units, deposits associated with conductive or resistive alteration, deposits associated with paleo-channels, as well as geotechnical applications.



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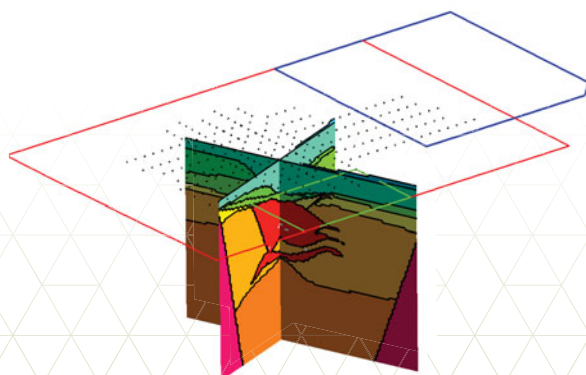
Conductivity from 6 drillholes.

Geology from 42 drillholes

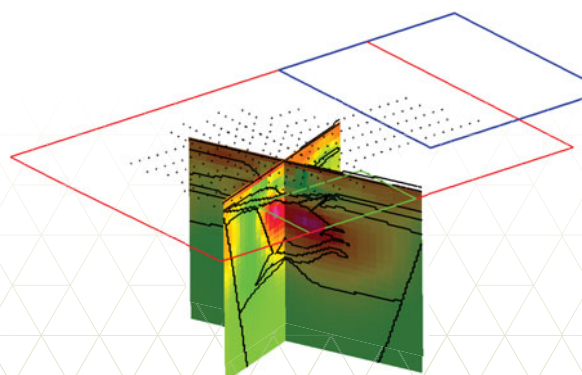
3D inversion of borehole TDEM data: Imaging mineralization at depth of more than 1000m.

## Core electromagnetic services

- » Experienced team versed in all types of electromagnetic data
- » Data quality control
- » 3D forward modelling and survey design studies
- » Unconstrained or constrained 3D inversion
- » Advanced targeting studies using an integrated 3D-GIS approach



Geology



3D conductivity

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3D inversion of ground TDEM data: imaging an irregular VMS body below conductive cover.

## Key Features

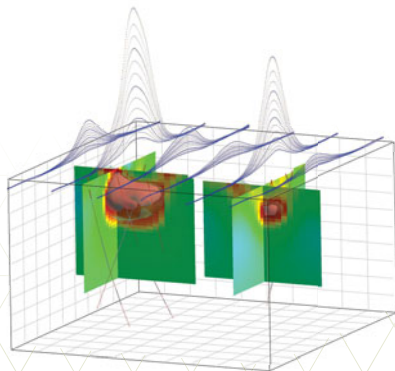
### Improved EM interpretation with 3D modelling and targeting

3D EM modelling can be performed in either the time or frequency domain. We provide forward modelling as well as constrained and unconstrained inversion.

Feasibility studies based on forward modelling performed before data acquisition will help you understand detection limits for your target. In addition, forward modelling can be used as a survey design tool before the outset of acquisition in order to optimize key survey parameters such as transmitter location(s) or receiver line and station spacing. These efforts can result in a better quality EM data set at lower acquisition costs.

After the data are acquired, our team can help you assess the quality of your data no matter the type. We have experience with all types of EM data including: time domain borehole surveys, ground based large loop SQUID surveys, Magnetotelluric and CSAMT, as well as all types of airborne time and frequency domain surveys.

Inversion of virtually all EM data types is possible and often necessary for reliable interpretation. Where even basic geologic information is available, inversions can be constrained to honour existing knowledge. Geological constraints range from simple assumptions, concepts, and maps to detailed information provided by outcrop samples, drillhole physical rock property samples, geological logs, downhole resistivity logs, structural measurements and 3D geological models. Even in greenfields exploration, geologic constraints that are based on your exploration team's conceptual knowledge of the area provide useful input to an inversion.



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3D inversion of airborne VTEM data

### Electromagnetic data types

#### » Ground-based

- » Ground time domain
  - Coil, SQUID or fluxgate
  - On-time or off-time systems
- » MT and AMT
- » CSAMT and CSEM
- » MMR

#### » Borehole

- » Coil or fluxgate sensors
  - Geonics
  - Smartem
  - Crone
  - UTEM
  - others

#### » Airborne

- » All commercial time-domain and frequency-domain systems
- » VTEM, SKYTEM, DIGHEM, AEROTEM, GEOTEM, others
- » ZTEM

### Exploration applications

- » Nickel exploration
- » All types of massive sulphide deposits
  - » VMS
  - » SedEx
  - » Magmatic
- » Porphyry copper gold
- » Kimberlite
- » Graphite
- » IOCG deposits
- » Oil and gas exploration
  - » Oil sands
  - » Shallow gas
  - » Seafloor applications
- » Uranium exploration
  - » Unconformity type
  - » Paleochannel type
- » Geotechnical applications
  - » Groundwater
  - » Tailings management

### 3D-GIS analysis and targeting services

We have a team of experts for processing, analyzing, modelling and interpretation of EM data. A key component of this service is the visualization and quantitative integration of geophysics, geochemistry, and geology. All pertinent exploration information is quantitatively represented in a consistent 3D framework. We work with you in applying true 3D-GIS functionality to generate targets based on your exploration criteria.

We provide results in common 3D formats and a Geoscience ANALYST workspace for easy communication of results and ideas, and will host meetings for project review, interpretation, or investment purposes.



**Mira Geoscience**

...Montreal Vancouver Brisbane Perth