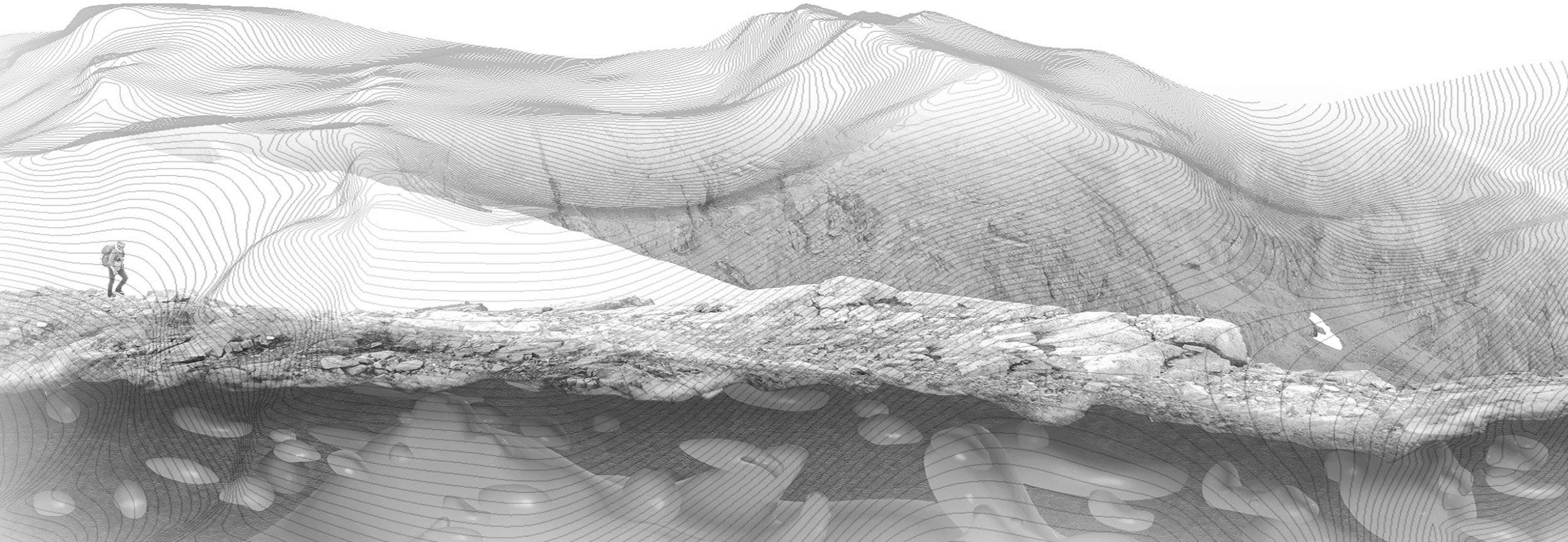
DIAS

LEADING GROUND AND AIRBORNE GEOPHYSICAL

QMAG^{T}

FULL-TENSOR MAGNETIC GRADIOMETRY (FTMG) SURVEYS



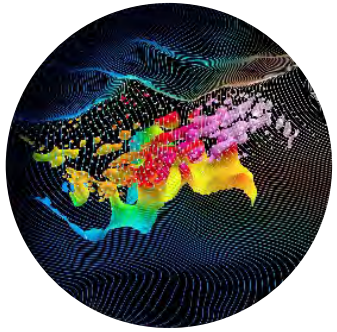
SERVICES OVERVIEW

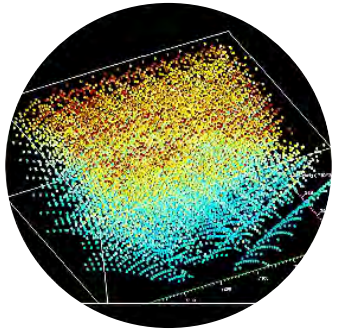
SPECIALIZING IN RICH, HIGH-VOLUME DATA ACQUISITION

SURVEY DESIGN OPTIMIZATION

SURVEY EXECUTION DATA ACQUISITION

DATA PROCESSING INITIAL MODELING





3D EARTH IMAGING

Patented 3D imaging systems
With patented acquisition technology and SQUID sensor systems, Dias delivers uniquely dense, rich data sets.

BIG DATA FOR ACCURATE, RESOLVED, DEEP MODELS

The ‘big data’ we acquire allows us to produce highly accurate and resolved deep images of the subsurface.

VERTICALLY INTEGRATED TO DESIGN, BUILD, DEPLOY

From gap analysis to data delivery, and design to manufacture, Dias controls its own destiny for its products.

WORLDWIDE OPERATIONAL EXCELLENCE

With experienced leadership and a global presence and partners, Dias has successfully deployed around the world.

DIAS CARAVEL LEVERAGING BIG DATA

A cloud service for the processing and 3D inversion of ‘big data’ powered by machine learning and custom codes.

EMERGING TECHNOLOGIES STRONG R&D PIPELINE

Dias has deployed the DIAS32 system, MT & the QMAG^{T} airborne system. Coming soon - QAMT, QTEM, DIASEM.

MARKET LEADERSHIP – WORLDWIDE SURVEYS

Dias operates globally with offices in Toronto, Vancouver, Chile, Mexico and head-office in Saskatoon.

Dias has carried out commercial surveys in Argentina, Australia, Canada, Chile, China, Czech Republic, Dominican Republic, India, Kazakhstan, Mexico, Peru, Mali, Saudi Arabia, West Africa and the USA.

What our clients say…

"Dias is a fine example of SUCCESS in technical INNOVATION & provides critical services to the mineral EXPLORATION industry INTERNATIONALLY."

"Your survey will continue to be the BASIS for our drill PLANNING through the summer. THANKS. . . we've found we can TRUST Dias!"

"We HIGHLY RECOMMEND Dias for geophysical services & would ABSOLUTELY use Dias again for FUTURE geophysical survey work."

"Thanks again for making a GOOD CALL today. SAFETY first. It's a relief to me to know that our team is in RESPONSIBLE hands."

"Thank you, the DATA looks GREAT, and the productivity OUTSTANDING. We will keep you in mind for any FUTURE IP work."

DIAS

LEADING GROUND AND AIRBORNE GEOPHYSICS

SUBSURFACE EXPLORATION

Our technology and services help clients uncover valuable insights into geological structure, lithology, and mineralization of their projects enabling them to make better decisions about exploration targeting, economic evaluation, and engineering design.

Minerals such as Gold, Silver, Copper, Lithium, Uranium, Iron, Zinc and more may be detected by geophysical means.

QMAG^{T} Airborne Full-Tensor Magnetic Gradiometry (FTMG) Surveys

Unrivalled Airborne Magnetometry

The QMAGT system is a helicopter-borne magnetic survey system that measures the magnetic field in a robust and detailed manner. The SQUID (superconducting quantum interference device) sensor measures the complete gradient tensor (second-order) of the earth's magnetic field (otherwise known as full tensor magnetic gradiometry – FTMG). This FTMG measurement provides directional information about the magnetic field which is not available from total field sensors, which have been the industry standard for many years.

The SQUID sensors are developed by Supracon AG of Jena, Germany. Operating within a liquid helium bath, the sensors measure the magnetic field with unrivaled sensitivity. The sensor system is the result of over 20 years of development and testing and has flown many successful exploration campaigns. The QMAGT system is the full commercialization of this established system.

The QMAGT system is deployed in a custom-built airfoil beneath a helicopter. This 'bird' effectively reduces motion noise, allowing for the recovery of high-quality data. As a lightweight system, QMAGT can be deployed in most operating environments.

QMAG^{T} Airborne Full-Tensor Magnetic Gradiometry (FTMG) Surveys

QMAG^{T} Advantages

- Plug and play helicopter operation for acquisition in most environments.
- Direct determination of anomaly geometry, irrespective of whether the source is remanent or induced.
- Better information on magnetization directions. The magnetic moment of compact sources can be directly determined.
- Gradient measurements, particularly full tensor measurements, determine on which side of a survey line a source lies.
- Effective survey results in low latitude environments
- Redundant tensor components (4 of the 9 measured tensors are redundant) give inherent error correction and noise estimates.
- Desirable mathematical properties, allowing magnetization mapping, rigorous continuation, reduction to the pole, depth slicing, invariants, etc.

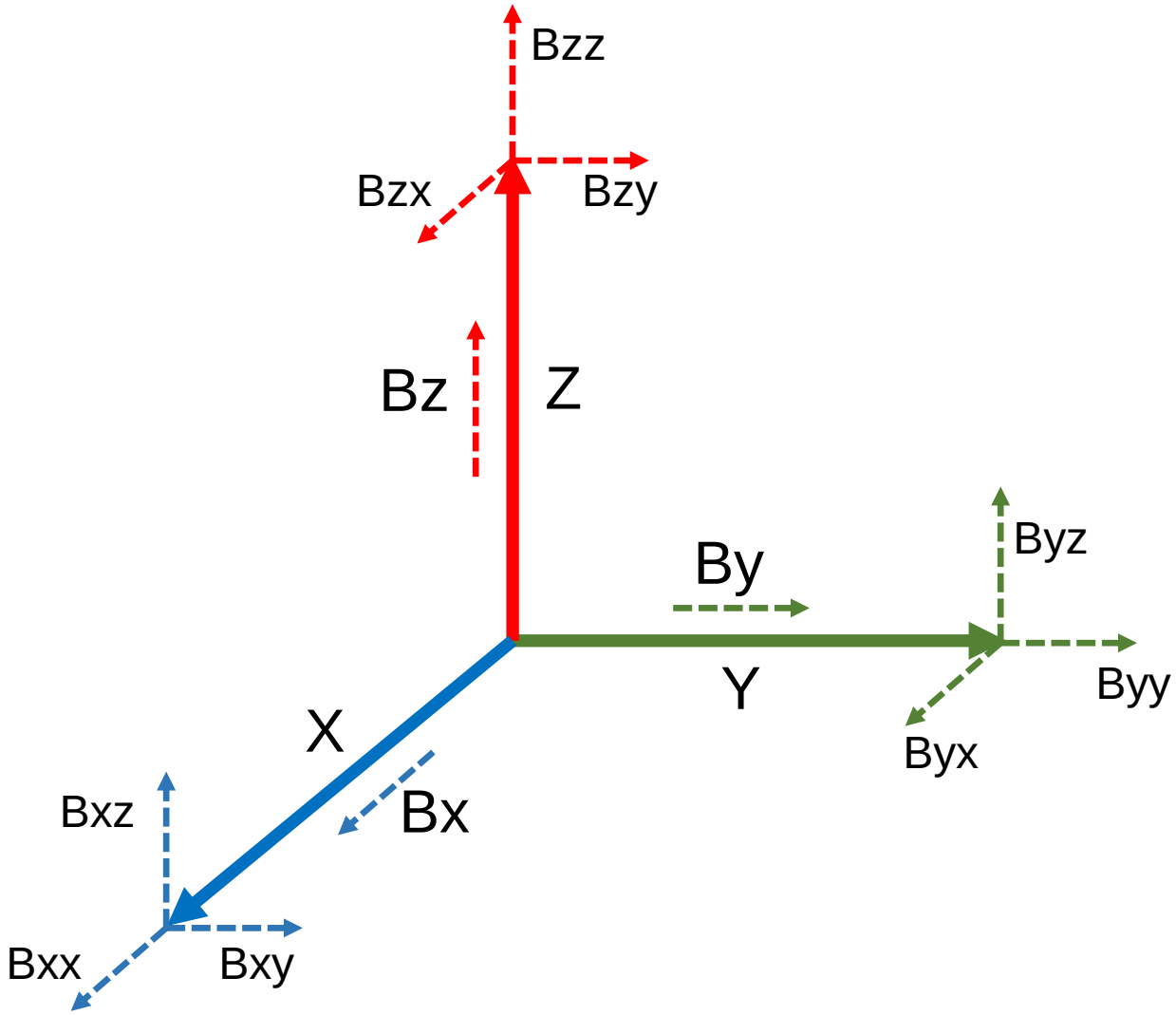
QMAG^{T} Airborne Full-Tensor Magnetic Gradiometry (FTMG)

QMAG^{T} Specifications

- SQUID sensor: 6-channel first-order planar gradiometers
- Intrinsic gradient noise: <100 fT / (m√Hz)
- Magnetometer: 4-channels of magnetometers
- Intrinsic noise: 2 pT / √Hz
- SQUID electronic bandwidth: > 3 MHz
- Sampling Rate: 1,000 samples per second
- Operating temperature range: -10°C to +40°C
- Cryostat operation: 2.5 days per refill
- Data acquisition: 20 channels of 24 bit ADCs
- IMU system: 3 fibre optic gyros, 3 accelerometer sensors
- Radar altimeter: max of 3 % or 0.5 m
- Laser altimeter: +/- 1 to 2 cm typical
- Total bird weight: 267 kg
- Tow rope: DyneemaTM – 32 m +

QMAG^{T} Airborne Full-Tensor Magnetic Gradiometry (FTMG)

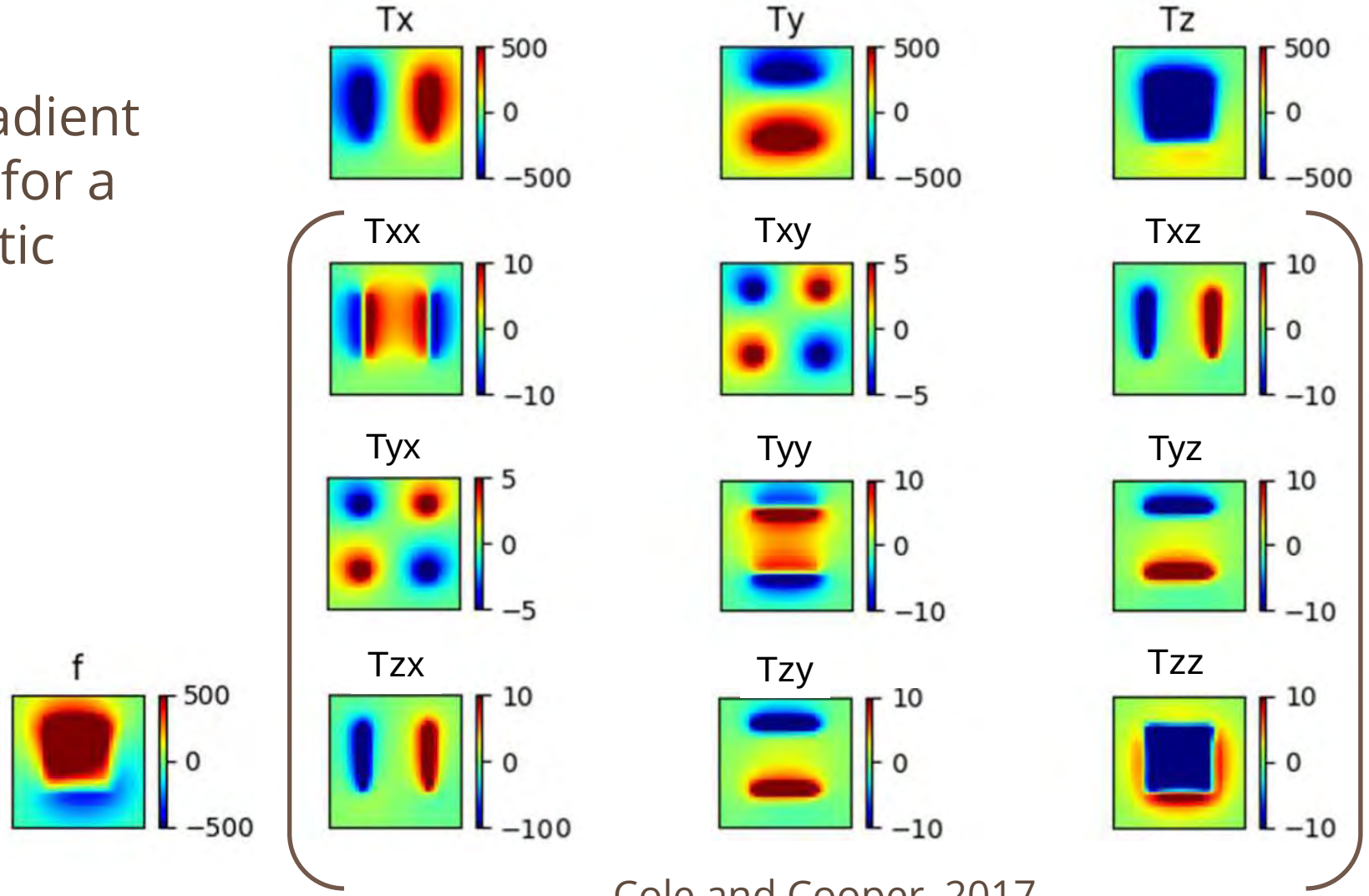
The gradient tensor is a 3 × 3 second-order tensor.



QMAG^{T} Cryogenic – Liquid Helium

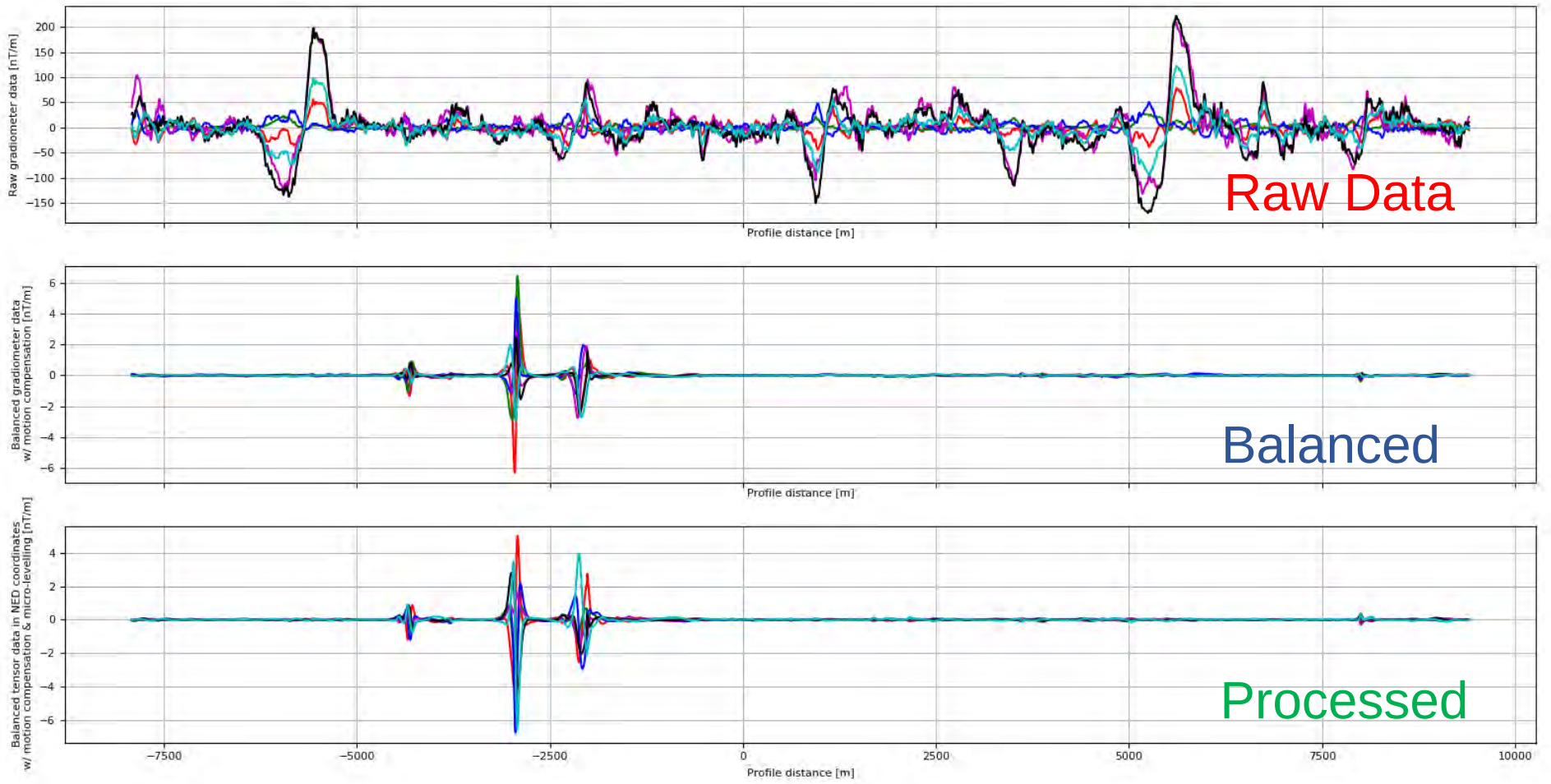
QMAG^{T} Airborne Full-Tensor Magnetic Gradiometry (FTMG)

The gradient tensor for a magnetic cube.



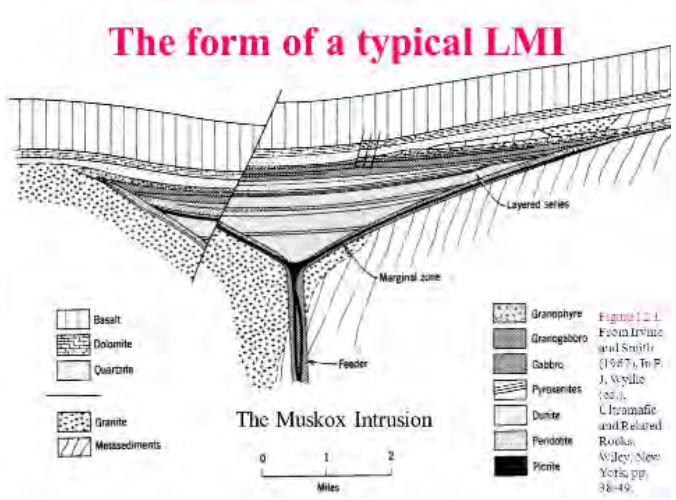
Cole and Cooper, 2017

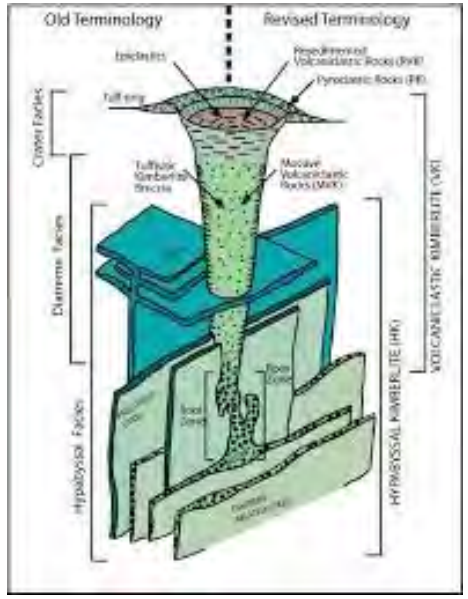
QMAG^{T} Processing

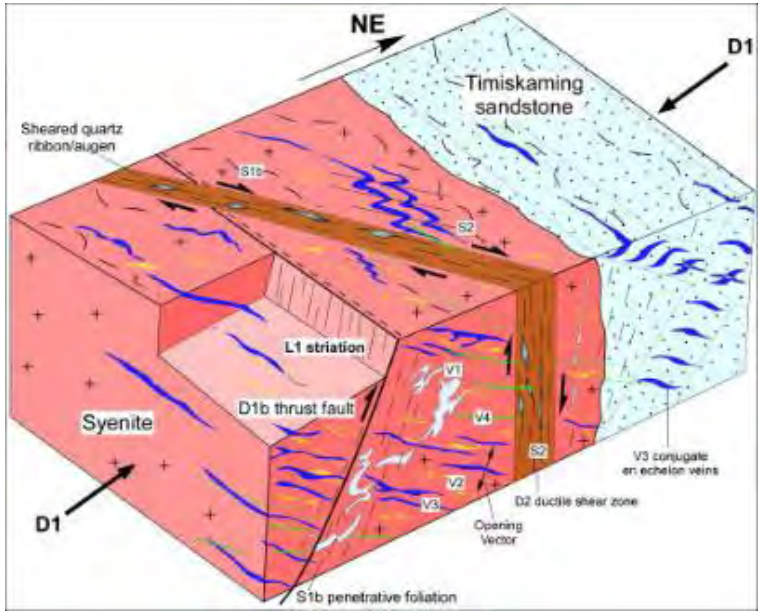


QMAG^{T} Applications

- Kimberlite mapping and characterization
- Ultramafic intrusion related mineralization
- Complex geology/structural gold
- Iron ore environments



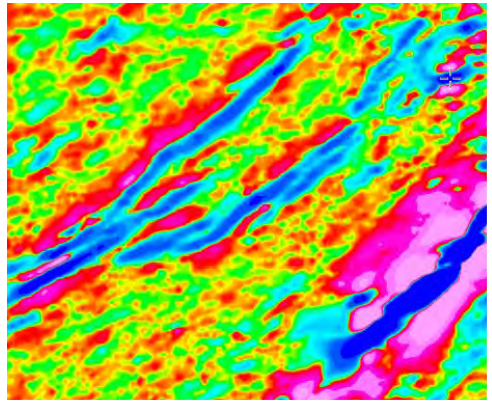




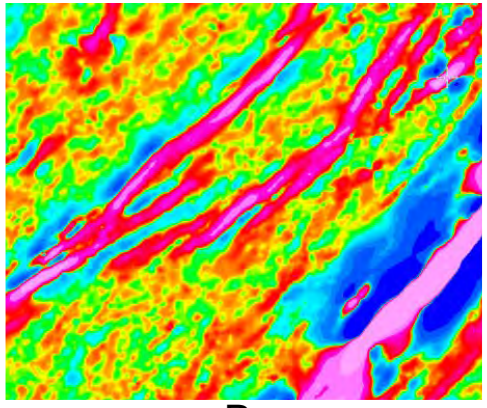
QMAG^{T} Sensitivity and Resolution

DIAS full tensor gradient magnetics

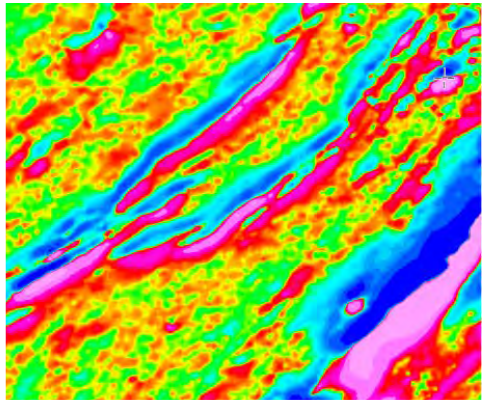
Bxx



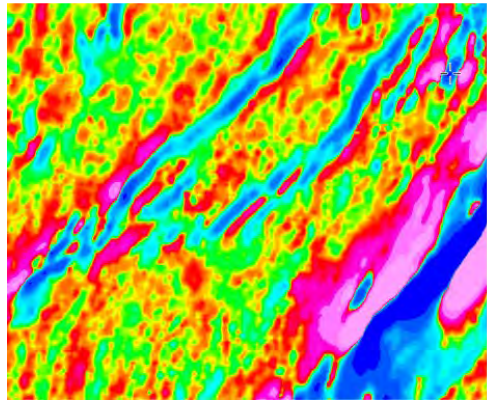
Bxy



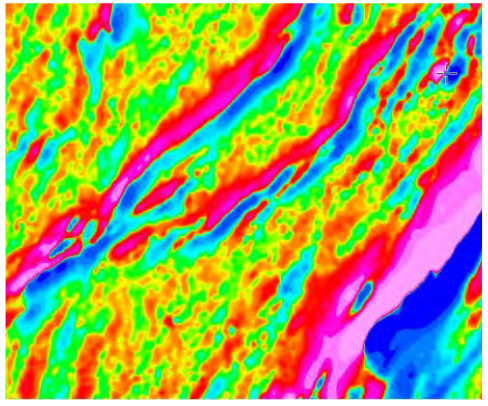
Bxz



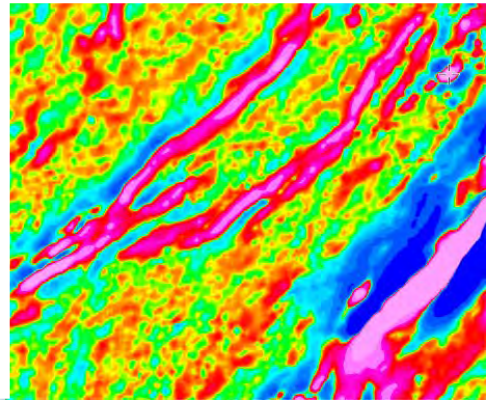
Byy



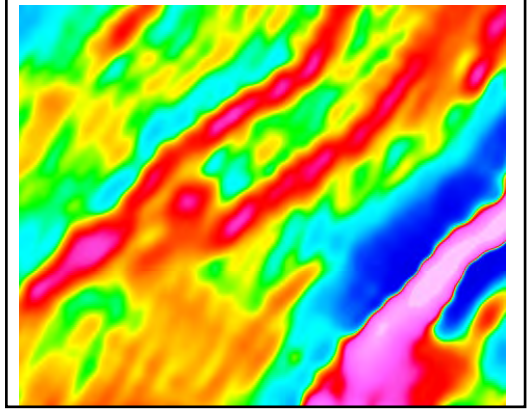
Byz



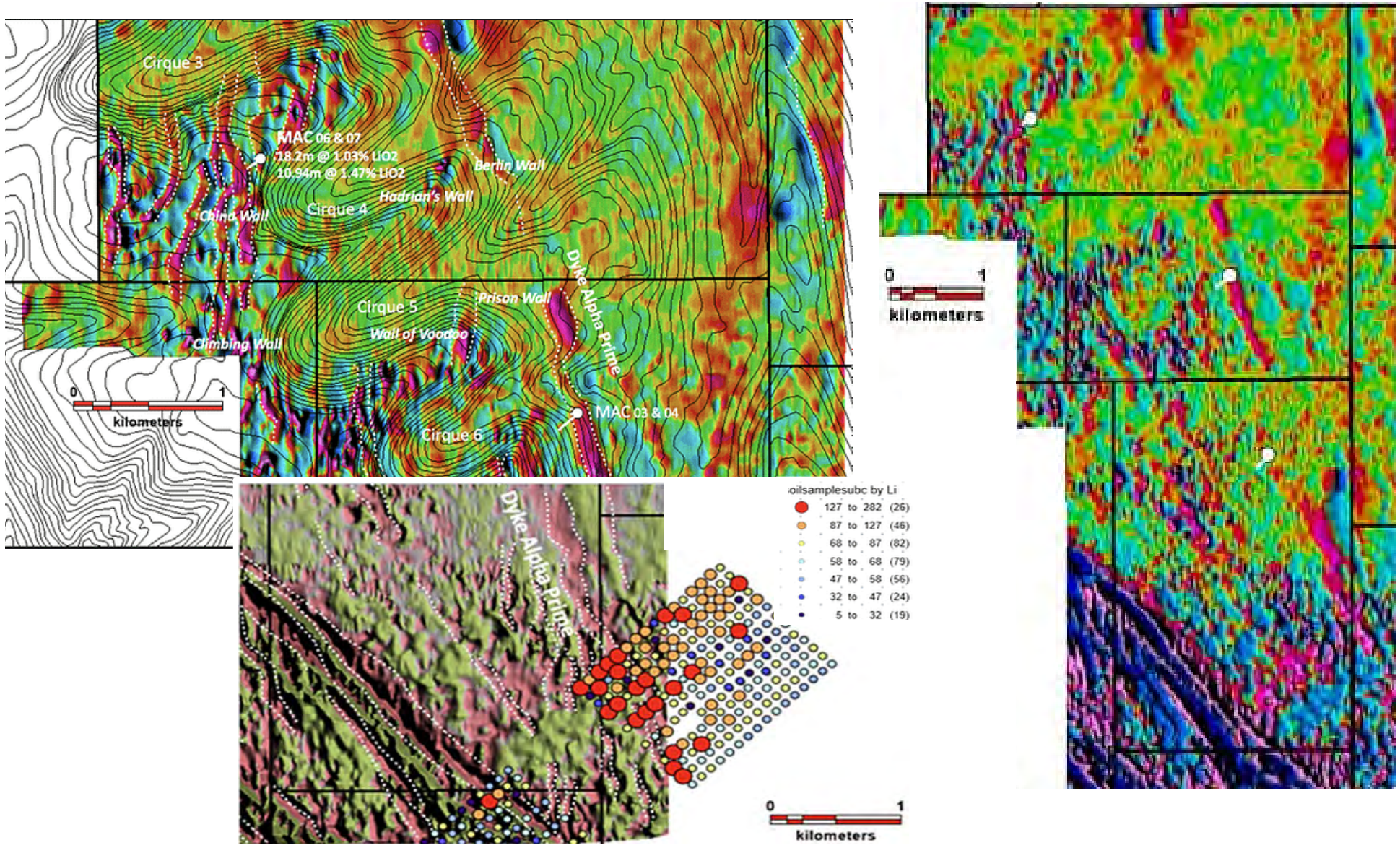
Bzz



Standard heliborne magnetics

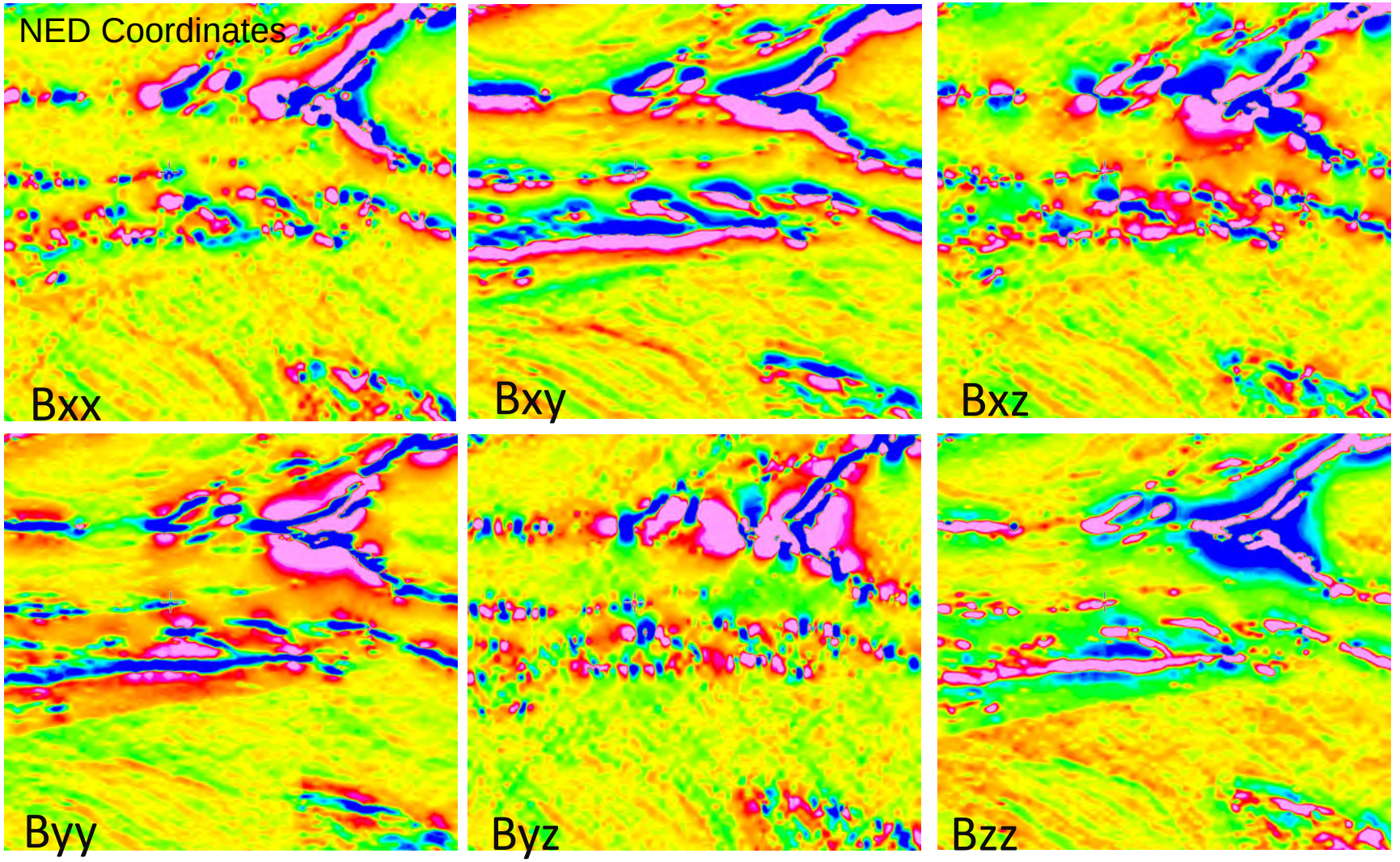


QMAG^{T} for Lithium



QMAG^{T} for Lithium

Here is an example of a recent survey where we are mapping in a Canadian Shield environment with mafic and felsic units, intrusions, and plenty of breaks and folding. We can see the ability to image geologic contacts with high resolution, faults and breaks with confidence, subtle northeast and southeast trends, and clear remanently magnetized sources.



QMAG^T Benefits

Resolution and Detectability

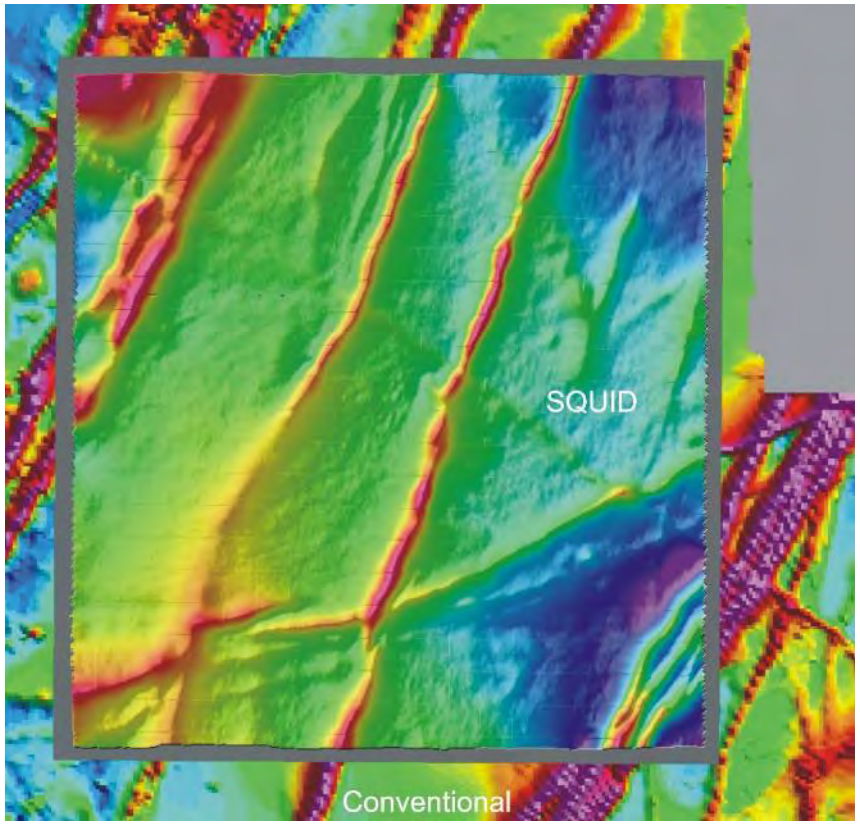
- extremely low-noise FTMG measurements (<10pT$_{RMS}$/m)
- the benefits of vector surveys without the disadvantage of extreme sensitivity to orientation
- higher spatial resolution (~ 2X) (Rasmussen & Pedersen, 1990)

Remanence mapping

Low latitude surveys

Improved geologic modelling

- Reduces non-uniqueness of potential fields
- Better model results, accurate, detailed 3D models



G_{ZZ} image - 7 × 7 km^2 (960 km)
courtesy Anglo Platinum

QMAG^{T} 3D Inversion and advanced products

3D Inversion

Input Data

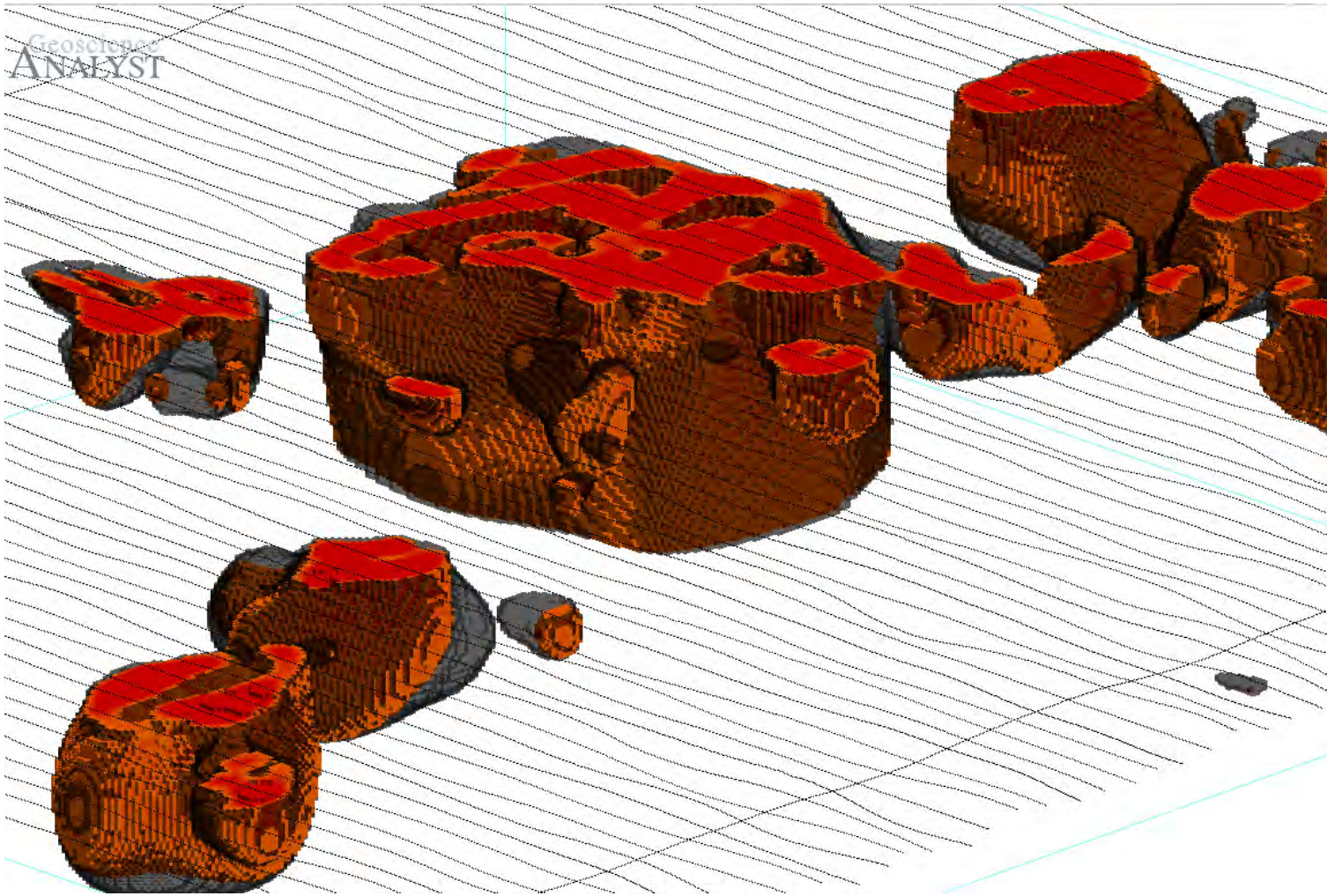
- Bxx, Bxy, Bxz, Byy, Byz, Bzz
- Total Field

Output Data

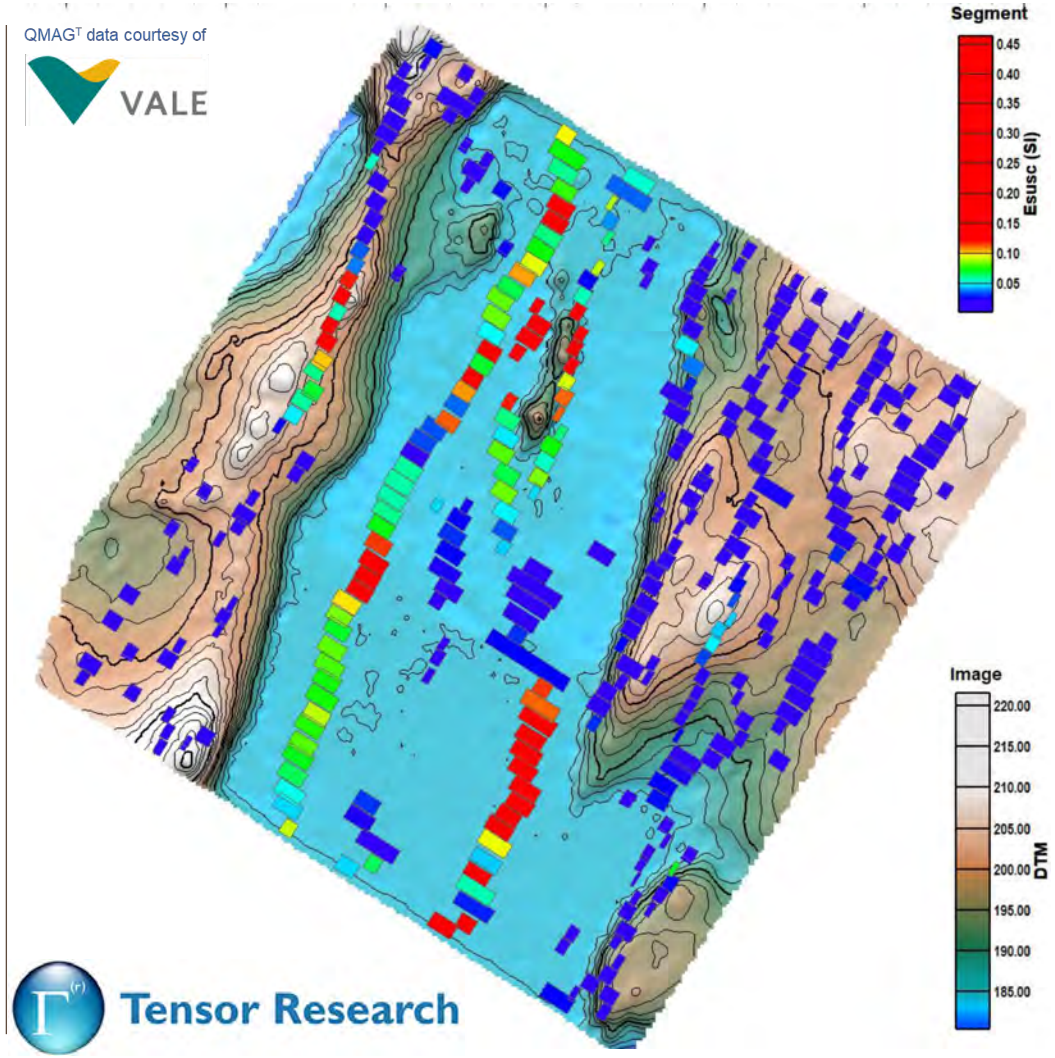
- Magnetic Susceptibility
- Remanence
- Field Vector

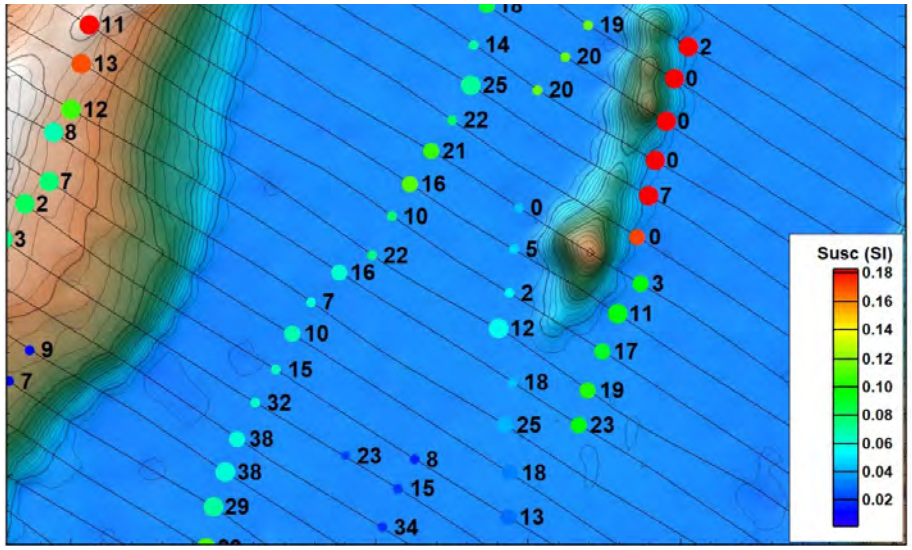
Final Inversion Details

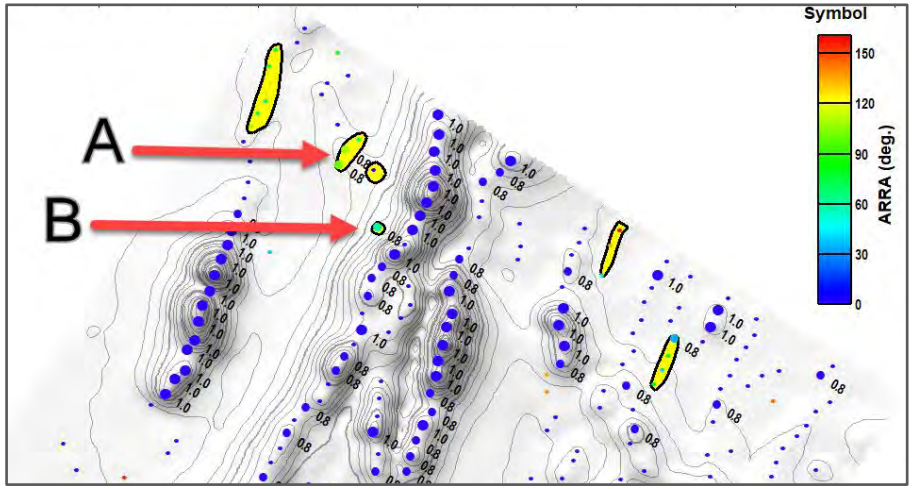
- Data every 25 m along line
- Total Data = 48,307
- Mesh - 6.25 x 6.25 x 6.25 m
- Total Cells = 2,459,808 cells
- RAM Usage = 540 Gb



QMAG^T 3D Inversion and advanced products

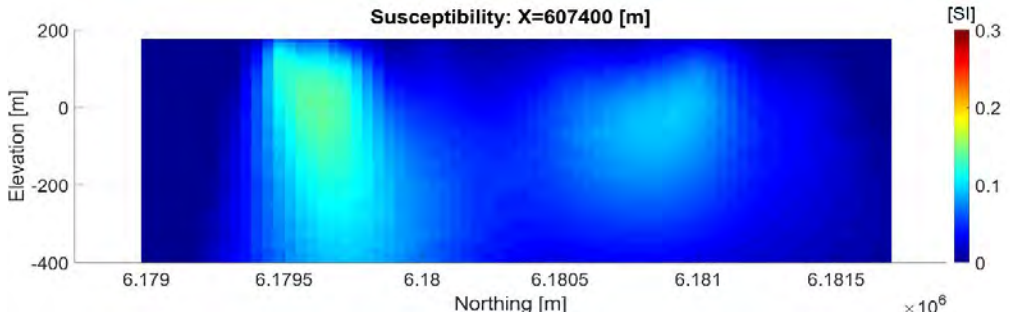




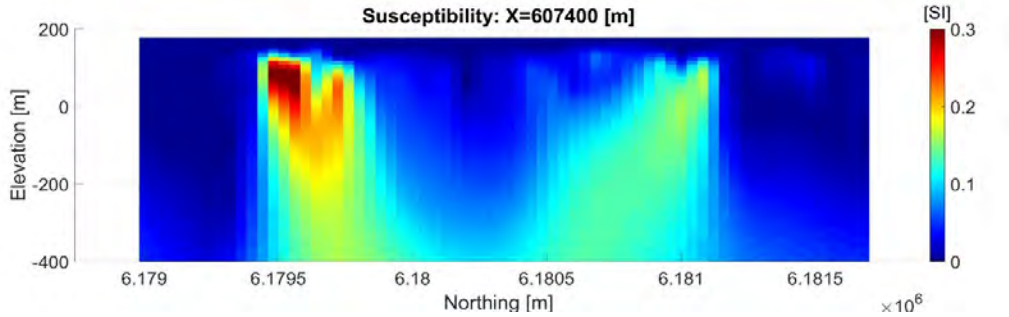


Magnetic susceptibility model comparison inverted from TMI and FMTG data

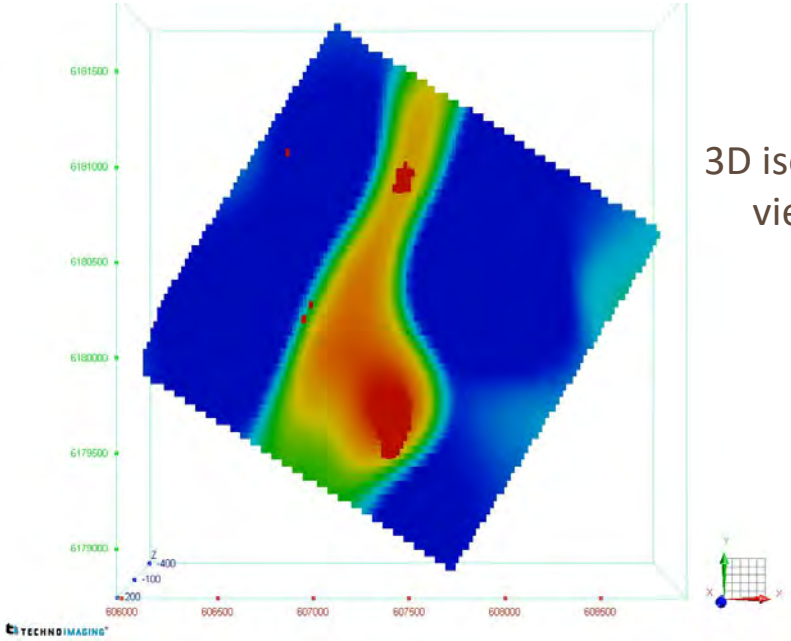
TMI



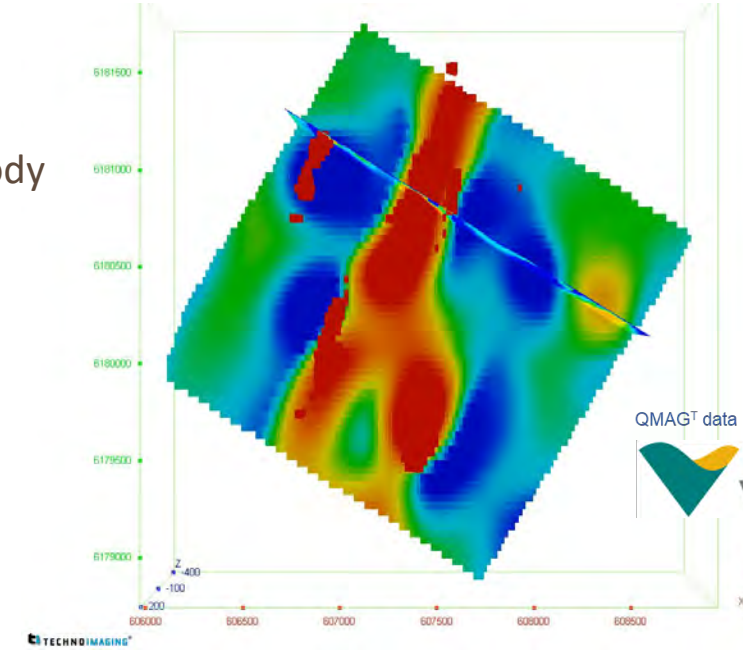
QMAG^T



TechnoImaging has developed a regularized inversion scheme employing a focusing stabilizer and Gramian constraints to invert FTMG data. Inversion runs for both susceptibility and components of the full magnetization vector.



3D isobody views

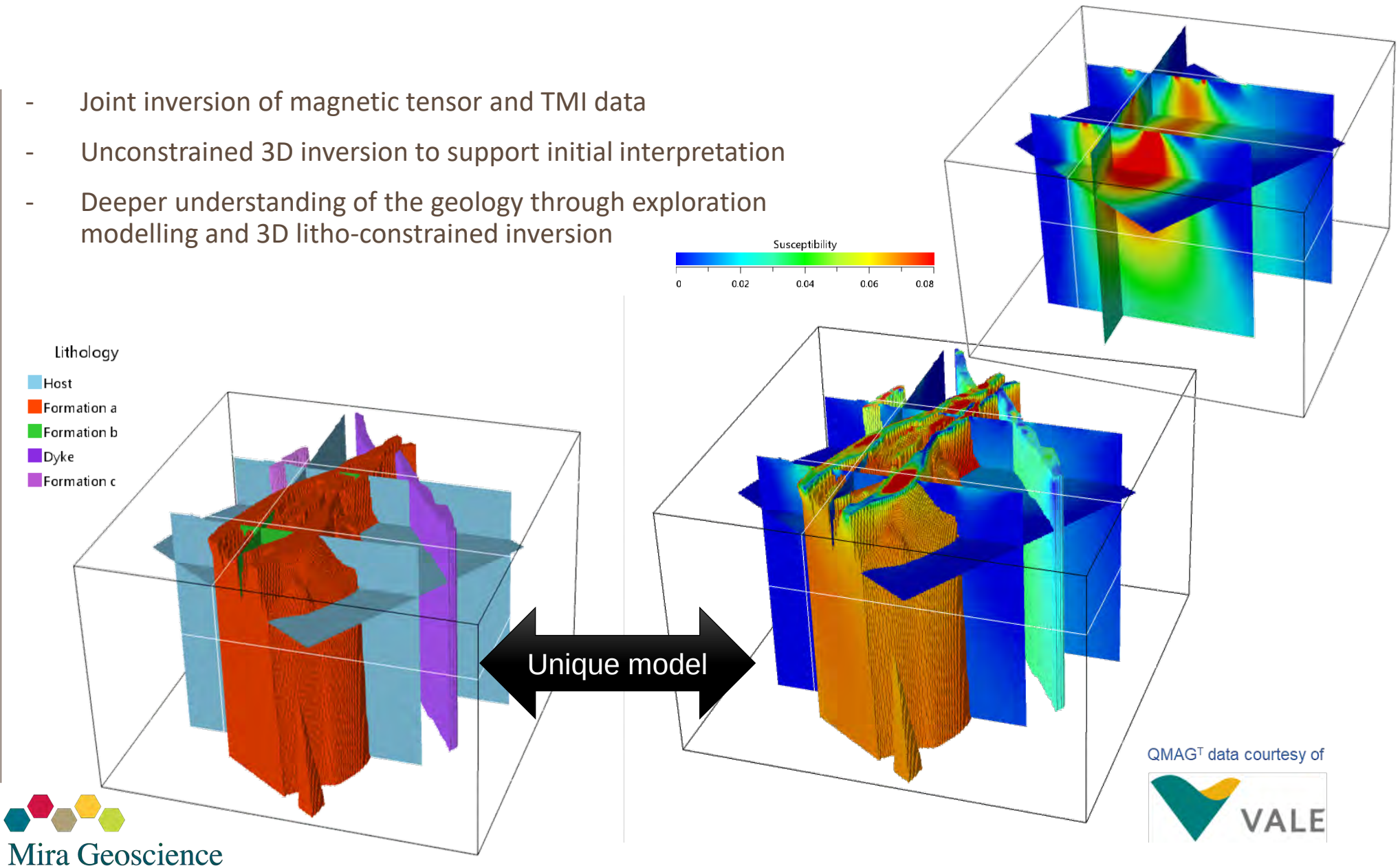


QMAG^T data courtesy of VALE

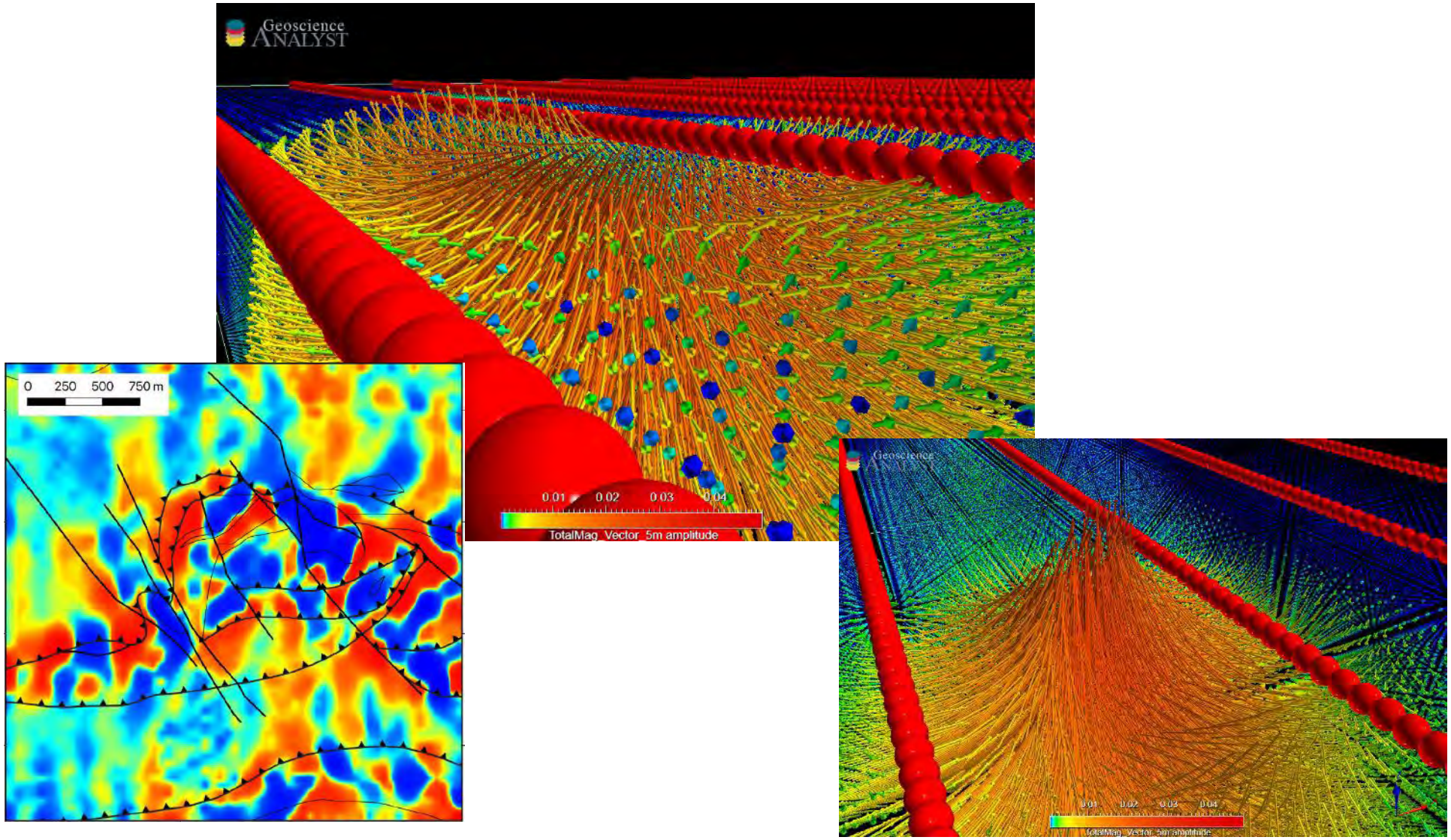
TECHNOIMAGING

QMAG^{T} 3D Inversion and advanced products

- Joint inversion of magnetic tensor and TMI data
- Unconstrained 3D inversion to support initial interpretation
- Deeper understanding of the geology through exploration modelling and 3D litho-constrained inversion



QMAG^{T} Imaging



LEADING THE WORLD IN SAFETY

Safely ahead of the rest

- Dias leads the industry in the safety and well-being of our team and partners
- We believe we have an obligation to ensure all staff are properly trained and educated to perform all tasks safely.
- Dias is at forefront of developing and producing our own equipment, building in a way that prioritizes long-term safety and sustainability. This also means that we can integrate customized safety features to meet and exceed safety standards
- We choose our work to protect staff, clients, and the environment.

"Thanks again for making a good call today. ***SAFETY FIRST****. It's a relief to me to know that our team is in* ***RESPONSIBLE HANDS****."*

QMAG^{T} What our clients say…

Trusted Worldwide Ground and Airborne Geophysical Surveys

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WWW.DIASGEO.COM

- TORONTO
  647.951.8499
- VANCOUVER
  604.334.6417
- SASKATOON
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- MEXICO
  +52.553.676.5757
- CHILE
  +56.966.766.062

"The direct imaging of remanent magnetized materials gives a more complete picture of the geology and mineralization of the survey area. We have demonstrated the advantages of the inversion of FTMG data over the traditional TMI data and the advantages of imaging different components of the magnetization vector."

- University of Utah

"Low contrast between the magnetic response of the pegmatites and their typical host lithologies limits the use of conventional magnetic surveys. However, the sensitivity of Dias Airborne's QMAG^{T} system and Mira Geoscience's MVI modelling significantly alters this convention."

- Junior Mining Network

"Dias Airborne's QMAGT system is the most advanced airborne magnetic system currently commercially available."

- Acme Lithium

"The QMAG^{T} results will greatly assist the upcoming field mapping and drill program."

- Lake Winn Resources