

ZTEM of GEOTECH AIRBORNE LTD

The ZTEM or Z Axis Tipper Electromagnetic system is an innovative airborne EM system which uses the natural or passive fields of the Earth as the source of transmitted energy. The Earth and Ionosphere, both conductive, act as a waveguide to “transmit” the source energy great distances. Due to the manner in which they propagate, these natural fields are planar and horizontal. Any vertical field is caused by conductivity contrasts in the Earth. The vertical EM field is referenced to the horizontal EM field as measured by a set of horizontal base station coils. The proprietary receiver design using the advantages of modern digital electronics and signal processing delivers exceptionally low-noise levels.



Features

- ZTEM data is closely related to resistivity/conductivity mapping of the subsurface.
- Passive EM technique – does not have a man-made transmitter.
- Frequency range – “audio range” Geotech’s airborne AFMAG can operate from 22 to 2800 Hz (depending on the signal strength).
- Superior Exploration Depth – over 2,000 metres from numerical simulation.
- Low Frequency of 22 Hertz for penetration through conductive cover.
- Excellent resistivity discrimination and detection of weak anomalies due to the nature of the natural EM fields.
- System is easily transportable – can be disassembled for packaging in relatively small units for shipping to surveys around the world.
- Two systems now available with over 20,000 line km of commercial surveys flown.

Specifications



Airborne Receiver

Geotech Z-Axis Tipper (Z-TEM)

Coil dimensions

7.4 metres diameter

Coil orientation

Horizontal (vertical magnetic dipole)

Digitizing rate

2000 Hz

The airborne loop is isolated from most vibrations by a patented suspension system and is encased in a fibreglass shell. It is towed from the helicopter using a 90 metre long cable. The cable is also used to transmit the measured EM signals back to the data acquisition system.

Base Station Receivers

The two base station receiver coils are set up perpendicular to each other. The orientation of both units is not critical as the horizontal field can be reprojected onto the two orientations of the survey flight.

Coil dimensions

3.5 metres each side

Coil orientation

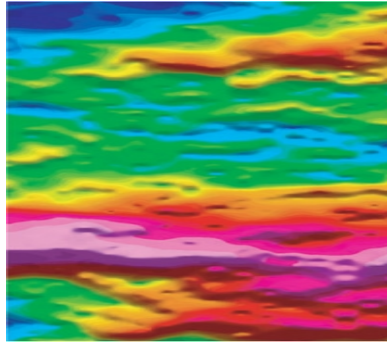
Vertical (horizontal dipole)

Attitude Measurement Sensors

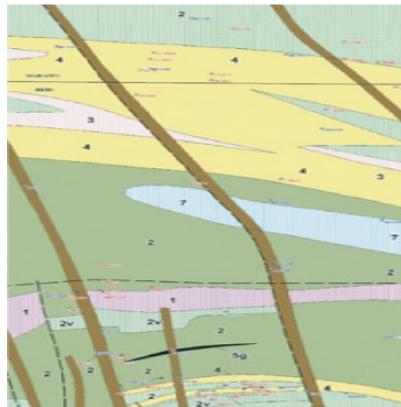
The attitude of the airborne coil must be monitored in order to remove the cross coupling between the horizontal and vertical EM field. Three GPS receivers are placed on the Z-TEM airborne coil. The data is processed using one of the GPS receivers as a moving base station and calculates the relative positions of the other two receivers to yield a very accurate attitude measurement.

Ontario Geophysical Test Range

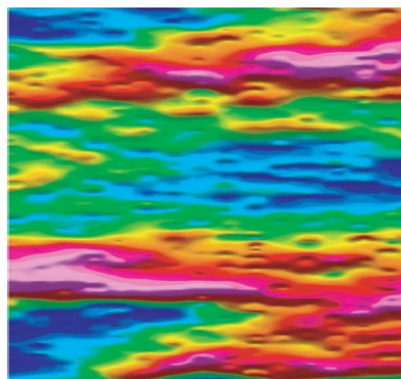
Z-TEM data showing good correlation with, and mapping of geology



Inline, inphase @ 49Hz 90 degree phase shifted



Simplified geology



Inline, inphase @ 247Hz 90 degree phase shifted