CORPORATE PROFILE

Airborne Geophysics for Mineral Exploration

Precision GeoSurveys

Specialists in high resolution airborne geophysical surveys in mountainous terrain

Highlights

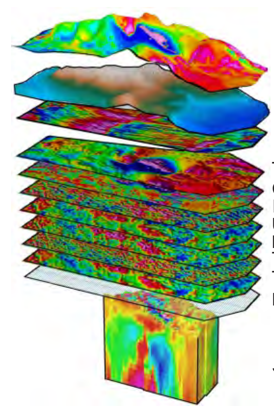
- Precision GeoSurveys is a full-service airborne geophysical contractor
- Industry leader in providing high resolution surveys in mountainous and remote terrain
- Experienced in electromagnetics, magnetics, and radiometrics
- Full capabilities in data acquisition, processing, inversions, interpretations, and integrations
- Experience across western North America in a wide variety of terrain and geological settings
- Dedicated helicopters specifically equipped for airborne geophysics
- Specialist airborne geophysical survey pilots enhance data quality and reduce delivery time
- Airborne geophysics provides consistent coverage over large areas
- Minimal permitting and environmental impact
- Year-round capabilities
- Self-sufficient survey operations
- Rapid turn-around of results

Precision GeoSurveys has flown over 200 high resolution geophysical surveys in mountainous and remote terrain on four continents. Services offered include airborne magnetic, gamma ray spectrometry, and electromagnetic surveys. Our expertise has been sought by a wide variety of clients in mineral exploration for gold, silver, copper, uranium, rare earth elements, diamonds, and groundwater.

Many mineral deposits have features which can be mapped with airborne geophysical methods. Every mineral deposit is unique, and the easy discoveries have already been made. Airborne geophysics is a powerful tool to provide exploration managers with data critical to help make decisions.

Precision uses state-of-the-art geophysical instrumentation operated by skilled technicians and geophysicists to collect high resolution data. Once the data are checked with an intensive QA/QC program, the data are processed. Preliminary data are usually delivered at the end of each day for immediate follow-up.

To maintain our position as a leader in providing high resolution airborne geophysical data in mountainous terrain, we are continuously developing new instrumentation and survey methods.



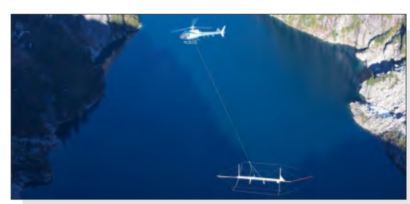
Simultaneous collection of multiple data sets allows quick and cost-effective evaluation of mineral potential

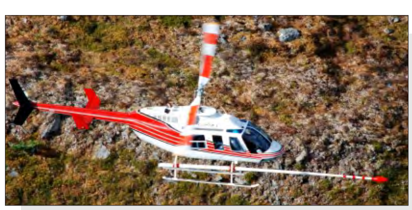
MAGNETICS

- maps the distribution of magnetic minerals
- useful for all types of geology and mineral deposits
- cost-effective
- applicable in all types of terrain

ELECTROMAGNETICS

- maps conductivity and resistivity
- particularly effective for massive sulfides
- can be applied to a wide variety of deposit styles
- consistent coverage over large and inaccessible areas





RADIOMETRICS

- maps the distribution of radioisotopes
- particularly effective for porphyries and REE
- easily combined with magnetics
- isotope ratios enhance detection of subtle features

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DESIGNING AN AIRBORNE SURVEY

Maximizing Value in Airborne Geophysics

Precision GeoSurveys

Highlights

Airborne geophysics is a powerful tool in mineral exploration

The main airborne technologies are:
- electromagnetics
- magnetics
- radiometrics

Not all geophysical technologies work in all environments

Appropriate technologies depend on:
- local geology
- exploration target
- budget
- terrain

Line spacing and flight height are determined by:
- budget
- local geology
- depth to target
- size of target
- terrain
- obstacle height

Lower flight height and higher line density will increase resolution

Survey lines should be perpendicular to geological strike

Near the equator, magnetic survey lines are flown N-S

Survey area should extend outside area of interest

Tie lines improve data through QA/QC procedures and leveling

Airborne geophysical surveys are used in a wide variety of geological, mineral exploration, oil exploration, and geotechnical applications to investigate the subsurface. In mineral exploration, airborne geophysical surveys are commonly used in early to mid-stage exploration projects for a wide variety of minerals and have contributed to the discovery of many ore deposits. Advances in sensor design, digital data collection, computer processing, and GPS navigation have revolutionized the way geophysical surveys are carried out, data are processed, and the results are interpreted. Airborne geophysics has never been more efficient or more affordable.

Many mineral deposits have features which can be mapped, directly or indirectly, with airborne geophysical methods. Every mineral deposit is unique, and the easy discoveries have already been made. Airborne geophysics can help provide exploration managers with data critical to help make decisions. An exploration manager must consider many variables in geology, deposit style, technology, logistics, terrain, and budget to maximize value in the survey investment.

Airborne surveys offer uniform coverage over a large area at much lower cost than an equivalent ground survey. The flight height and line spacing determines the resolution of the data and cost of the survey per unit area.

Not all mineral deposits respond to all types of geophysics. The right technology and the right survey parameters must be selected for the survey to be effective.

Deposit Type / ***Geophysical Method***	Magnetic	Electro-magnetic	Radio-metric	Gravity
Kimberlite	Highly effective	Moderately effective	Moderately effective	Moderately effective
Lode Gold	Highly effective	Moderately effective	Moderately effective	Ineffective
VMS	Highly effective	Highly effective	Moderately effective	Highly effective
MVT Pb-Zn	Highly effective	Moderately effective	Ineffective	Highly effective
Porphyry Cu-Au	Highly effective	Moderately effective	Highly effective	Moderately effective
Uranium	Highly effective	Moderately effective	Highly effective	Moderately effective
IOCG	Highly effective	Highly effective	Highly effective	Highly effective
Magmatic Ni-Cu	Highly effective	Highly effective	Ineffective	Highly effective
REE	Highly effective	Ineffective	Highly effective	Ineffective
Cost $/km^2	200-400	400-700	150-350	400-800

● *Highly effective* ● *Moderately effective* ● *Ineffective*

Generalized applications of airborne geophysical methods to mineral deposit types. Cost is based on 200 m line spacing by helicopter, and will vary according to job size, topography, and location. Combining different technologies will reduce cost but may reduce data quality.

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MAGNETICS

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Why use Magnetics?

Aeromagnetic surveys map the Earth's magnetic field

Earth's magnetic field is affected by the distribution and concentration of magnetic minerals in the subsurface

Many mineral deposits are related to variances in magnetic minerals which can be mapped by aeromagnetic surveys

Useful for mapping of lithology, structure, and alteration

Applicable to most types of mineral deposits and geological settings

Modern magnetometers are lightweight, reliable, and very accurate

Aeromagnetic surveys are cost-effective exploration tools, especially for early to mid stage projects

Stinger mag with 3D compensation provides high resolution data in mountainous terrain

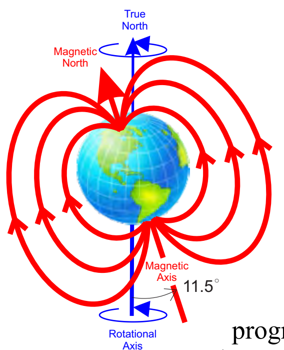
Gradient mag is useful for shallow targets in gentle terrain

Towed mag is best suited for flat terrain

Aeromagnetics -

Useful in a wide variety of exploration targets

The Earth's magnetic field is generated primarily by sources in the core. It is influenced by many factors, including the distribution and concentration of magnetic minerals in the subsurface, primarily magnetite and pyrrhotite, as well as man-made objects containing iron or steel.



Most mineral deposits are related to changes in the concentration and distribution of magnetic minerals. Therefore, magnetic surveys are very useful for mineral exploration programs, especially for early to mid stage projects.

With careful data collection and corrections for solar and regional effects, aeromagnetic maps show the spatial distribution and relative abundance of magnetic minerals in the survey area. Different rock types differ in their content of magnetic minerals to allow a visualization of the geological structure of the upper crust in the subsurface, particularly the spatial geometry of bodies of rock and the presence of faults, folds, and hydrothermal alteration zones. This is particularly useful where bedrock is obscured by surficial deposits of sand, soil or water. While some mineral deposits contain an abundance of magnetic minerals and are direct targets for aeromagnetic surveys, the most valuable contribution of aeromagnetic data in most mineral exploration applications is the identification of lithology, structure, and alteration.

Stinger-mounted mag sensor

Stinger Mag Specifications

Resolution (nT)	0.001
Compensation	3 axis
Sampling rate (Hz)	10 or 100
Gradient Tolerance	40,000 nT/m
Absolute Accuracy	<2.5 nT

High resolution magnetic survey near Juneau, Alaska

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RADIOMETRICS

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Mapping radioisotopes with gamma rays

Why use Radiometrics?

Most geological materials contain varying concentrations of the natural radioisotopes U, Th, and K

Radiometric surveys map the concentration and distribution of natural gamma rays generated by radioactive isotopes

Distinguishing between the individual isotopes is called gamma ray spectrometry

Many mineral deposits are related to distinctive changes in U, Th, and K concentrations

Gamma rays are attenuated by mass, therefore, radiometric surveys map isotope concentrations at the Earth's surface

Low level flights enhance resolution

Particularly effective for porphyry exploration, uranium exploration, and REE exploration

Also used for mapping potassic alteration and soil types

Easy add-on with stinger mag survey, without compromising either data set

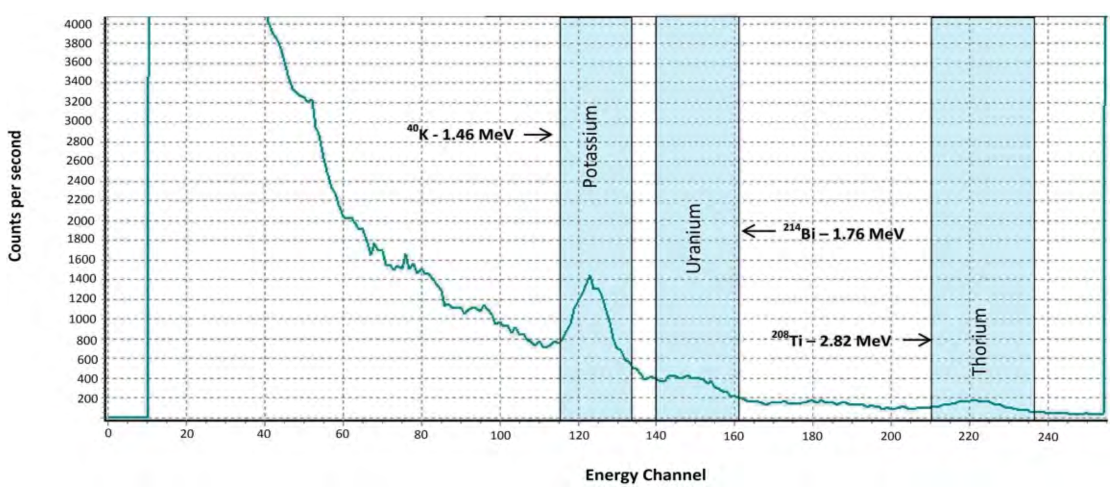
Almost all geological materials contain trace amounts of the natural radioisotopes uranium (U), thorium (Th), and potassium (K). The distribution and concentration of the radioisotopes is strongly influenced by many geological processes related to the formation of mineral deposits.

Gamma rays generated by radioisotope decay can be detected and mapped using spectrometers. Precision uses Scionix self-calibrating NaI(Tl) spectrometer crystals which measure the full spectrum of radioactive elements including U, Th, and K. The system records 256/512 channels to detect and map individual radioisotope sources for processing using PC-based Praga-3 software.

Maximum quality of radiometric data is achieved by increasing crystal volume and decreasing flight height. Most of Precision's surveys are flown with 8.4 to 21 liters of crystals within 50 m of ground level.

Radiometric surveys are particularly useful for mapping gamma ray sources associated with uranium and rare earth element deposits, and also for mapping K enrichments in potassic alteration zones in porphyry environments. Other applications are nuclear investigations and soil mapping. Gamma ray crystals can be added to stinger magnetic surveys without compromising either data set for a small incremental cost increase.

Spectrometer crystals installed in AS350 survey helicopter



Gamma ray spectrum from porphyry target in northern BC, measured at 40 m ground clearance. 256 channels identify individual radioisotopes, including distinctive potassium channel.

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ELECTROMAGNETICS

Precision GeoSurveys

Time Domain ElectroMagnetics
1TEM

Introducing the New Standard in Helicopter Time Domain Electromagnetics

Why use 1TEM?

EM is useful for mapping conductivity and resistivity in the subsurface.

Typical applications are mineral deposits, massive sulfides, graphite, kimberlite, and groundwater.

Search depth ranges up to 300 m below surface.

Lightweight design with single wrap of Tx loop

Powerful transmitter - 340 amps at 80 volts

Square wave and fast ramp-off time of 35 microseconds provide unsurpassed resolution for shallow and deep targets

Aerodynamic structure provides stability in mountainous flying conditions

Low polar moment of inertia permits tight turns in confined areas

1TEM is a third generation TDEM system ideal for collecting high resolution data in mountainous terrain

Very low noise data reduces filtering

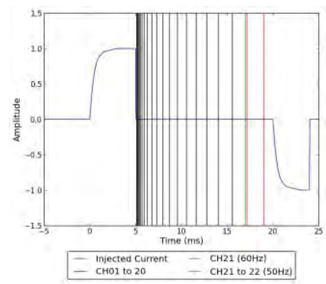
1TEM data are delivered in hours - not weeks or months

1TEM is designed for mapping changes in subsurface conductivity/resistivity related to mineral deposits, geology, alteration, silicification, and ground water. 1TEM measures the electrical conductivity of the ground below the sensor by inducing an electrical current into the ground. The transmitted 1TEM field induces a series of currents in the earth at increasing depths over time. These currents, in turn, create magnetic fields which can be measured to map

subsurface conductive properties. Because measurements are made while the transmitter current is turned off, the more sensitive measurement of the magnetic field generated by the subsurface enhances resolution of conductive features at great depth.

1TEM is an innovative third generation TDEM system developed by GeoSolutions Pty. Ltd. as REPTEM in Australia. A single wrap of the transmitter loop permits a very quick ramp-off time of 35 microseconds, which provides increased sensitivity in early time gates to significantly enhance spatial and vertical resolution. 1TEM's exceptionally high signal/noise ratio and true square wave form make it capable of measuring early time responses to enable accurate geological mapping of shallow features as well as deeper conductive responses from later time gates.

1TEM is a fully automated system operated from a helicopter platform which provides lower operating cost with a high level of safety. Extremely low-noise data require much less filtering than competing systems, and preliminary data can be delivered on the same day. Its simple lightweight design, low polar moment of inertia, and stable low drag aerodynamics in horizontal, climbing, and descending flight regimes make it well suited to operations in mountainous terrain without compromising power or resolution. This allows it to collect better data, especially in steep terrain, through longer survey endurance and close terrain draping while reducing survey costs.



Square wave form provides unsurpassed resolution, especially in early time gates

1TEM Specifications

Diameter (m)	24
Area (m^2)	375
Current (amps)	340
No. of turns	1
Moment (Am^2)	127,000
Duty Cycle (%)	25
Coil orientation	Z
Wave form	Square
Ramp-off time (µs)	35
Base frequency (Hz)	25/30
Weight (kg)	330

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