



# MINERAL EXPLORATION



## SkyTEM for mineral exploration

SkyTEM has engineered the next generation of airborne geophysical electromagnetic systems designed specifically to deliver cost effective and time-saving exploration solutions. The information presented here illustrates the economic and technical benefits gained from fast acquisition and near real time delivery of high quality data that can serve to reduce exploration costs while maximizing exploration objectives.

SkyTEM has its roots in solving demanding problems through innovation. The technology is recognized and praised by scientists and governments worldwide as the technically unsurpassed HTDEM technology for mapping the subsurface in fine detail. For over a decade SkyTEM's high quality data has been used as the foundation for a wide range of earth studies and is now increasingly applied globally for mineral exploration. Not just a "bump-finder" SkyTEM delivers images of subtle changes in lithology from the very near surface to depth and at a dramatic increase in data acquisition and data delivery speeds.

SkyTEM introduced the first system capable of operating in MultiMoment mode that combines high resolution near surface data, previously only available with helicopter frequency domain, with the ability to map at depths of 400 m or more. This patented innovation allows for discrimination between weak geological contrasts giving a more complete and accurate interpretation of geology while increasing confidence in modelling deeper geological structure by illuminating any links between surface and depth. SkyTEM<sup>FAST</sup> is able to collect data at speeds approaching that of fixed wing aircraft and combined with 24-48 hour delivery of high quality data SkyTEM delivers effective and economic exploration solutions at a time when they are needed most.

## SkyTEM can detect, locate and map:

- Mineral deposits
- Aquifers
- Soil contamination
- Aggregates
- Fractures and faults
- Landfills
- Salt water encroachment
- Paleochannels
- Groundwater recharge
- Water depths (bathymetry)
- Oil and gas
- Site characterisation
- Landslide investigations
- Pre-construction planning

## SkyTEM maps high grade graphite

Noram Ventures June 2016 press release states: “the discovery was made on the basis of a SkyTEM survey conducted in 2012 and includes the highest grades found to date that are coincident with the strongest and most discrete SkyTEM conductive zones.”

## Xcalibur Airborne Geophysics Paper

“One needs exceptional quality airborne data from low-flying state-of-the-art systems to resolve the subtle kimberlite signature. We thank SkyTEM for the good data... It is a real pleasure to work with such data.”

## Geoforce paper about uranium “mapping”

SkyTEM “has a self-response below the natural noise level, and there is therefore no requirement for drift correction or levelling of the data. A recent SkyTEM survey at Pells Range has yielded results consistent with mapped geology and extensive drilling...and has provided clear targets for follow-up drilling.”

## Cost efficiencies from real near-time advanced deliverables

By taking full advantage of the rapid increase in acquisition speed and delivery of advanced products within 24-48 hours of acquiring the data, exploration budgets can be reduced in several ways. The ability to acquire over 1,000 line kilometres of data per day combined with Fast data delivery allows exploration managers to consider flying an area regionally, with wide flight line spacing and greatly reduced helicopter hours. Results from each days flying can be reviewed and geological trends and anomalies identified. Areas

of interest can be strategically targeted for infill lines or extended flight lines thereby reducing time in the field while maximizing exploration objectives. This is all done in one mobilization with crew and helicopter still on site as data is delivered.

The combination of speed of acquisition combined with tactical selection of flight lines contributes not only to efficiency and economic benefits but also to providing exploration management with near real-time data to make appropriate management decisions.

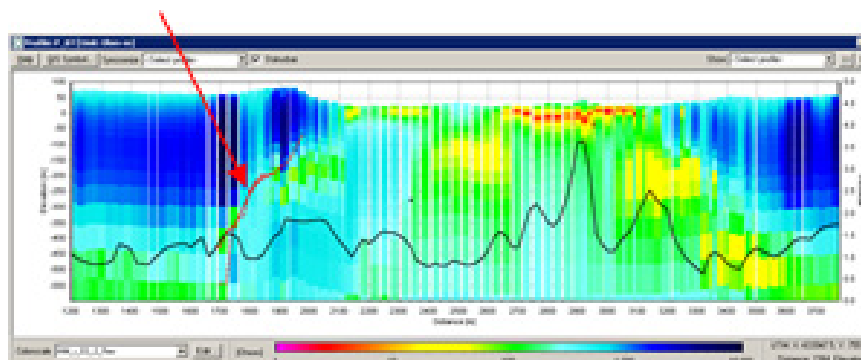
## Best of both worlds: High Dipole Moment (NIA) and High Signal to Noise Ratio (SNR)

TMAC Resources conducted a SkyTEM survey in the summer of 2015 over their Hope Bay and Elu gold mining project areas in Nunavut. The survey required the acquisition of 15,000 line kilometres of data to supplement previous exploration carried out on the Greenstone belt. The depth to known mineralization was in the order of 500 m or more so a high powered SkyTEM system was configured to operate with an

NIA of 1,000,000. In the figure, the SkyTEM resistivity data (blue) is in good agreement with an area of known mineralization at a depth of approximately 500 m.

The near surface was also well resolved and the shallow conductive feature (red) is interpreted to be an aquifer. The presence of readily available water in the area can be of benefit to future mine operations, or an environmental/social concern.

*Resistivity data for TMAC Resources*





## Truly versatile - smaller and smarter

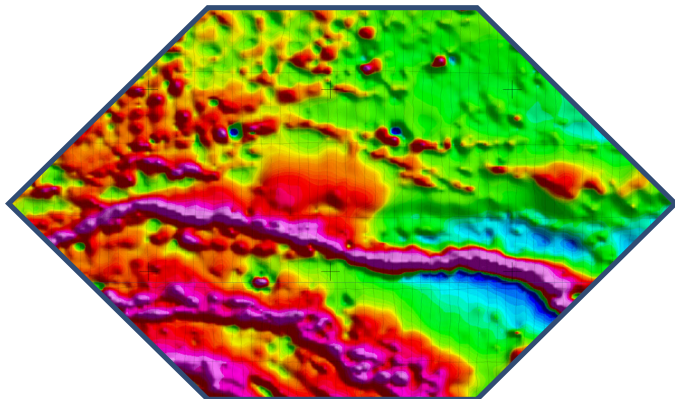
As conventional HTDEM systems focus on increasing the depth of investigation, an easy way to increase dipole moment (NIA) is to increase the transmitter loop area or number of turns of the loop. This has led to increasingly heavier arrays with additional weight leading to larger, more powerful helicopters being required to maintain flight performance characteristics and safety margins. Recent SkyTEM R&D has reduced the size and weight of systems while at the same time increasing the dipole moment (NIA) and the resulting depth of investigation (DOI). All SkyTEM systems are now available on a single 341m<sup>2</sup> rigid and light weight frame platform. This basic building block is then fully customizable for dipole moment and survey speed to suit specific exploration targets or manage safety risks such as hot climates or steep terrain. Just as flight line planning can be modified in the field given near real time data delivery, system specifications can also be modified and customized to maximize exploration results. For example, within a day

or less all SkyTEM systems can be changed – from Multi Moment to Single Moment with a focus on late time gates and greater depth of investigation to focus on deeper targets after completing a regional mapping survey, or, to a lighter configuration for flying in rugged terrain at high altitudes if the target area spans from valley floor to the tops of a mountain range. Exploration projects can sometimes require ultra high-resolution hydrogeological or geotechnical information in addition to geological information over different tenements in the area, and rather than deploying two systems, a configurable platform is more cost effective. In order to survey such widely differing exploration objectives, other geophysical contractors must utilize different technologies (FDEM, for example) to achieve the same result as SkyTEM. In addition, comparison of results obtained by these differing systems often makes for a more complex interpretation task. SkyTEM delivers a comprehensive and seamless data set.

SkyTEM offers a suite of systems, each customizable for dipole moment, speed, and altitude to suit specific targets and terrain

Advantages for the exploration sector include:

- Survey speeds up to 150 kph for reduced helicopter hours and time in the field.
- Near real time data. Optional 24-48 hour 1D inversions for quick review of data.
- Dipole moment (NIS) in excess of 1,000,000 with a high signal to noise ratio for deep mapping.
- One-time calibration procedure to minimize post-flight corrections for enhanced target and depth accuracy. Raw data is available for critical analysis.
- Ultra-light carbon fibre frames facilitate surveys in hot and humid conditions and increase manoeuvrability in rugged terrain.
- Delivery of calculated B-field, observed IP effect and streamed data.



## Select list of mineral exploration clients:

- Rio Tinto
- BHP Billiton
- First Quantum Minerals
- Golder Associates
- Aurora Minerals Group
- Nuna Minerals
- Oban Mining
- Soquem
- BHPB Iron Ore
- Sociedade Mineira de Catoca
- Alba Minerals
- Boliden
- TMAC Resources
- Geoscience BC
- Avannaa Resources
- Anglo American
- Graphite One
- Spar Resources