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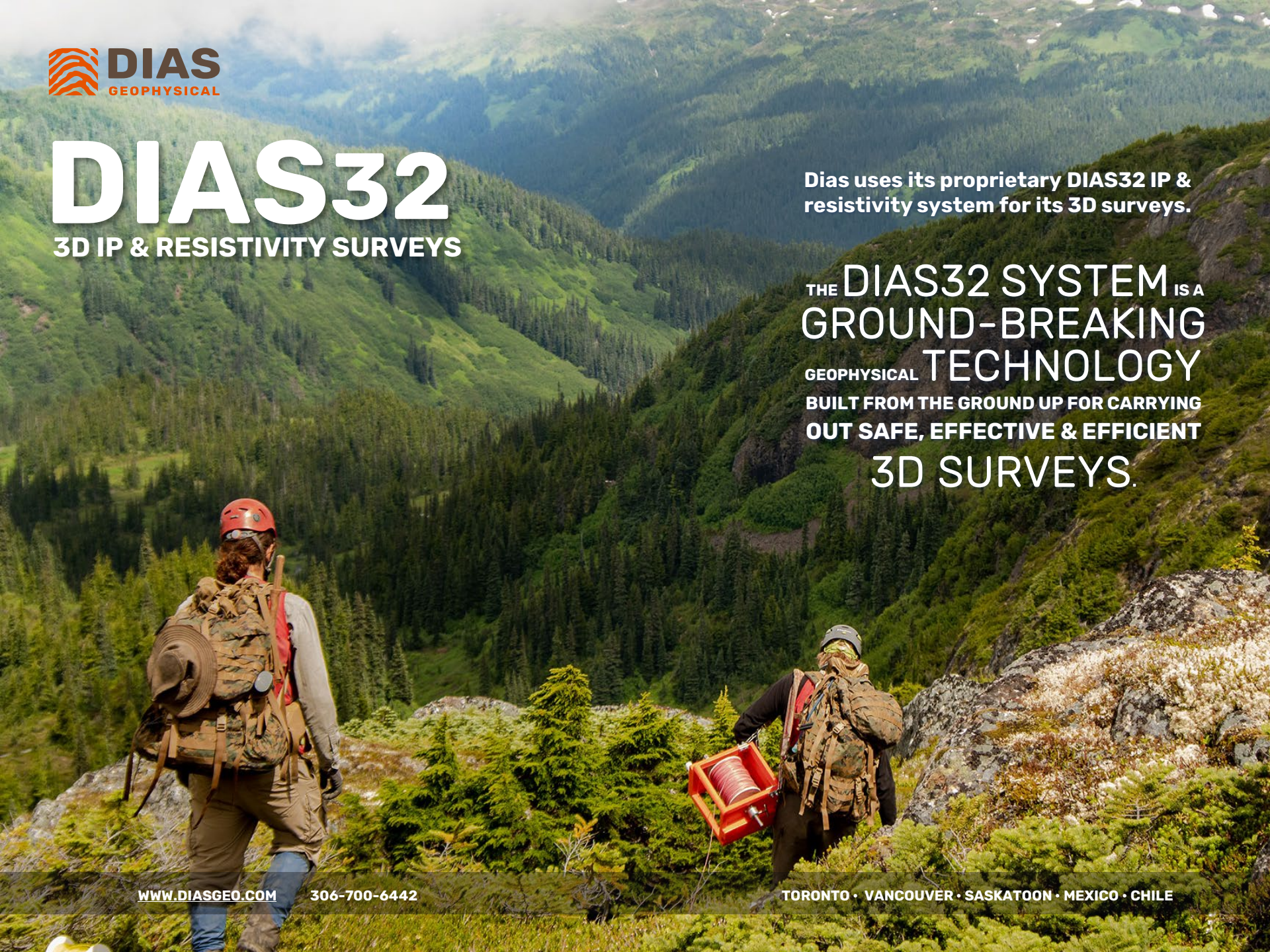
DIAS
GEOPHYSICAL
DIAS32
3D IP & RESISTIVITY SURVEYS
Dias uses its proprietary DIAS32 IP & resistivity system for its 3D surveys.
THE DIAS32 SYSTEM IS A GROUND-BREAKING GEOPHYSICAL TECHNOLOGY BUILT FROM THE GROUND UP FOR CARRYING OUT SAFE, EFFECTIVE & EFFICIENT 3D SURVEYS.
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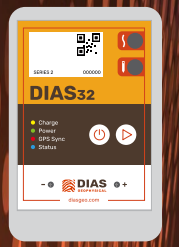
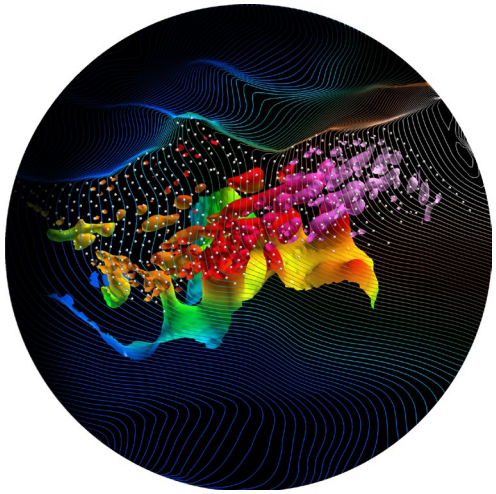


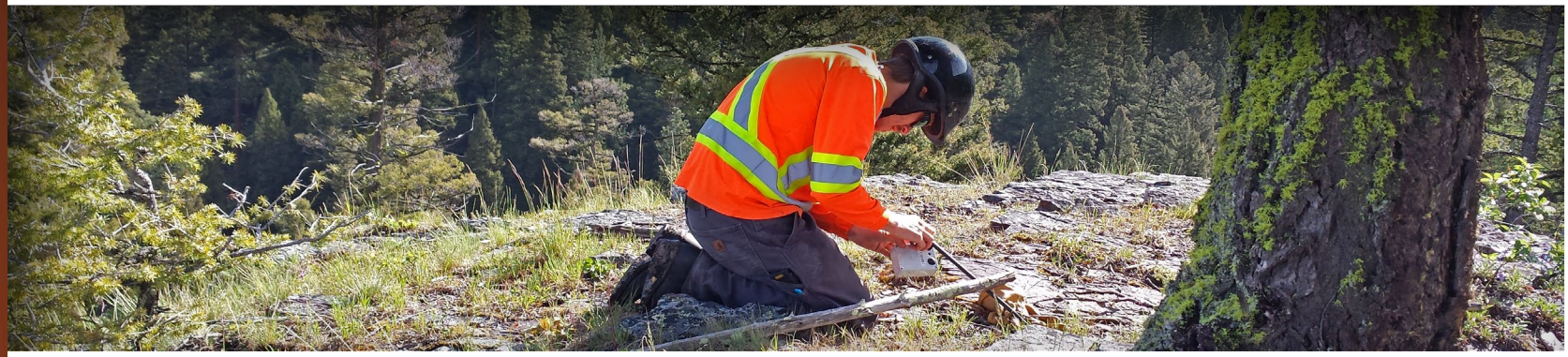
DIAS32

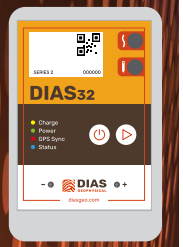
3D IP & RESISTIVITY SURVEYS

SYSTEM ADVANTAGES



- Proprietary safety technology and procedures assure a safer work environment.
- Mesh network technology provides real-time monitoring of system health and data quality.
- Injection point monitoring of the current waveform improves data quality.
- Proprietary signal processing routines produce low-noise final data.
- Fully distributed array architecture allows for full flexibility in survey design.
- Optimized survey methodology produces efficient and effective field operations.
- Multi-dipole processing means better balance between depth of investigation and resolution.
- Efficient and low-cost mobilization - compact receiver design, no network cable, less wire.





DIAS32

3D IP & RESISTIVITY SURVEYS

SURVEY CHARACTERISTICS

DIAS32 establishes a new standard in 3D IP and resistivity surveying. The patented CVR methodology and wireless mesh network technology deliver unprecedented safety, quality control, and survey flexibility.

SAFETY

The DIAS32 system was designed with safety in mind, so crew size is optimized - a smaller crew means greater overall project safety.

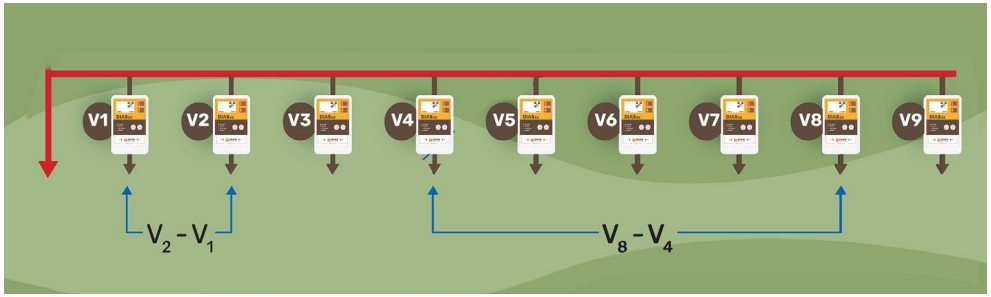
Lightning shunt and integrated current lockout technologies maximize safety for survey personnel.

Dias' internet-enabled HSE system comprises documentation, training, recording and reporting.

SURVEYING

Common voltage reference surveying minimizes wire usage & facilitates acquisition of multiple data sets (p-p & p-d). This mode of surveying also reduces the amount of wire and the associated noise due to EM coupling.

Each recorder is equipped with GPS positioning and time-synchronization for more accuracy in the modeling of the final results.



PLANNING

Single-channel architecture allows for full survey design flexibility including gradient, distributed 2D, offset 2D. rolling 3D, full 3D.

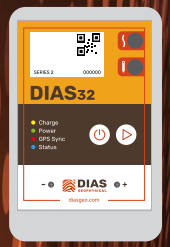
Optimization software is available to guide selection of dipole spacing and current injection.

ACQUISITION

The data are acquired as a time series with a sampling rate of up to 200 Hz.

A wireless mesh network is established in the survey area for the real-time transmission of data quality and system health information, yielding a more complete, high quality data set.

We acquire pole data at each electrode, measured against the voltage reference wire. Each of these data records can be paired with any other record to build a dipole. This decouples resolution from depth of exploration.



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3D IP & RESISTIVITY SURVEYS

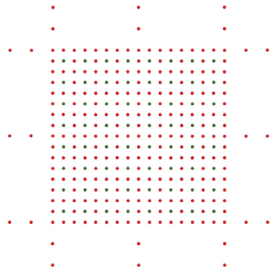
SURVEY MODES

The DIAS32 system architecture allows for complete flexibility in survey design. In the following we describe several effective methods.

FULL 3D

APPLICATION

- Where the geology is complex
- Where model resolution and accuracy are critical such as in advanced projects or hi-resolution applications
- For time monitoring of ground resistivity and chargeability

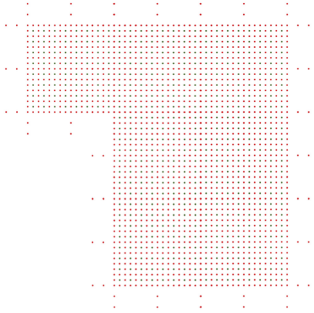


FULL 3D SURVEY ELECTRODE PLAN

● Receiver electrode ● Transmitter electrode

FEATURES

- High-density, omni-directional data for accurate 3D models
- Regular orthogonal electrode pattern - no near-surface bias
- Current extensions to enhance coverage at depth near survey margins
- Full scalability – from metre-scale to kilometre-scale surveying – multiple 'patches' for extensive surveys
- Pole-dipole mode provides a good balance between resolution and depth penetration.
- Optional multi-pole mode adds pole-pole acquisition for greater depth search.



Above: survey coverage comprising 7 patches

IRREGULAR 3D

APPLICATION

- Where access is restricted for safety or other reasons

FEATURES

- With single-channel nodes, deployment is efficient and there is no restriction on survey configuration
- GPS location/synchronization in each DIAS32 receiver means each electrode is accurately located – GPS is also recorded at each current injection point
- Survey is planned with safety & efficiency in mind
- Compact, lightweight DIAS32 receivers mean safer and more efficient set-up in challenging terrain
- DIAS32 receivers work in autonomous mode if it is not possible to establish a wireless network
- Common voltage referencing allows full flexibility in dipole selection post-survey

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SURVEY MODES Continued

PARTIAL OR BAISED 3D

APPLICATION:

Where thick vegetation or topography limit safe access in one direction, a line-biased design may be the best solution

FEATURES:

- Moderate-density, omni-directional data for accurate 3D models
- Line-biased electrode set-up – higher resolution in one direction
- Efficiently build dipoles in any direction

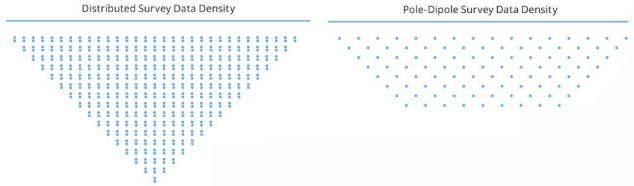
DISTRIBUTED 2D

APPLICATION:

Where geology is less complex, or for a preliminary stage of investigation.

FEATURES:

- High-density, bi-directional data for accurate 2D models
- 'Rolling' mode for longer lines
- Pole-dipole and dipole-pole for good resolution and depth penetration.
- Variable dipole spacings ensure depth sensitivity while retaining desired spatial resolution
- Current extensions to enhance coverage at depth near line ends



CONVENTIONAL 2D SURVEYS

The DIAS32 system can be deployed in any of the conventional 2D arrays with enhanced safety and effectiveness. Our crews typically walk up to 30% Less distance than conventional crews for the same line coverage. And DIAS32 surveys provide GPS positioning for all electrode locations.

GENERAL CONSIDERATIONS

SCALABILITY – from metre to kilometer resolution, all surveys can be scaled to meet the objectives.

MULTIPOLE – any survey mode can be augmented for more depth search with the simple addition of a remote voltage electrode. This yields a full pole-pole data set in addition to the pole-dipole (and dipole-pole).

ENHANCED RESOLUTION – in any of the above methods, higher resolution acquisition can be achieved across a targeted region for variable resolution results.

GROUND CONTACT – when determining the optimal survey set-up, the ground contact conditions must be considered. Where contact resistance is high, more receiver electrodes should be used, and where contact is good, more current injections can be used.

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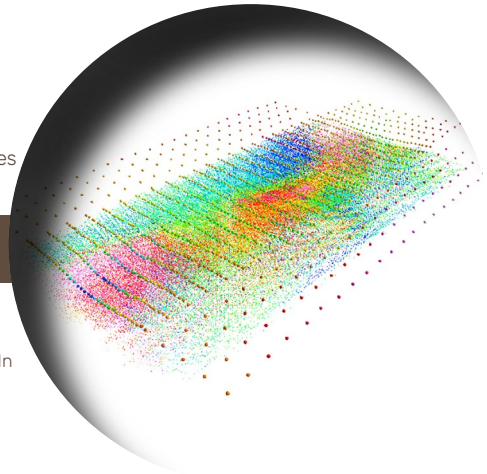
3D IP & RESISTIVITY SURVEYS

WHITE PAPER



The DIAS32 IP and resistivity system is a ground-breaking geophysical technology built from the ground up for the express purpose of carrying out 3D surveys safely, effectively and efficiently. The DIAS32 system features two significant technologies and a design philosophy that together establish it as the leading IP and resistivity survey technology in the world today.

CVR

CVR is a completely new mode of **acquiring IP and resistivity data**. The DIAS32 system measures the response from individual electrode sensors relative to a common voltage reference wire (CVR). The DIAS32 system places a receiver immediately adjacent to each sensor, minimizing analog noise. The CVR mode of measurement provides several distinct advantages.

Operational flexibility and scalability. The DIAS32 system can be deployed in any array configuration at any scale, both 3D and 2D

Enhanced safety. Dias crews are usually smaller, individual crew members have less weight to carry, & generally walk far less for a given survey coverage than for non-CVR surveys.

Multi-scale dipoles for unrivalled data volume. CVR allows for the computation of a dipole from any two electrodes across the survey area, and as many dipoles as the survey scope allows. In 2016, Dias Geophysical completed the first 3D survey with over 1 million processed data records. In this data set, over 25 million pole-dipole records were available for processing.

High signal to noise. Multi-scale dipoles deliver high signal to noise – larger dipoles can be selected when increase signal is needed, and low noise is achieved through natural removal of common-mode noise in the normal CVR processing flow.

MESH

Mesh networking, a technology developed for the 3D seismic industry, allows individual receivers to communicate with each other and with the acquisition computer through a self-managing, self-healing network. The first benefit of mesh networking is obvious – no network cables. Less equipment, no cable problems, more efficient deployment. The second advantage is the ability to get real time information from each receiver. The DIAS32 system delivers data quality metrics, system status and health, and detailed diagnostics – all in real-time.

More complete final data. Problems encountered are addressed immediately, not the following day.

Higher quality data. Real-time QC informs the operator of any data issues for rapid resolution.

Greater survey efficiency. Any identified system problems are addressed immediately and precisely.

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3D IP & RESISTIVITY SURVEYS

WHITE PAPER

SAFETY

Safety technology and procedures have been integrated into the development of the DIAS32 system. As mentioned, CVR and mesh networking contribute to a fundamentally safer survey methodology, but Dias has developed two new, survey-specific safety technologies, and use robust HSE processes and procedures facilitated by an on-line tracking and recording system.

Lightning Shunt Technology. The proprietary DIAS-LS lightning shunt technology mitigates the risk of electrocution due to electrical storms during surveying.

Current Lockout System. Integrated with the mesh network system, the lockout technology protects at-risk personnel from the risk of electrocution from high voltage wires & electrodes.

On-line HSE Management. Dias employs eCompliance, an internet-enabled HSE training, tracking, and reporting system, which provides timely, accurate information for decision-making.

CAPABILITY

Survey Methods – Dias has carried out full 3D, partial 3D, distributed 2D (deep IP), gradient, and combined surface and borehole surveys.

Location – Dias has successfully carried out surveys in South America, the USA, Australia, China, the Middle East, Europe, and Canada. With light, compact systems, Dias can mobilize internationally very efficiently.

System Capacity – With over 900 single-channel DIAS32 receivers, Dias has the largest capacity for 3D surveys, and can efficiently carry out large-scale 3D programs with greater efficiency than other DCIP technologies.

Applications – While mineral exploration is currently our largest application, the DIAS32 system has completed surveys for groundwater, geothermal, environmental and engineering applications as well.

Water and Rugged Terrain – Each DIAS32 receiver records a single channel and has GPS timing and location, so surveying safely and with efficiency on water or in rugged environments is more feasible than ever.

Experience – Dias has completed surveys in conditions from desert to swamp, from -20 to +40, from flat to mountainous, and from barren to forested. We have completed surveys from a 7 m to a 400 m inter-electrode spacing. Our clients are happy to provide a reference for our operational and technical capabilities.

"ACCURATE EARTH MODELS ARE INFORMED BY HIGH DENSITY FULL AZIMUTH DATA. DIAS' CVR TECHNOLOGY DELIVERS HIGH DATA VOLUME WITH GREAT EFFICIENTY."

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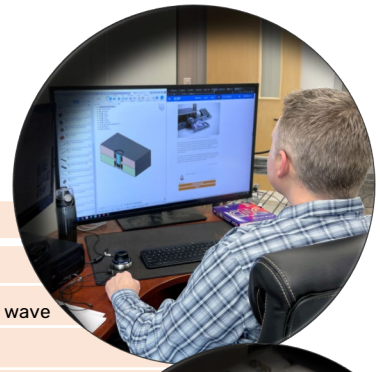
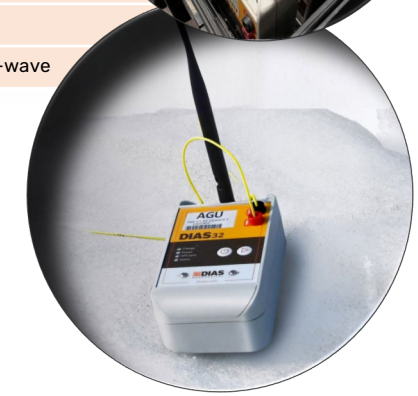
RECEIVER SPECIFICATIONS





DIAS32 SYSTEM SPECIFICATIONS	
# of channels:	Single channel, as many as required
Survey type:	Resistivity and Time domain IP
Acquisition:	Time series recording, up to 200 Hz
Time base:	0.5, 1, 2, 4 and 8 seconds or custom
IP windowing:	Arithmetic, log, semi-log, user defined
Synchronization:	GPS PPS synchronization with internal clock
Noise reduction:	Various rejection and stacking algorithms
Computation:	Apparent resistivity, chargeability, noise stats
Size:	16 X 9 X 5 cm (6.3 X 3.5 X 2 in) per receiver
Weight:	Receiver: 0.6 kg (1.3 lb)
Enclosure:	ABS, IP66
Communication:	USB, wireless mesh network, WiFi
Operating Temp:	-45 to +50°C (-49 to +122°F)
Environmental:	Dustproof, water resistant
Power:	Internal LiPo rechargeable, to 5 days @ 20°C

ELECTRICAL SPECIFICATIONS	
Contact Resistance:	Up to 2 MΩ
Signal waveform:	Time domain, bipolar 50% duty square wave
Input impedance:	80 GΩ
Input range:	±25 V, ±2.5 V (adjustable gain)
Maximum input V:	±40 V for any channel, protection up to ±320 V
Input:	True differential for common-mode rejection
V measurement:	1 µV resolution
Filter:	Low-pass and 50 Hz / 60 Hz notch
OPERATOR CONTROL	
Tablet:	Computer or tablet with mesh networking
Operating System:	Windows 8/10
Real time QC:	Vp & Vs data, current, on demand full-wave

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3D IP & RESISTIVITY SURVEYS

GS5000 HIGH PERFORMANCE TRANSMITTER

GS5000

Dias Geophysical's GS5000 is the most advanced transmitter technology in its class in the world.

This new transmitter system is fully integrated with our DIAS32 receiver system and our safety technologies.

The GS5000 provides unrivalled power to weight performance with integrated safety features, timing control, and a fully-controlled waveform.

GS5000 ADVANTAGES

- Delivers top performance in both conductive and resistive ground conditions.
- The GS5000 can be checked onto an aircraft, improving operational flexibility.
- Waveform control produces a high-quality waveform at any base frequency.

GS5000 FEATURES

- Safety - auto shut-down on fault conditions, remote control
- Current recording, monitoring, and leak detection
- Base performance to 25 kW, 5,000 V, and 20 A
- Full integration with DIAS32 receiver system
- Portable – checked baggage friendly
- Internal GPS time synchronization
- Rugged, portable housing

GS5000 SPECIFICATIONS

Power Rating:	25 kW continuous to 100 kW with 4 parallel units
Dimensions:	53.8 x 40.6 x 26.9 cm (iM2620 Pelican Storm Case)
Exterior:	high-performance resin
Output Voltage:	100 V to 5,000 V continuous
Output Current:	1 mA to 20 A per unit (to 80 A with 4 units in parallel)
Weight:	31.5 kg (69.5 lbs) per unit
Waveform:	programmable, fully-controlled
Operating Range:	-40 C to 50 C
Enhanced Operation:	to 80 A and 100 kW with 4 units in parallel
Generator Compatibility:	single or three-phase

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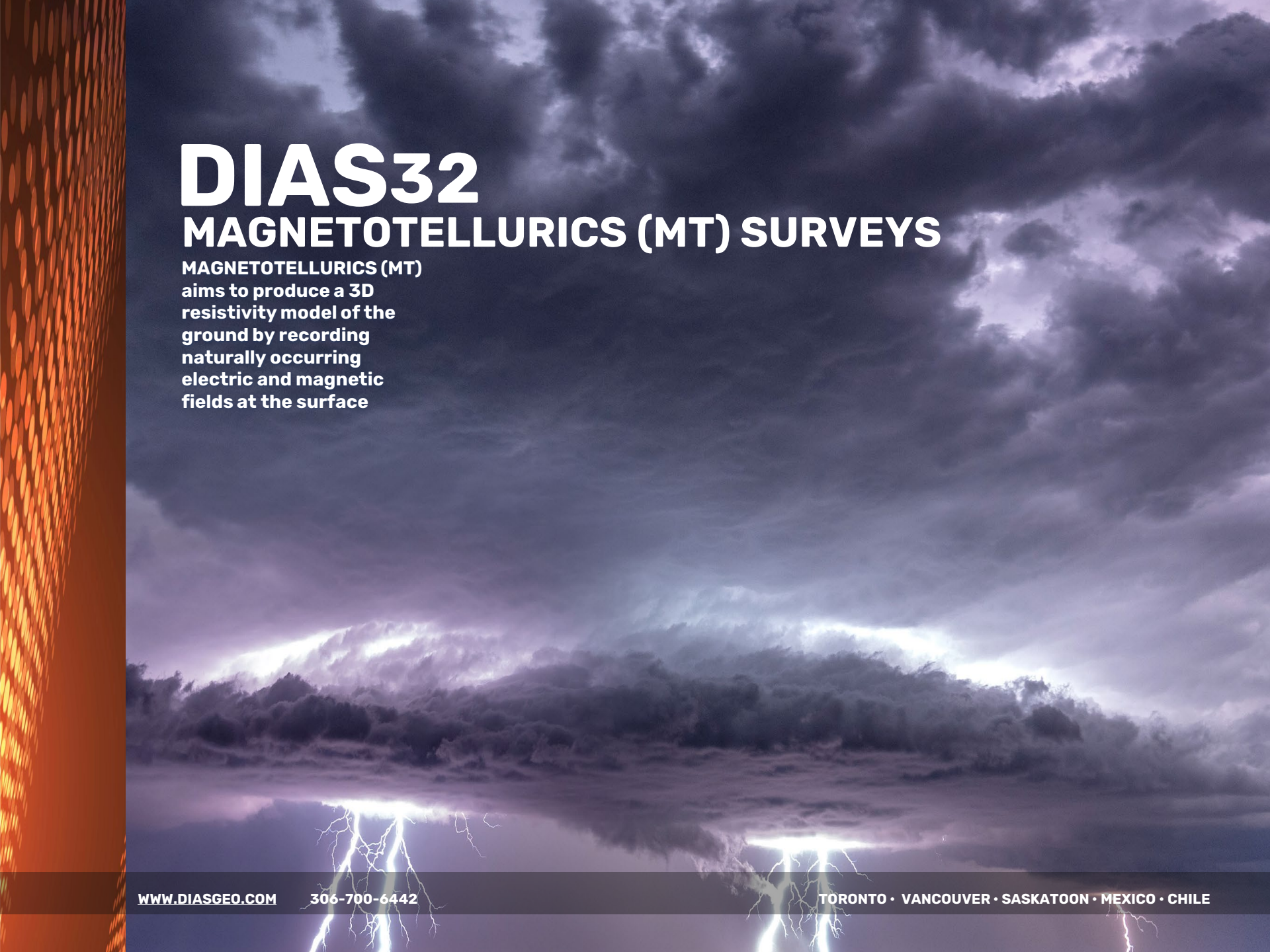

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MAGNETOTELLURICS (MT) SURVEYS

MAGNETOTELLURICS (MT) aims to produce a 3D resistivity model of the ground by recording naturally occurring electric and magnetic fields at the surface

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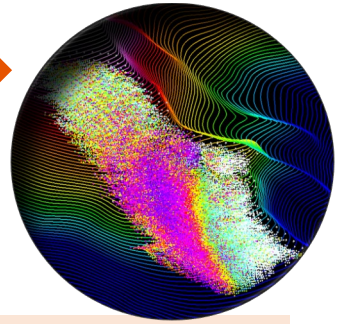
MAGNETOTELLURICS (MT) SURVEYS

MAGNETOTELLURICS (MT) SURVEYS



MAGNETOTELLURICS (MT) aims to produce a 3D resistivity model of the ground by recording naturally occurring electric and magnetic fields at the surface. Its depth of penetration ranges from tens of meters up to tens of kilometers.

The DIAS32-MT system is designed for the acquisition of MT time series. Capable of recording up to 19,200 samples per second, the system is equipped for the acquisition of Broadband-MT (BBMT), Audio-Magnetotellurics (AMT), and controlled-source AMT (CSAMT).

The system is an upgrade of the DIAS32 DCIP single-channel receivers and is based on the same wireless communication technology. Ultimately designed to be integrated into a combined 3D DCIP – MT acquisition, the receivers can also be used for MT-only surveys.

The wireless communication technology allows a geophysical operator to perform initial data quality control before recording data, through data streaming and ground resistance measurements.

DIAS32 MT ADVANTAGES

- Survey designs and optimization using 2D/3D forward modeling and inversion with SimPEG.
- Low-noise MFS07e magnetic induction coil sensors from Metronix Geophysics.
- A wide array of electrodes are available, from stainless steel for AMT surveys to non-polarizable porous pots for long period MT recordings.
- Low instrumental noise from the receiver.
- Complete flexibility on survey design (sparse magnetic sensors w/ high density electrics, high density E and H).
- Compact receiver design, easy to camouflage in sensitive areas, with a plug and play option to record from the interface without the need for a geophysical operator.

OPERATIONAL ADVANTAGES

- For long-period recording, data can be streamed without accessing the remote site.
- Lighter weight for hybrid MT layout (Telluric-Magnetotelluric, only TE mode for 2D surveys…), no need for a full acquisition unit at each station.

PRODUCTS

- EDI files – standard in MT community.
- Apparent resistivity maps.
- 2D sections/3D resistivity models
- Orientation information

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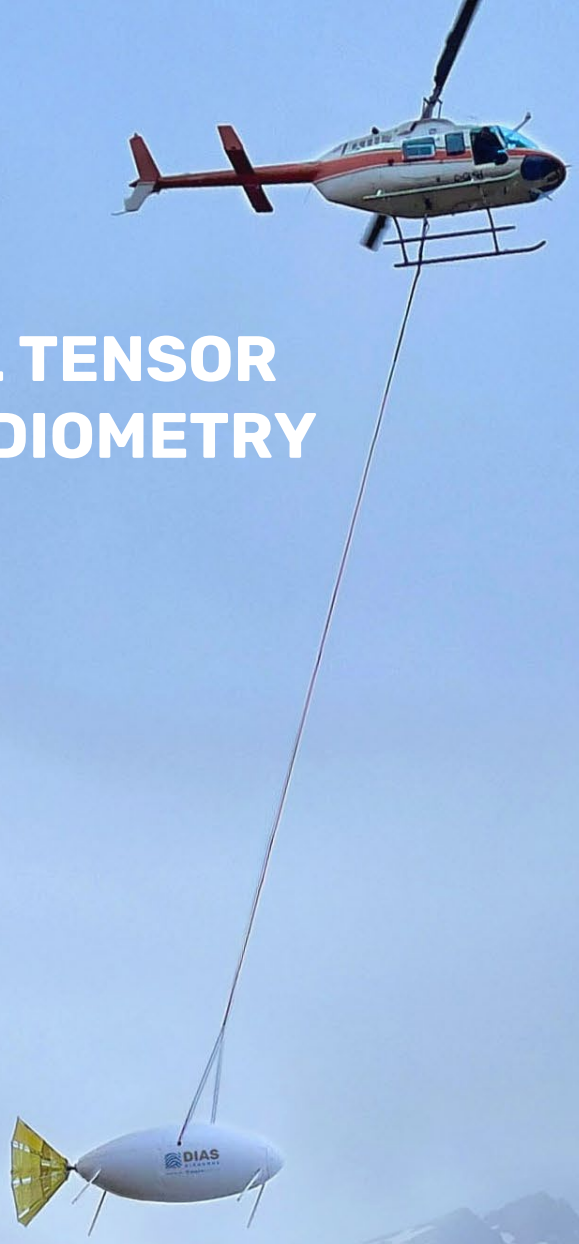
QMAG^{T}

AIRBORNE FULL TENSOR MAGNETIC GRADIOMETRY

SQUID-based airborne magnetics that delivers unrivalled magnetic field information



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QMAG^T

THE MOST ADVANCED HELICOPTER MAGNETIC SYSTEM

AIRBORNE FTMG SURVEYS

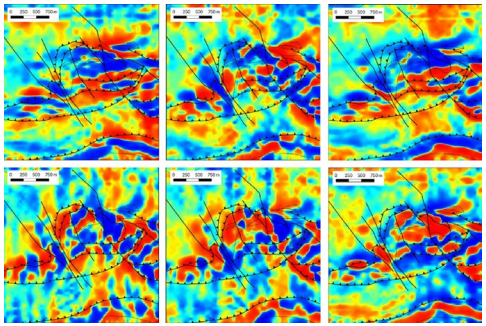
SQUID-based airborne magnetics that delivers unrivalled magnetic field information

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
- FTMG measurements determine on which side of the flight line a source occurs
- Better information on magnetization directions – the magnetic moment of compact sources can be directly calculated
- Redundant tensor components give inherent error correction and noise estimates
- Mapping of N-S features at low latitudes

PRODUCTS

- Tensor gridding
- Magnetization mapping
- Rigorous continuation and RTP
- Inclination deviation angle
- 3D inversion models
- High quality 3C magnetic products



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The QMAG^T technology will take magnetic mapping and interpretation to the next level. After over 50 years of measuring and interpreting the total magnetic field, the QMAG^T system will improve the interpretation of target location, geometry, orientation, and magnetization.

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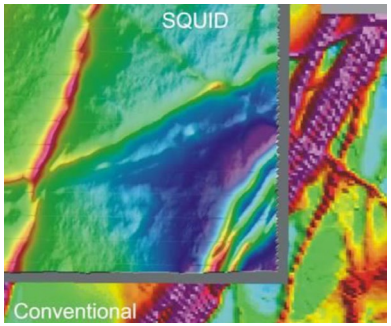
QMAG^{T}

AIRBORNE FTMG SURVEYS

THE MOST ADVANCED HELICOPTER MAGNETIC SYSTEM

The product of 22 years of R&D, the QMAG^{T} technology has a long track record of successful application throughout the world.



QMAG^{T} System Specifications

SQUID Sensor:	6 channels 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
Operating Temperature Range:	-10°C to +40°C
Cryostat Operation:	2.5 days after refill
Data Acquisition:	20 channels of 24 bit ADCs
IMU System:	3 fibre optic gyros, 3 accelerometers
Radar Altimeter:	Max of 3% or 0.5 m
Laser Altimeter:	+/- 1 to 2 cm typical
Total Bird Weight:	267 kg
Tow Rope:	Dyneema™ – 32+ m

SQUID sensor systems have revolutionized ground EM surveying – we expect the same advantages will be seen in airborne applications

The QMAG^{T} system can be combined with radiometric data acquisition for multi-parameter surveying

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Dias Airborne is a partnership between Dias Geophysical of Saskatoon, Canada, and Supracon AG of Jena, Germany. Dias Airborne offers QMAG^{T} and QAMT surveys.

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QAMT

AIRBORNE MT SURVEYS

Lightweight, airborne magneto-telluric system that delivers deep search, high resolution data

QAMT

AIRBORNE MT SURVEYS

ADVANCED HELICOPTER MT SURVEYING

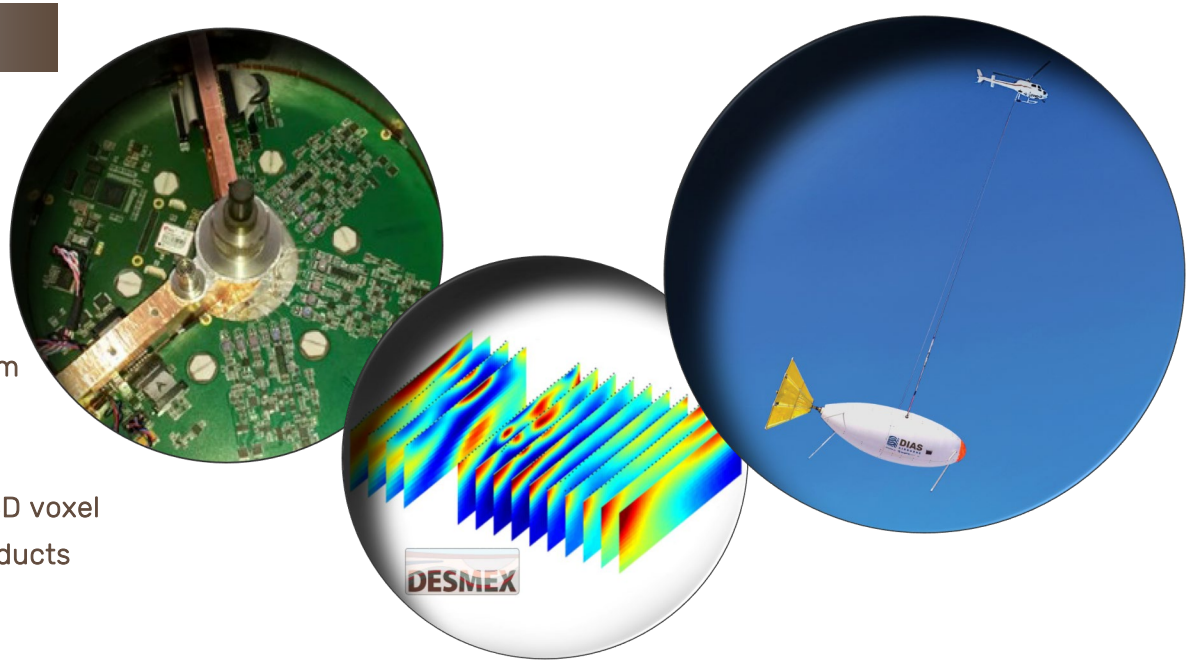
Lightweight, airborne magneto-telluric system that delivers deep search, high resolution data

QAMT ADVANTAGES

- Low-noise LT SQUID sensors
- 3C H-field measurement
- Lightweight towed bird
- Full-tensor base station
- Simultaneous 3C mag data

PRODUCTS

- Apparent resistivity maps from surface to depth
- 2D and 3D resistivity models
- Visualize in plan, section, or 3D voxel
- High quality 3C magnetic products
  - gradient maps – Bx, By, Bz
  - 3D inversion models



Natural field airborne EM methods have advanced significantly over the last decade. They are known to provide valuable information for deep targeting and large-scale mapping. With low-noise 3-component sensors, the QAMT system now provides a new standard of resolution and depth search capability.

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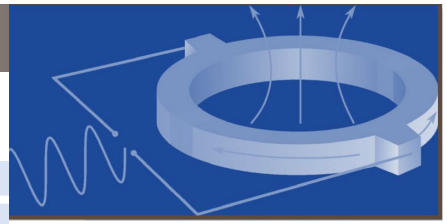
QAMT

AIRBORNE MT SURVEYS

ADVANCED HELICOPTER MT SURVEYING

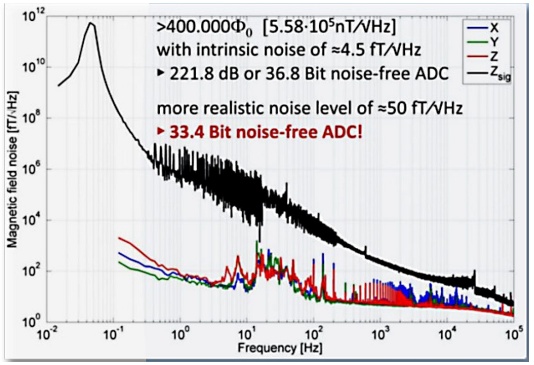
Single component passive EM systems do not provide certainty in resistivity imaging. With low-noise, 3C mobile acquisition, modeling of QAMT data sets can be done with greater confidence and will deliver clearer, deeper imaging.

QAMT System Specifications



SQUID sensor systems have revolutionized ground EM surveying – we expect the same advantages will be seen in airborne applications

SQUID Sensor:	3 channels orthogonal
Noise:	< 50 fT / √Hz
SQUID Electronic Band:	> 3 MHz
Operating Temperature:	-10°C to +40°C
Cryostat Operation:	2.5 days after refill
Data Acquisition:	2 MS/s and SNR > 34 bit
IMU System:	3 fibre optic gyros, 3 accel.
Radar Altimeter:	Max of 3% or 0.5 m
Laser Altimeter:	+/- 1 to 2 cm typical
Total System Weight:	267 kg
Tow Rope:	Dyneema™ – 32+ m



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Dias Airborne is a partnership between Dias Geophysical of Saskatoon, Canada, and Supracon AG of Jena, Germany. Dias Airborne offers QMAG^T and QAMT surveys.