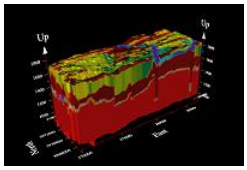
EMIGMA for Airborne TDEM and FDEM

Airborne TDEM software package is available as an add-on to other EMIGMA packages or as a standalone product. The package also includes the tools for or ground TDEM data. The airborne FDEM package includes the tools for ground FDEM.

In the airborne FDEM method, the transmitter and receiver coils are generally housed in a single case and are towed by a helicopter, whereas airborne TDEM transmitters are either attached to the fixed wings, nose and tail of an aircraft and a 3-component receiver is housed in a towed bird or the system has a towed transmitter with one or more receivers. EMIGMA provides configurations of helicopter TDEM systems for both central loop and Slingram styles as well as many configurations for ground TDEM systems.



Airborne FDEM and TDEM offer the advantage of collecting large amounts of data over a relatively short period of time. Being not limited by the geophysical survey size, EMIGMA allows for rapid airborne FDEM and TDEM modeling and inversion within a full contrast range from massively conducting targets in a resistive environment to resistive targets inside a conducting earth, for any number of plate, prism and polyhedra anomalies. EMIGMA is an excellent tool for survey design in addition to interpreting your data.

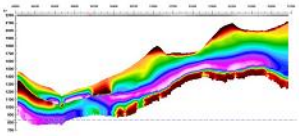
Click image to enlarge
Inversion volume

Data Import

- FDEM data imports from either ASCII or .qct files and some manufacturer's formats. As data is often delivered in a .gdb format, it can be imported to QCTool, manipulated and then the resulting .qct file may be imported very simply to EMIGMA.
- Airborne TDEM (VTEM, SKYTEM, Xcite, Genesis, TEMPEST and archived Fugro GeoTEM/MegaTEM/HeliGeoTEM/TEMPEST as well as AeroTEM) as ASCII or by .gdb through QCTool. QCTool is provided with the license. QCTool has the advantage of allowing easy QC/QA and data merging and cleaning of your survey prior to import to EMIGMA for interpretation

Data Processing and Correction

- 1D digital and spatial filters , 2D spatial filters
- Simple and weighted averaging decimation. As airborne data is often oversampled when compared to the height and size of Tx, it is best to decimate the data. Using a weighted average decimation reduces noise levels as it is decimating.
- Average duplicates, remove outliers, merge lines or surveys
- Data Spreadsheet tool combining dynamic spreadsheets and line plotter for data cleaning, missing data interpolation and simultaneous plotting of different data channels for fast cross-analysis



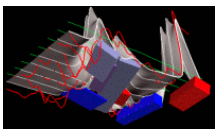
Click image to enlarge
Airborne TDEM Inversion

Data Display and Analyses

- Display of data over flight altitude variations, GPS positions
- Display of Apparent Resistivity as a surface or spatial contour
- PEXShow tool - 2D representation of geoelectric sections
- Display of section cutting of 3D models in the 3D Visualizer
- Grids: Natural Neighbor, Delauney Triangulation, Shepard, Minimum Curvature and Thin-Plate-Splines
- Contours: 2D and 3D surfaces
- Time decay rate and amplitude contours (TEM)
- Line plots
- Residual plots
- Overburden model removal processing
- For more detailed data display capabilities, see EMIGMA Complete

3D Modeling

- Two advanced thin-sheet plate algorithms
- Fast and accurate 3D simulations: model suite generation and batch mode
- Prisms, polyhedra
- New high accuracy sphere targets including inductive effects of magnetization
- Multiple body interactions
- Modeling of magnetostatic and galvanic magnetic effects in EM data
- Account for variations in resistivity, susceptibility and Cole-Cole parameters



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Combined 3D magnetic and EM modeling with data overlays and surface

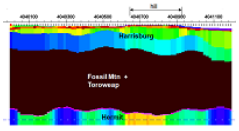
- Ability to handle full contrast between host and bodies
- Incorporation of altitude information
- Interactive 3D model building tool

1D FDEM Inversion

- Multi-Component and/or Multi-Frequency inversions, Inphase and/or Quadrature component/frequency selectable
- Smooth Occam joint susceptibility/resistivity inversion with fixed layer thickness with user defined starting models
- Sharp boundary Trust region Inversions - invert for thickness and/or resistivity
  - User defined starting models
  - User defined parameters for inversion
  - Full resistivity and thickness constraints
  - Spatial smoothing capabilities
- Incorporation of GPS_Z information

1D TDEM Inversion

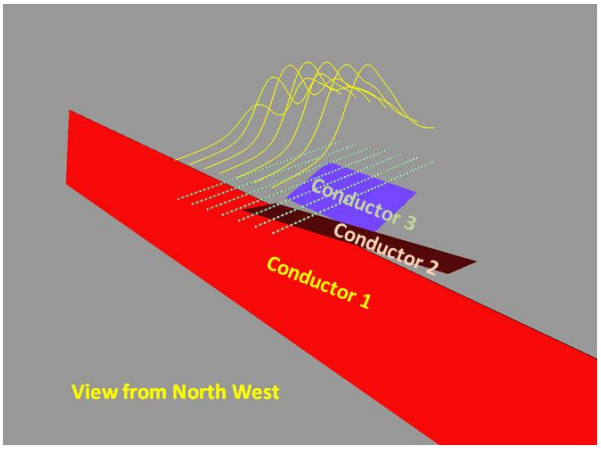
- 2 inversion techniques - Smooth Occam and sharp boundary Trust region styles
- 2 Forward techniques - approximate utilizing a causal transform and accurate using system response and bandwidth
- User defined starting model - multiple starting models allowed
- User defined inversion parameter and constraint definitions
- Multi-station, Multi-parameter, multi-separation inversions allowed
- Spatial inversion weighting
- Production orientated - inversions saved at regular intervals, inversion parameters saved to recoverable log files, inversion progress outputs, intermediate stops and restarts allowed



Click image to enlarge
Arizona VTEM Inversion

3D TDEM/FDEM Inversion

- Inductive Thin-Sheet plate inversion
- Multiple plates, multiple sources, multiple separations, multiple components
- Background response can be included
- User defined starting model
- User defined inversion parameters and constraint definitions
- Speeds up and improves accuracy of your conductive target interpretatons



FDEM CDIMAP

- Apparent Resistivity Tool - a half-space mapping technique for generating apparent resistivities as a function of frequency
- Sengpiel Depth-Sections - a resistivity pseudosection technique for generating resistivities as a function of pseudo-depths

Export

- Inversions exportable as volumes, sections or depth slices to ASCII or QCTool file
- Model/Inversion data export to XYZ ASCII, .GBN, .QCT
- Export to EMIGMA database for interpretation sharing
- 3D models may be exported to CAD format and voxel formats.