

## EMIGMA V8.x Premium and Professional Series

### EMIGMA FOR MAGNETICS

Magnetics interpretation is available in the EMIGMA Complete packages, both Premium and Professional, as a standalone product or as an add-on to other EMIGMA licenses.

Airborne Magnetic Surveys are supported by the Premium Series only.

**Unlimited Survey Size with Premium!**

**Up to 50,000 data points per survey with Professional!**

#### **Database Structure**

- True database design
- Full integration of survey, processed and modeled data
- Allows a single database to hold many different surveys
- Many different survey designs
- Ground, airborne, borehole surveys

#### **DATA IMPORT**

- TotalMagneticIntensity, TMI Gradients and DC 3 Component vector
- Data is natively stored in database
- Ground, Airborne and Borehole data

#### **DATA PROCESSING**

- 2D FFT tools for:
  - Wavelength/wave number filtering
  - Upward/downward continuation
  - Derivative generation (any order)
  - Reduction-to-the-Pole (3 approaches)
  - Analytic Signal
  - Horizontal Analytic Signal
- 1D, 2D spatial and digital filters
- Data correction and trend analyses tools
- Magnetic Base Station correction
- IGRF Corrections
- Tieline corrections

and

- Advanced Aeromagnetic Compensation as standalone or add-on

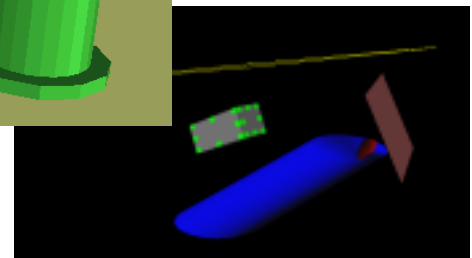
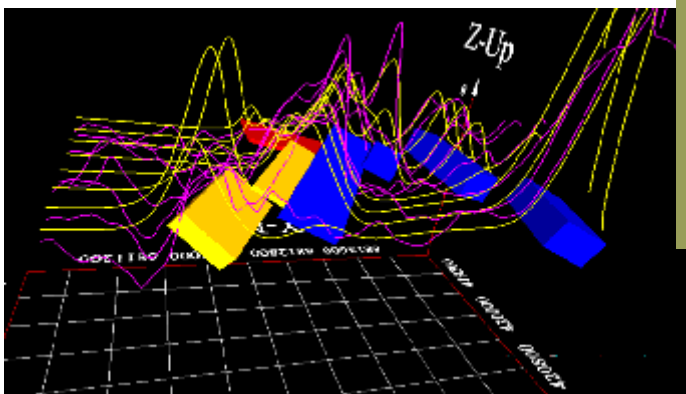
## 3D MODELING

EMIGMA contains two 3D modeling techniques. 2D modeling can be done by simply making the 3D structures have as long as desired (no limits on strike extent). There are 2 fundamental approaches to induced magnetic modeling – the traditional weak (Born) approach where the induced magnetization is parallel to the earth's field and a more comprehensive non-linear approach (LN).

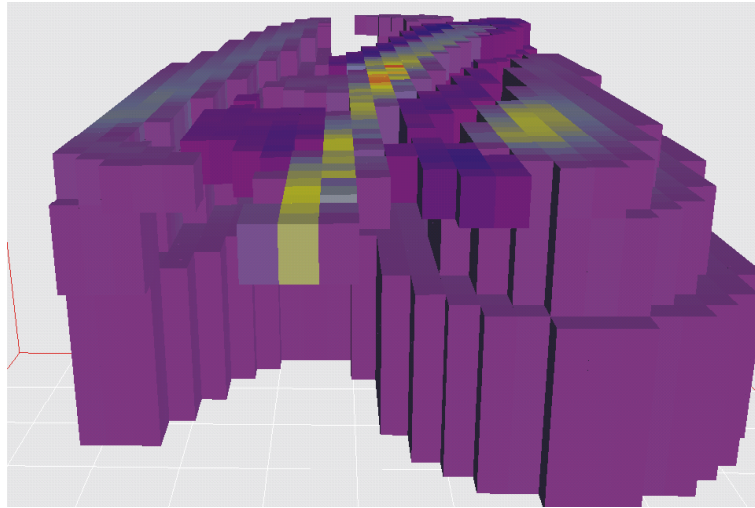
*PetrosEikon's* Magnetic LN algorithm is an extension to the current gathering LN algorithm for prisms or polyhedra to include magnetic field gathering effects due to induced magnetization.

Our implementation of DC magnetic modeling is unlike the majority of techniques available at present. By extending the LN technique to magnetic effects, we are able to model interactions not only between multiple bodies, but also within a single body (so-called demagnetization effects). We also provide magnetic body interactions but with internal weak (Born) induced field.

- Modeling of large data sets
- Fast and accurate 3D or 2D simulations: model suite generation and batch mode
- Unlimited prism and polyhedra targets  
*NEW Polyhedra: pipes (hollow cylinders with or without lids), ellipsoids, shells, bullets, landmines, drums, spheres, general polyhedra...*
- Accurate for both small and large susceptibilities
- Permanent magnetization effects
- Magnetic body interactions
- Non-linear effects, demagnetization, magnetic channeling, remanent effects
- Direct quasi-analytic derivative calculation
- Topography effects
- Model building tool in 3D visualization tools



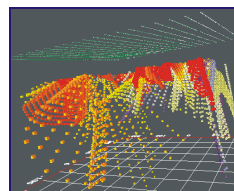
## 3D MAGNETIC INVERSION



- 3D volume modeling of susceptibility with linear and non-linear inversion tools:
  - Optimization & Matrix Inversion Techniques
  - Physical sensitivity functions
  - Iterative non-linear solutions
  - Iterative born approximations
  - Suite of minimization techniques
  - Magnetization Vector Inversions
  - Topographic effects
- Removal of non-susceptible cells
- Use of derivatives in inversion
- Magnetization Vector Inversions
- Full 3D gridded inversions
- inversion cells within topography

## 3D Extended EULER DECONVOLUTION

- Statistical and Rodin post-processing
- 2D and 3D visualization of Euler solutions

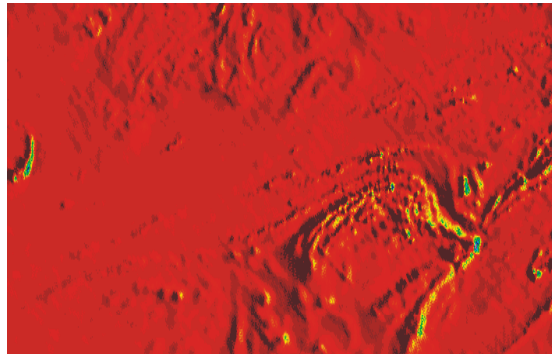


## GRADIENTS

- Leveling with vertical gradients
- Derivation of gradients from TMI
- Enhanced contouring with horizontal gradients
- Measured gradients for inversion and depth estimation

## DATA DISPLAY AND ANALYSES

- 3D surfaces
- Gridding with 5 algorithms: Natural Neighbor, Delauney Triangulation, Shepard & True-to-Data, Minimum Curvature and Thin-Plate-Splines
- Contoured 2D and 3D surfaces
- Line Plots
- Residual Plots
- Grid differencing



**Derived Horizontal Derivative**

## UXO/Geotechnical/Archeological Tools

A variety of EMIGMA tools can be utilized for these applications:

- Gridding: EMIGMA utilizes a variety of tools built around its high-resolution interpolation techniques for identification and analyses of the data and discrimination of small magnetic objects from background geology
- 2D FFT filters: These tools are built around EMIGMA's ability to produce high resolution grids. Wavelength filtering, upward continuation, RTP and grid differencing techniques all allow analyses for discrimination between geology and small magnetic objects.
- The 3D extended Euler solutions give accurate spatial and depth estimates on small objects
- The Magnetization vector inversion technique provides an estimate of the location, strength, depth and orientation of the main dipole response of the UXO or geotechnical anomaly.
- Integrated modeling of "small" and "large" 3D objects with either weak or strong magnetization both induced and permanent allows trial and error determination of object size, shape, orientation and magnetic properties.