Comprehensive modeling, inversion and interpretation of potential field data

CGG’s powerful software for processing, inverting and interpreting potential field data is able to model a large variety of structures, ranging from simple 2D modeling to full 3D modeling of salt domes and reefs. Our earth modeling systems use sophisticated computer algorithms, multiple geophysical data stores, and sharp graphic displays to create, analyze and verify integrated seismic, gravity, magnetic and geological interpretations. Whether dealing with line-oriented or randomly spaced data, our software provides the explorationist with suitable tools to deliver a rapid and accurate model of the subsurface.

The industry leader in potential field software
- Interpretation software: 2D and 3D suite
- Magnetic depth estimates
- Grid analysis
- Processing software
- Specialized modules for 3D visualization and for terrain correction computation

The software runs on Linux platforms.

Our customer service includes:
- Full software maintenance program
- Updates and user group meetings
- Technical manuals and training
- On-line support

Traditional 2D modeling with Talwani polygons.

Extended 2D modeling with variable density definition and embedded seismic data.
Potential Field Software

Interpretation software: 2D earth modeling
Variable density definition for Talwani polygons is the newest addition to our sophisticated group of algorithms aimed at obtaining accurate 2D models from gravity and magnetic data. The use of seismic data to constrain the results from potential field data is facilitated by the simultaneous display and edit of a cross-sectional earth model in time or depth, with dynamic linking of two screens containing seismic and potential field data.

2MOD™ - 2 and 2.5 dimensional gravity/magnetic field modeling program
2MOD features include:
• Tensor gradient calculations
• Easy import of standard grid formats, GXF, GMT and USGS grids
• Built in map view for observed gravity/magnetic data
• Dynamic linking of cross section and map view
• Customized rock properties database
• Ability to quickly extract profiles from a map to represent observed profiles for 2D modeling
• Simultaneous views of depth and time models with real time/depth conversion
• Variable density calculations

The 2D suite of the interpretation software includes:
MAK2MOD™: to create polygon models and to read seismic data for constraining the potential field model. MAK2MOD is also used to assign typical rock types and properties to the polygons-based model.

LCTSEIS™: to integrate and simultaneously display and edit seismic and potential field data in time or depth.

Interpretation software: 3D earth modeling
3MOD™ is an interactive, horizon-based program for producing realistic geologic models that satisfy known geologic, seismic, and observed gravity and magnetic data. A model displays as a series of stacked grids, each representing the depth to a particular geologic horizon. Density, susceptibility, and velocity are specified between these horizons in a variety of ways to create and alter the model.

3MOD features include:
• Superior reading of voxets for modeling variable density, susceptibility, or velocity
• Complex density or susceptibility properties, with optional definition of background density or magnetization
• Model editing along a cross section or in map view and local gridding

The 3D suite of the interpretation software includes:
MAK3MOD™: to assemble input data into 3D models.

a) 3MOD horizons and seismic data used to constrain the model, colored with density (red: higher density; green and blue: lower density). Calculated gravity (red trace) and observed gravity (green trace) are shown above. Map views show: b) the calculated gravity; c) bathymetry; d) the deeper of the horizons highlighted in the seismic section.
**LCTSEIS-3D™**: to manipulate velocity and density voxets and to convert seismic velocity volumes to density volumes and vice versa.

**JI-3MOD™**: to simultaneously manipulate and invert gravity, gravity gradient and magnetic data.

### Magnetic depth estimates

**MAGPROBE™** is a powerful interactive tool for determining the position and comparison of multiple depth estimation methods.

**MAGPROBE** features include:
- Display of raw and filtered magnetic field data, derivatives, and gradients
- Fast computation of depth estimation filters
- Selection of magnetic body style and input field type for calculation
- User-defined parameters for selective display of the desired solutions and profile data
- Batch mode processing of lines available

**3DEULER™** is an interactive, three-dimensional gravity and magnetic field program for the deconvolution of gridded magnetic data and the automatic depth to magnetic source.

### Grid analysis

**GRDFFT™** is an interactive frequency-domain grid enhancement program. Users can enhance grid data using a diverse suite of standard and advanced wavenumber domain filters.

Filters include:
- Low, high and band pass
- Vertical/horizontal derivative or integrals
- RTP for high and low latitudes
- Differential RTP for large areas
- Upward and downward continuation from and to arbitrary surfaces
- Tilt angle filter
- Wiener noise removal

**GRDSDT™** provides a rich set of filters to bring out subtle features in gridded data sets. Compared to frequency domain filtering, spatial domain filtering is more robust to noise, suffers much weaker edge effects and can perform nonlinear transformations.

**GRDSDT** features include:
- Smoothing and restoration
- Polynomial fitting
- Automatic gain control
- Derivatives and sharpening
- Easy import of a variety of grid formats; multiple import/export grid file type options

Example of filtering enhancements in GRDFFT™.
Potential Field Software

Processing software
DATAPRO™ is our data processing system for line-oriented gravity/magnetic data which loads multiple format datasets and stores them in a coherent database.

GRIDPRO™ is our data processing system for gridded gravity/magnetic data which is able to interpolate randomly spaced data to rectangular grids.

Specialized modules – 3D Visualization
GMVISION™ is an interactive program for visualizing the three dimensional relations of all modeling files. GMVISION™ can read 3MOD files, SEG-Y volumes, magnetic depth estimate files, DATAPRO™ databases, cultural files, etc. and display them concurrently allowing the explorationist to better understand the relations between the various datasets.

GMVISION™ features include:
- Reading of 2MOD and 3MOD files
- Display SEG-Y data
- Density isolation by ranging
- Rotation and scaling
- Overlay of data
- Setting transparency

Benefits of CGG’s Multi-Physics imaging software include:
- Simultaneous display and edit of a cross-sectional earth model in time or depth, with dynamic linking of two screens containing seismic and potential fields data
- Real-time calculation and display of gravity and magnetic fields based on Talwani 2D and 2.5D polygonal bodies
- Variable density definition for Talwani polygons
- Computation of potential fields along irregular surfaces
- Support of SEG-Y and other seismic data formats
- Multiple format datasets loaded into a coherent database

Integration of seismic data and potential field data in GMVision™.